

## **Appendix 43**

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### **Whale Tail 2020 Groundwater Management Monitoring Report**

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## TECHNICAL MEMORANDUM

**DATE** 9 April 2021

**Project No.** 20148777-516-TM-Rev0

**TO** Eric Haley  
Agnico Eagle Mines Limited

**CC** Marie-Pier Marcil

**FROM** Dale Holtze / Jennifer Levenick

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### WHALE TAIL PIT PROJECT – 2020 GROUNDWATER MANAGEMENT MONITORING REPORT

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) received a Project Certificate No.008 from the Nunavut Impact Review Board for the development of the Whale Tail Pit Project, a satellite deposit located on the Amaruq Exploration Property. To comply with the Terms and Conditions No.15 and 16 included in the Project Certificate a Groundwater Monitoring Plan (GWMP) was developed that included commitments made with respect to submissions provided during the technical review of the FEIS (Agnico Eagle 2019). The 2020 groundwater monitoring program was completed in accordance with the requirements of amended water license no. 2AM-WTP1830 issued by the Nunavut Water Board (NWB) on 12 May 2020 following approval of the Whale Tail Expansion project.

This memorandum provides a compilation of the site-specific data collection in 2020 and the review of 2020 monitoring data undertaken by Agnico Eagle to meet the requirements established in the GWMP. Each of these requirements and the relevant sections of the GWMP that are addressed are described herein. Section 1 of the report summarizes the open pit and underground mine operations interacting with groundwater. Section 2 of this report provides site-specific data collected in 2020 including thermistor data (Section 3.1 of the GWMP), groundwater quantity data (Section 4.1 of the GWMP), groundwater quality data (Section 4.2 of the GWMP) and hydraulic head monitoring (Section 3.1 of the GWMP). Section 3 discusses the mine inflow monitoring data and presents a comparison of these data to model predictions (Section 5 of the GWMP).

#### 1.0 2020 OPEN PIT AND UNDERGROUND MINE OPERATIONS

The project consists of mining from the Whale Tail and IVR Pits and underground operations. Of these developments only Whale Tail Pit and the underground operations are expected to intercept saline groundwater. The IVR pit is in permafrost and is not expected to interact with the deeper groundwater flow system until closure, when the formation of the pit lake will slowly degrade the permafrost underlying the open pit.

The mining of Whale Tail Pit required the dewatering of the North Basin of Whale Tail Lake (North Basin) and the construction of the Whale Tail Dike (WTD). In 2020 WTD seepage was observed each month. Grouting activities associated with WTD were suspended in March 2020 based on the acceptable inferred seepage rate and the progress of the installation of the dike seepage interception system. Dewatering of the North Basin was completed by 15 May 2020.

Prior to dewatering, mining occurred in the portions of the Whale Tail Pit that are above the North Basin. The eastern portion is referred to as Quarry 1, and the western area as Whale Tail (Starter) Pit. During the dewatering period, Quarry 1, located in permafrost, was the established attenuation pond on site.

Starting in the spring of 2020, Quarry 1 and the Whale Tail (Starter) Pit merged to form the Whale Tail Pit. The Whale Tail Attenuation Pond, located in the Whale Tail Lake (North Basin) became the established attenuation pond in June 2020, collecting all contact water on site. Whale Tail Attenuation Pond will be the established attenuation pond until freshet of 2021, when the IVR Attenuation Pond is planned to come online.

In 2020, only Whale Tail Pit intercepted saline groundwater. The maximum depth of excavation was 81 metres above sea level (masl) (approximately 91 metres below ground surface) and the deepest point of the excavation within interpreted talik (unfrozen bedrock) was approximately 90 masl. The underground development in 2020 was fully within permafrost and no interception of groundwater occurred.

## **2.0 MONITORING DATA COLLECTION**

The following section documents monitoring completed to meet the requirements of Sections 3.1, 4.1 and 4.2 of the GWMP.

### **2.1 Westbay Sampling and Assessment of Groundwater Quality**

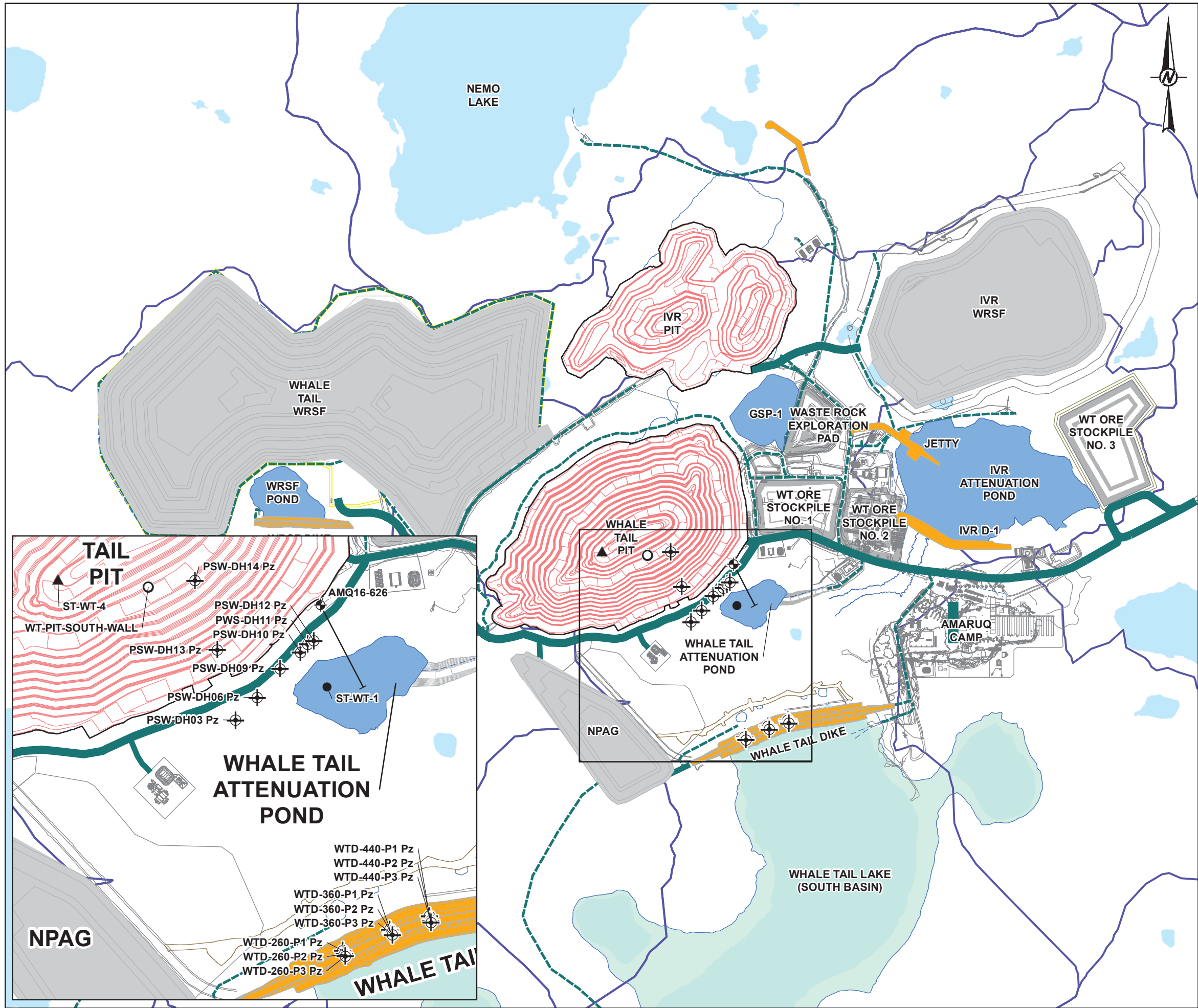
In accordance with Section 3.1 of the GWMP, hydraulic head measurements of the Westbay Well AMQ16-626 was undertaken in October 2020. During the visit, groundwater samples were also collected from Westbay Well 16-626 to continue to monitor the TDS and groundwater quality. A technical memorandum documenting this work, sampling results and historical monitoring from AMQ16-626 is included in Attachment A (Golder 2021a). The approximate location of AMQ16-626 is illustrated on Figure 1. The following presents a summary of the results.

Groundwater samples were collected from Ports 2, 3, 4 and 6 of AMQ16-626 in October 2020. During drilling and installation of the well, the drilling fluid was tagged with fluorescein. During collection of the water samples, the fluorescein concentration was measured to estimate the proportion of the sample attributed to drilling fluid versus formation groundwater.

Given AMQ16-626 had to be installed through permafrost, removal of groundwater for well development, purging and sampling must be carried out using a small volume sampler which substantially lengthens the time requirement for these activities for each port (months). The sampling program prioritizes key ports that optimized groundwater quality data collection, though each port is accessed for hydraulic pressure measurements. The rationale for ports selected for sampling is provided below.

- Ports 4 and 3 were targeted for sampling based on their port elevation relative to planned underground infrastructure and because these intervals had been previously developed in 2016 (i.e., drill water had been largely removed from the interval). These ports are used to assess groundwater quality for the Whale Tail Pit Project. Field activities prioritized obtaining representative samples of groundwater quality from Ports 3 and 4.
- Port 6 is interpreted to be located within the cryopeg zone (temperature below 0 degrees, but not frozen). In the cryopeg, groundwater has the potential to yield variable water quality even following periods of sufficient development because this zone is partially frozen, and salt concentrates in the liquid phase relative to ice. The liquid phase is likely preferentially conveyed to the sampling device. A groundwater sample was collected from Port 6 to compare against previous sampling results from this port.
- Ports 1 and 2 were sampled although they are still insufficiently developed, to document if, and the degree to which, the aquifer is being naturally flushed of the drilling water over time.

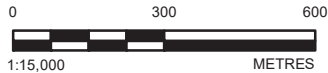
R:\TH\Yibumab\CAD-GIS\Client\Agnico\_Eagle\_Mines\_Ltd\Wahla\_Tail\99\_PROJECTS\2014877\3000\301\_0516\02\_PRODUCT\IONM\WD\Report\2014877\_5\_16\_01\_2020\_Groundwater\_Monitoring\_Locations.mxd PRINTED ON: 2021-04-07 AT: 11:04:28 AM



**LEGEND**

**GROUNDWATER MONITORING STATIONS 2020**

- WESTBAY SYSTEM
- PIEZOMETER
- POND
- SUMP
- WALL SEEPAGE
- ACCESS ROAD
- PIT
- ROAD
- WT WRSF CONTACT WATER COLLECTION SYSTEM
- DIKE
- POND
- WATERBODY
- WATERSHED
- WHALE TAIL LAKE (SOUTH BASIN)



**REFERENCE(S)**

- INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED SHOWING PLANNED WHALE TAIL MINE OPERATIONS TO 2025. DESIGN INFRASTRUCTURE HAS SINCE BEEN MODIFIED.
- WATERBODY DATA OBTAINED FROM PHOTOSAT.

DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

CLIENT



AGNICO EAGLE MINES LIMITED:  
MEADOWBANK DIVISION

PROJECT

2020 GROUNDWATER MONITORING PROGRAM  
WHALE TAIL PIT PROJECT, NUNAVUT

TITLE

2020 GROUNDWATER MONITORING LOCATIONS

CONSULTANT



YYYY-MM-DD 2021-04-07

DESIGNED DH

PREPARED CDB

REVIEWED DH

APPROVED JL

PROJECT NO.  
20148777

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516

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- Port 5 was never intended for groundwater sampling and was installed for pressure measurements only.

Groundwater quality at each port sampled was estimated using a mass balance calculation on analytical results and initial drilling brine composition to remove the proportion of residual drill fluid from the collected samples. The 2020 program estimated that groundwater quality at Ports 6, 4 and 3 is in the same range as estimated in 2016 (Golder 2016) and the water quality data collected from these ports were considered reliable. Port 3 is considered the most likely to be representative of the natural groundwater quality and salt content (total dissolved solids (TDS) concentration) because of the relatively low fluorescein concentrations at the time of sampling. TDS measured at Port 4 in 2020 was higher than previous measurements, but within the TDS profile of site groundwater. No changes to the TDS profile are warranted at this time. Given the continued high proportion of drilling brine remaining in Ports 1 and 2, an accurate estimation of formation groundwater quality at these Ports is not possible at this time. It is noted that electrical conductivity and fluorescein values at Port 2 increased throughout the limited 2020 development period.

The assumptions for the conceptual model, which were based on the 2016 data are consistent with the recent data collection in Ports 6, 4 and 3, and are therefore still considered to be appropriate. Changes to the management water plans are not considered necessary based on the data collected during the 2020 Westbay ell monitoring program.

## 2.2 Thermal Monitoring Related to Groundwater Flow Interpretation

Thermal monitoring at the Site is documented in the Whale Tail Pit Project Thermal Monitoring Report 2020, dated February 2021 (Agnico Eagle 2021), which is included in Attachment B for reference. Attachment C presents a subset of this data for the south wall of Whale Tail Pit and the Whale Tail Dike relative to piezometer hydraulic head measurements. The approximate locations of the thermistors are included in Appendix A of Attachment B.

AMQ17-1233 and AMQ17-1337 were located outside of the pit footprint and were intended to monitor permafrost conditions between Nemo Lake and Whale Tail Pit (verify the presence of permafrost and the restricted horizontal movement of groundwater below the active layer due to permafrost in the upper 450 to 520 m of bedrock). These thermistors are no longer functioning due to mining activity but were showing permafrost conditions until they stopped functioning in 2019. A new thermistor, IVR long TH 651A, was installed near IVR Pit in 2019. Data from this thermistor indicates the presence of permafrost and the restricted horizontal movement of groundwater since its installation.

Nine thermistors (PSW-DH2 TH through PSW-DH14 TH) were installed in 2020 to monitor the talik zone near the south wall of the Whale Tail Pit. These thermistors will be used to evaluate if during open pit mining and with the dewatering of the North Basin, the closed talik zone progressively freezes back. Data collected in 2020 confirms continued talik, but given the limited data set, continued monitoring will be required to evaluate temperature trends.

As part of the Whale Tail Dike Operation Maintenance and Surveillance manual, performance of the Whale Tail Dike (WTD) was monitored with thermistors located downstream and/or upstream (U/S) of the WTD (0+142, 0+190 U/S, 0+210, 0+260, 0+276 U/S, 0+310, 0+336 U/S, 0+360, 0+407, 0+543, 0+520, 0+607, 0+675, 0+710 U/S, 0+750, 0+772 U/S). Collected data does not indicate freeze back has occurred near the WTD since the dewatering of the North Whale Tail Basin; some permafrost degradation was noted at the abutments of the WTD but is not reported to have resulted in increased seepage to date (Attachment B).

## 2.3 Hydraulic Head Monitoring and Definition of Horizontal and Vertical Groundwater Flow

Hydraulic head data were recorded in 2020 from the Westbay Well AMQ16-626 (Attachment A) and from piezometers (refer to Figure 1) installed to monitor the south wall of the Whale Tail Pit and the performance of the WTD (Attachment C). The Whale Tail pit is located below the dewatered North Basin. The talik in the pit is closed at depth but transitions to open talik towards the South Basin due to the increased width and depth of Whale Tail Lake towards the south. Due to the dewatering activities, some freeze back of the talik in the North Basin is possible as mining progresses, and some alteration in vertical hydraulic gradients will have occurred.

As documented by thermal monitoring (Section 2.2), permafrost underlies the land surrounding the lake, which restricts the lateral flow of groundwater to the talik and restricts the recharge of the sub-permafrost groundwater flow system by precipitation. Groundwater flow is controlled by surface water elevations in lakes with open talik; water moves vertically through the open talik to the underlying sub-permafrost groundwater flow system. Local influences are observed due to dewatering of the North Basin and the Whale Tail Pit development.

For the Westbay Well AMQ16-626, hydraulic heads were derived from the formation pressures measured at each monitoring port installed along the well prior to development or sampling. The 2020 measurements of hydraulic head are lower than previous years, which reflects the dewatering of the North Basin and the mining of Whale Tail Pit. Hydraulic heads measured in 2018 and 2019 at AMQ16-626 showed a downward hydraulic head gradient was present prior to the mine development. In 2020, an upward hydraulic head gradient was measured between Ports 4 and 5, which is attributed to the dewatering of the North Basin of Whale Tail Lake and dewatering of Whale Tail Pit. A downward hydraulic gradient is still observed in the deeper Ports of the well, which indicates that while dewatering is causing flow from the South Basin towards the North Basin and Whale Tail Pit, the South Basin of Whale Tail lake also continues to recharge the deeper regional groundwater flow system. The downward hydraulic gradient observed in 2020 between Ports 4 and 1 is 0.001 m/m. This 2020 hydraulic gradient is less than what was measured prior to development (0.006 to 0.008 m/m), which reflects the influence of mining activities.

As part of pit and WTD surveillance monitoring, hydraulic data is collected from a series of vibrating wire piezometers installed near the south wall of the Whale Tail Pit and upstream and downstream of the WTD. Water levels are also monitored in the Whale Tail Lake Attenuation Pond, located between the WTD and the Whale Tail Pit. The approximate locations of the piezometers are illustrated in Figure 1 and the collected data is presented in Attachment C. This data will support future model recalibration efforts if required for the Project and support the understanding of changes in groundwater flow conditions between the South Basin of Whale Tail Lake and Whale Tail Pit as mining progresses.

Hydraulic heads measured in piezometers near the south wall of Whale Tail Pit decreased in response to mining of the Whale Tail Pit. Temporal variations are observed in the data in response to multiple influences, including precipitation, blasting and variations in surface water levels in the Whale Tail Attenuation Pond (identified as WTN on plots in Attachment C). The correlation of hydraulic heads measurements to surface water levels in the pond is strongest near the pond and diminish closer to the pit. Agnico Eagle noted the large water level fluctuation observed between 15 December 2020 and 22 December 2020 correlates to a period where water was discharged in the Phase 3 ramp or Pit South Wall instrument road.

Near the Whale Tail Attenuation Pond, and between the pit and the pond, downward vertical hydraulic gradients were observed at DH11, DH13 and DH13. Close to the pit, DH14 reverts to an upward hydraulic gradient, which reflects the influence of pit depressurization on the groundwater flow system.

## 2.4 Whale Tail Pit Inflow Quantity

### 2.4.1 Whale Tail Pit Sump

In accordance with Section 4.1 of the GWMP, pit inflow quantity during the 2020 Whale Tail Pit operations was monitored by Agnico Eagle. Water that accumulates in the pit sump consists of groundwater inflow, surface water runoff and direct precipitation. Total monthly volumes of water pumped from the sump during the winter months (i.e., October to April) is assumed to predominantly represent groundwater inflow as freezing temperatures restricts surface water runoff and the influence of direct precipitation.

The total and average daily volume of water pumped per month from the Whale Tail Pit sump in 2020 is presented in Table 1. Inflow rates to Whale Tail Pit in 2020 are influenced by release of water from storage, the proximity of the un-dewatered portions of the North Basin, and surface water contributions. As mining progresses and storage is depleted, steady-state flow conditions will develop. For 2020, flow measurements recorded in October, November and December (1,491 m<sup>3</sup>/day to 1,869 m<sup>3</sup>/day) are the best estimate of groundwater inflow rates to the Whale Tail Pit because surface water inflows should be minimal.

**Table 1: 2020 Monthly Total Volumes of Water Pumped from Whale Tail Pit Sump**

Operations	Month	Total Volume Pumped (m <sup>3</sup> )	Average Daily Volume (m <sup>3</sup> /day)
North Basin Dewatering Occurring	January	22,741	73
	February	9,395	324
	March	34,518	1113
	April	24,930	831
	May	0	0
Mining	June	119,659	3,989
	July	72,812	2,349
	August	46,294	1,493
	September	112,444	3,748
	October	57,836	1,866
	November	44,744	1,491
	December	57,945	1,869

**Notes:** m<sup>3</sup> = cubic metres; masl = metres above sea level

### 2.4.2 Seepage Surveys

As part of the GWMP, pit seepage assessments are to be completed twice a year for the first two years and once a year starting in the third year and continuing until the end of operations. In the first two years of pit development, one of the seepage surveys is to be conducted in early summer, following snow melt and any thawing of ice in the pit walls, and then again in late August. In the following years of mining, one survey will be conducted in August of each year. The objective of the seepage surveys is to identify preferential groundwater flow pathways in the walls of the open pit, if present, and to determine their relative contribution to the groundwater inflow to the pit with respect to water quantity and quality.

During 2020, Agnico Eagle monitored the presence/absence of groundwater inflow within the vicinity of the south side of the pit, which is the portion of the open pit within talik conditions. Agnico Eagle notes that seepage was not observed in the south wall until November 2020, when seepage was observed through a 5-metre vertical section and created an ice wall. In December 2020, following blasting of a deeper bench, water was observed through a

sub-horizontal joint at a rate of 90 m<sup>3</sup>/hr. This flow decreased over a few days with the wall freezing back and it is unknown what the sustained flow rate through this joint would be.

## 2.5 Whale Tail Pit Inflow Quality

In accordance with Section 4.2 of the GWMP, Agnico Eagle collected water samples from the following locations in 2020.

- Whale Tail Pit sump station ST-WT-4
- Whale Tail Pit seepage station WT-PIT-SOUTH-WALL collected from the south wall of Whale Tail Pit

Water from ST-WT-4 reflects the combined influences of groundwater inflow, surface water runoff and precipitation, and pit construction (blasting). Water quality measurements in the winter months (October to April) will be the most representative of groundwater, though some influences of blasting and mine excavation will be present.

Water from WT-PIT-SOUTH-WALL will predominantly reflect groundwater quality as it is direct seepage to the pit wall prior to mixing with surface water inputs. Given the proximity of the Whale Tail Pit to the Attenuation Pond and the South Basin of Whale Tail Lake, seepage to the south wall of the pit will be a mixture of saline groundwater present in the formation, seepage from the Whale Tail Attenuation Pond and seepage from the South Basin of Whale Tail lake.

Water quality from the Whale Tail Pit sump (ST-WT-4) and the Whale Tail Attenuation Pond (ST-WT-1) was monitored on a weekly basis (more frequently than the water license requirements of four times per calendar year) for Group 1 chemical parameters listed in Table 1 Schedule I of NWB Water License Number 2AM-WTP1830 and for additional parameters of interest including electrical conductivity, major ions (total calcium and total magnesium), select dissolved metals, ortho-phosphate and total phosphorus. Field measured parameters including dissolved oxygen, electrical conductivity, pH, temperature, and turbidity were recorded during sampling. A summary of the TDS and chloride measured at ST-WT-4 and ST-WT-1 is presented in Attachment D. Additional data comparison for other parameters of interest are included in the Whale Tail Pit Project Site and Downstream Receiving Water Quality 2020 Annual report (Golder 2021b). It is noted that ST-WT-4 samples were not analyzed for bicarbonate alkalinity, carbonate alkalinity, dissolved organic carbon, potassium, sodium, reactive silica, total kjeldahl nitrogen and total organic carbon as required under the GWMP.

The seepage sample (WT-PIT-SOUTH-WALL) was collected on 19 November 2020 by Agnico Eagle from the south pit wall, at an elevation of about 99 masl (UTM Zone 14W, easting 606847 metres and northing 7255399 metres). This seep location is shown on Figure 1. The seepage sample was collected from wall runoff directly below the observed flowing fracture and analyzed for the Group 1 chemical parameters listed in Table 1 Schedule I of the water license and for additional parameters of interest including electrical conductivity, major ions (total calcium and total magnesium), select dissolved metals, ortho-phosphate and total phosphorus. No accessible open fracture could be located that was suitable for the insertion of a piece of low-density polyethylene tubing, which can be used to prevent the sample from contacting the atmosphere or exposed pit wall (which may contain residuals associated with blasting and loading from the exposed rock). The full suite of analytical results for WT-PIT-SOUTH-WALL are included in Attachment D. Similar to ST-WT-4, seepage sample WT-PIT-SOUTH-WALL was not analyzed for bicarbonate alkalinity, carbonate alkalinity, dissolved organic carbon, potassium, sodium, reactive silica, total kjeldahl nitrogen and total organic carbon as required under the GWMP.



TDS measured in the sump is variable throughout 2020 ranging from approximately 15 mg/L to 867 mg/L. The variability reflects a complex mine development sequence on-site in 2020 related to WTD construction, dewatering of the North Basin, surface water and pit wall runoff, and pit construction. In general, the TDS is higher in the pit sump than is observed in the Whale Tail Attenuation pond, which may reflect combined loading to the pit sump from mine construction/blasting, pit wall and surface water runoff, and groundwater inflow.

TDS measured in late 2020 (October to December) and from the seepage wall sample is likely the closest estimate available of the TDS in the groundwater inflow to the pit, as contributions from other sources will be lower given the freezing conditions. The groundwater inflow will be a mixture of saline formation groundwater, seepage from the Whale Tail Attenuation Pond, and seepage from the South Basin. The TDS measured in the pit sump (ST-WT-4) in October to December 2020 ranged from approximately 200 to 400 mg/L and is generally lower than the first nine months of the year. The TDS measured in the Whale Tail Attenuation Pond (ST-WT-1) in October to December 2020 ranged between 9 mg/L and 222 mg/L. Similar to the pit sump, the TDS data is variable.

### **3.0 COMPARISON TO MEASURED VERSUS PREDICTED GROUNDWATER INFLOW AND TDS GROUNDWATER QUALITY**

#### **3.1 Predicted Groundwater Inflow and TDS Water Quality**

Table 2 presents a summary of the predicted average annual groundwater inflow to the Whale Tail Pit during operations, as documented in the updated FEIS Environmental Assessment (EA) Scenario (Golder 2019). Water discharging to the pit is a mixture of saline formation groundwater, seepage from the Whale Tail Attenuation Pond, and seepage from the South Basin of Whale Tail Lake. TDS values presented in Table 2 only account for TDS from saline formation groundwater. Contributions of TDS in the groundwater from attenuation pond seepage and seepage from the South Basin are assumed to be zero, though some loading will be present. TDS from these loading sources, and the direct influences of surface water additions in the pit (runoff and precipitation) are not simulated in the groundwater model and are instead accounted for in the Site-Wide Surface Water Balance and Water Quality Models. This means that predicted TDS values in Table 2 from the groundwater model will be lower than the TDS measured directly in the sumps and seepage wall samples, as these samples include TDS loading from the Whale Tail Attenuation Pond and South Basin of Whale Tail Lake (which are not zero). The Whale Tail Attenuation Pond is somewhat of a feedback loop as flow from the pit is pumped to the pond, where it mixes with other water and a portion reinfilters and seeps back to pit. The Water Balance and Water Quality Models account for this mixing.

**Table 2: Predicted Groundwater Inflow and Groundwater Quality During Mining of Whale Tail Pit**

Phase	Simulated Time Period	Whale Tail Pit Modeled Predictions – EA Scenario			
		Groundwater Inflow (m <sup>3</sup> /day)	Groundwater Inflow TDS Concentration (mg/L) <sup>1</sup>	Portion of Inflow from Attenuation Pond (%)	Portion of Inflow from South Basin of Whale Tail Lake (%)
Lake Dewatering (Q1-Q3)	2019	1,330	80	NA	NA
Mining	August – December 2019 <sup>2</sup>	970	120	1%	<1%
	2020	1,170	50	64%	<1%
	2021	1,320	30	79%	3%
	2022	1,360	20	81%	9%
	2023	1,360	20	82%	12%
	2024	1,350	10	82%	14%
	2025	1,350	10	82%	15%

**Notes:**

NA = not applicable; TDS = total dissolved solids; m<sup>3</sup>/day = cubic metres per day; mg/L = milligrams per litre; % = percent;

<sup>1</sup> TDS concentrations do not account for loading from the South Basin of Whale Tail lake and Whale Tail Attenuation Pond (model assumes a TDS of 0 mg/L for these seepage sources). TDS from these sources to be accounted for in Site Wide Water Quality analysis.

<sup>2</sup> Mining prior to Q4 2019 was anticipated to be within permafrost and groundwater inflow was predicted to be negligible.

## 3.2 Comparison of Model Predicted Values to Measured Values

In accordance with the GWMP, measured groundwater inflow rates are to be compared to model predictions on an annual basis. If significant variations from model predictions are observed, the assumptions behind the data will be reviewed and the analysis updated if required. In addition, updates to the groundwater model will be made if operational changes occur as the open pit advances which could significantly alter groundwater inflow or groundwater quality (TDS).

Variations that would be considered significant and that would be trigger a review of the data include:

- Groundwater inflow quantity to the mine, based on rolling monthly average of inflow over six consecutive months, is 20% higher than predicted groundwater inflow. The six-month averaging period of observation is based on observed seasonal variations in inflow quantities in mines situated in continuous permafrost regions, where half the year there is virtually no surface water component of flow to the pit.
- Collected water samples that indicate that the TDS is more than 25% higher than the estimated water quality, based on a 6-month rolling average.
- Temperature profiles observed in the sentinel thermistors (AMQ17-1233 and AMQ17-337) located between Nemo Lake and Whale Tail Lake are showing sign of permafrost degradation below the active layer.
- Observed inflow quantity and quality is lower than expected would not be of concern and/or effect water management plans on-site. Model updates or analysis would therefore not be conducted if predicted inflow quantity and quality is higher than observed conditions.

Model predictions presented in Table 2 (Section 3.1) assumed dewatering of the North Basin would be complete in 2019 and that a pit bottom elevation of 123 metres would be reached in 2020. Based on 2020 mine activities,

however, dewatering took longer and continued into May 2020. This means that for a significant portion of 2020, portions of the lake were still not dewatered and in proximity to the pit, which was not simulated in the groundwater model, and may result in higher than predicted inflows. It also means that following complete dewatering, some transient storage changes may still be occurring in the second half of 2020 in response to both mining and North Basin Dewatering. Model predictions in Table 2 also assumed the pit would only reach a pit bottom elevation of 123 metres in 2020, when, a localized area of the pit reached 90 masl in an area of inferred talik. This is deeper than assumed in the numerical model and may contribute to higher than predicted 2020 inflows.

Flow measurements recorded in October, November, and December (1,491 m<sup>3</sup>/day to 1,869 m<sup>3</sup>/day; average of 1,745 m<sup>3</sup>/day) are the best estimate of groundwater inflow rates to the Whale Tail Pit since surface water inflows should be minimal and the influences of dewatering activities and storage changes will be diminishing. These inflow rates are higher than the annual average groundwater inflow rates estimated by the model for 2020/2021 (1,160 to 1,310 m<sup>3</sup>/day), which suggests inflow measurements may be trending higher than predicted. Inflow measurements should continue to be monitored into 2021 to acquire and confirm six months of winter flow measurements. This information will be used to evaluate if the groundwater inflow data continues to trend over 20% higher than predicted. These data should be combined with a spring seepage survey to evaluate preferential flow paths and if required, the groundwater model should be recalibrated, and updated groundwater inflow rates provided.

TDS in the pit sump samples (ST-WT-4) in October, November and December 2020 ranged from 15 mg/L to 412 mg/L, with an average concentration of 222 mg/L (Attachment D). Overall, the TDS data is variable. At this time there is insufficient data to directly compare TDS observations to model predicted values, given the complexity of mine activities occurring in 2020 and the uncertainty in water source contributions to the open pit. It is noted that TDS and chloride in the pit sump samples at the end of 2020 is trending closer to the Whale Tail Attenuation pond measurements, which is expected to be a significant proportion of the groundwater inflow to the pit. Like the groundwater inflow monitoring, TDS measurements should continue to be monitored into 2021 to acquire and confirm six months of winter flow measurements. This information will be used to evaluate if the groundwater inflow data (quantity and TDS quality) are trending higher than predicted. Understanding of the flow contributions is required to back calculate the TDS quality in the groundwater inflow coming from formation groundwater versus seepage from the Whale Tail Attenuation Pond and South Basin. These data should be combined with a spring seepage survey to evaluate preferential flow paths and if required, the groundwater model should be recalibrated, and updated groundwater inflow rates and TDS quality from formation groundwater provided. It is also recommended that the parameter list included in Section 4.2 of the GWMP be expanded to include all major cations (calcium and magnesium) and the full suite of dissolved metals contributing to TDS such that TDS can be directly calculated from the laboratory analysis.

## 4.0 SUMMARY

The following presents a summary of the data contained in this document and how the data relate to relevant sections of the GWMP.

- Westbay Well AMQ16-626 was sampled in October 2020. The estimated groundwater quality at Ports 6, 4 and 3 are in the same range as estimated in 2016, thus no updates to the TDS profile from the deep bedrock groundwater are recommended at this time.
- Hydraulic head data collected at Westbay Well AMQ16-626 in 2020 indicated a local upward gradient was present between Ports 4 and 5, which is attributed to the dewatering of the North Basin. A downward hydraulic gradient is observed in the deeper ports, which indicates the South Basin is still recharging the deeper groundwater flow system.
- Data from IVR long TH 651A confirmed that horizontal groundwater flow below the active layer is restricted by permafrost in at least the upper 500 metres. Horizontal groundwater flow in the sub-permafrost is controlled by the relative hydraulic heads of lakes that are sufficiently large and deep to have an open talik beneath them (Whale Tail Lake and Nemo Lake). Thermistors near the TWD and south wall of Whale Tail Pit do not indicate freeze back has occurred since dewatering of the North Basin; however, continued monitoring is required to confirm temperature trends and possible freeze back in the future.
- Piezometric data near WTD, Whale Tail Attenuation Pond and the South Wall of Whale Tail Pit reflect the influences of dewatering of the North Basin and mining of the pit. Piezometer data shows some fluctuations in response to precipitation, blasting and fluctuations in the Whale Tail Attenuation Pond.
- Flow measurements recorded in October, November, and December (1,491 m<sup>3</sup>/day to 1,869 m<sup>3</sup>/day; average of 1,745 m<sup>3</sup>/day) are the best estimate of groundwater inflow rates to the Whale Tail Pit since surface water inflows should be minimal and the influences of dewatering activities and storage changes will be diminishing. These inflow rates are higher than the annual average groundwater inflow rates estimated by the model for 2020/2021 (1,160 to 1,310 m<sup>3</sup>/day), which suggests inflow measurements may be trending higher than predicted. Inflow measurements should continue to be monitored into 2021 to acquire and confirm six months of winter flow measurements. This information will be used to evaluate if the groundwater inflow data continues to trend over 20% higher than predicted. These data should be combined with a spring seepage survey, following any thawing in the pit walls, to evaluate the presence of preferential flow paths and if required, the groundwater model should be recalibrated, and updated groundwater inflow rates provided.
- TDS in the pit sump samples (ST-WT-4) in October, November and December 2020 ranged from 15 mg/L to 412 mg/L, with an average concentration of 222 mg/L. Overall, the TDS data is variable. TDS trends will continue to be reviewed in 2021 and the parameter list will be expanded to allow direct TDS calculation from laboratory data. At this time there is insufficient data to directly compare TDS observations to model predicted values, given the complexity of mine activities occurring in 2020 and the uncertainty in water source contributions to the open pit. Like the groundwater inflow monitoring, TDS measurements should continue to be monitored into 2021 to acquire and confirm six months of winter flow measurements. This information will be used to evaluate if the groundwater inflow data (quantity and TDS quality) are trending higher than predicted. It is also recommended that the parameter list included in Section 4.2 of the GWMP be expanded to include all major cations (calcium and magnesium) and the full suite of dissolved metals contributing to TDS such that TDS can be directly calculated from the laboratory analysis.



## 5.0 CLOSURE

We trust the above meets your needs, please contact the undersigned for any questions or concerns.

**Golder Associates Ltd.**

*Dale Holtze*

Dale Holtze, M.Sc.  
Environmental Specialist



Jennifer Levenick, M.Sc., P.Eng.  
Associate - Mine Water Group

DH/JL/sg

[https://golderassociates.sharepoint.com/sites/131663/project files/6 deliverables/whale tail/2020 groundwater tm/20148777-516-tm-2020 wt gw monitoring-rev0.docx](https://golderassociates.sharepoint.com/sites/131663/project%20files/6%20deliverables/whale%20tail/2020%20groundwater%20tm/20148777-516-tm-2020%20wt%20gw%20monitoring-rev0.docx)

Attachments: Attachment A – 2020 Westbay Well Sampling Technical Memorandum  
Attachment B – 2020 Thermal Monitoring Report  
Attachment C – 2020 Piezometric and Thermistor Monitoring Data  
Attachment D – Supplemental 2020 Water Quality Data

<b>PERMIT TO PRACTICE</b> <b>GOLDER ASSOCIATES LTD.</b>
Signature <u><i>[Signature]</i></u>
Date <u>09-04-2021</u>
<b>PERMIT NUMBER: P 049</b> NT/NU Association of Professional Engineers and Geoscientists

## References

- Agnico Eagle (Agnico Eagle Mines Limited). 2019. Whale Tail Pit Project Groundwater Monitoring Plan. Version 3\_NWB. May 2019.
- Agnico Eagle. 2020. Whale Tail Pit Thermal Monitoring Plan. Version 3. March 2020.
- Agnico Eagle. 2021. Whale Tail Pit 2020 Thermal Monitoring Report. February 2021.
- Golder (Golder Associates Ltd.). 2016. Westbay System Installation Summary – Whale Tail Pit Project, Nunavut. Dated July 7, 2016 (Reference 1649355-003-TM-Rev0-4000).
- Golder. 2019. Updated Hydrogeological Assessment, Whale Tail Pit, Expansion Project. dated 6 May 2019. (Reference 18108905-291-TM-Rev0)
- Golder. 2021a. 2020 AMQ16-626 Westbay Groundwater Monitoring Investigation, Amaruq, Nunavut. Dated 31 March 2021 (Reference 20148777-506-TM-Rev0).
- Golder. 2021b. Whale Tail Project 2020 Annual Report – Site and Downstream Receiving Water Quality. Dated April 2021 (Reference 20442330-517-RPT-Rev0).

**ATTACHMENT A**

# 2020 Westbay Well Sampling Technical Memorandum

## TECHNICAL MEMORANDUM

**DATE** 8 April 2021

**Project No.** 20148777-506-TM-Rev1

**TO** Marie-Pier Marcil  
Agnico Eagle Mines Limited

**CC** Eric Haley, Robin Allard

**FROM** Valérie Bertrand / Dale Holtze

**EMAIL** dholtze@golder.com

### **2020 WHALE TAIL PROJECT AMQ16-626 WESTBAY GROUNDWATER MONITORING INVESTIGATION AMARUQ, NUNAVUT**

## **1.0 INTRODUCTION**

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is developing the Whale Tail Pit Project that was approved by the Nunavut Impact Review Board (NIRB). The property is a 408 square kilometre (km<sup>2</sup>) site located on Inuit Owned Land approximately 150 kilometres (km) north of the hamlet of Baker Lake and approximately 50 km northwest of the Meadowbank Mine in the Kivalliq Region of Nunavut.

As part of the Approved Project baseline studies, groundwater samples have been collected from a Westbay System monitoring well installed in borehole AMQ16-626, drilled in March and April 2016 targeting the area of the talik below Whale Tail Lake near future mine developments. Pre-development hydraulic head and groundwater quality monitoring was also completed in 2018 and 2019 (Golder 2019a, 2019b) in support of the Whale Tail Project Certificate No. 008, Term and Condition No. 15 (TC15) (NIRB 2018). As part of mine development, dewatering of the Whale Tail Lake (North Basin) was completed on 15 May 2020 and storage of contact water in a portion of the Whale Tail Pit commenced on 16 May 2020. Prior to dewatering, mining occurred in the portions of the Whale Tail Pit that are above Whale Tail Lake (North Basin). The eastern portion is referred to as Quarry 1, and the western area as Whale Tail (Starter) Pit. Starting in June 2020, Quarry 1 and the Whale Tail (Starter) Pit merged to form the Whale Tail Pit.

Agnico Eagle retained Nuqsana Golder Engineering and Environmental Inc. (Nuqsana Golder) to complete a three-week groundwater monitoring program during fall 2020 in accordance with Section 3.1 of the Groundwater Monitoring Plan Version 3\_NWB dated May 2019. During the visit, groundwater samples were also collected from the Westbay Well to continue to monitor the TDS and groundwater quality. The objective of the program was to obtain 2020 data on hydraulic head and groundwater quality in support of the Whale Tail Pit Project Certificate No. 008.

This report provides an interpretation of the data collected in 2020 from the Westbay groundwater well system (Westbay System) on hydraulic gradients and groundwater quality. The data was evaluated in the context of the conceptual model and compared against predictions of the numerical water quality and flow model for the Whale



Tail Pit Project determine whether they are within the predicted ranges or if there are significant differences that merit follow-up assessments.

## 2.0 BACKGROUND

A Westbay System was installed in borehole AMQ16-626 between March and April in 2016. It is located east of the proposed open pit mine footprint and is completed below the Whale Tail Attenuation Pond (refer to Figure 1). The Westbay System serves to obtain groundwater samples and measure the vertical hydraulic gradient within the talik of Whale Tail Lake, in the area of future mine development. These data serve as a basis against which to measure potential effects of the mine workings on the groundwater flow regime and overall site water quality, from development to post-closure of the mine.

The well was installed in the purpose-drilled borehole (AMQ16-626) at an inclination of -69 degrees, an azimuth of 152.6 degrees and a depth of 499 metres along the borehole (mah), through massive diorite throughout the borehole. A tagged 9% calcium chloride brine was used to displace the fresh water in the upper portion of the borehole to prevent freezing during the well installation. The Westbay System was designed to tap discrete zones of unfrozen bedrock and, if encountered, zones of higher hydraulic conductivity observed during drilling and well testing conducted prior to well installation. Six sampling ports were installed at and below the depth of anticipated ramp development (0 to 385 metres below ground surface [mbgs]). The locations of the ports are listed in Table 1 Borehole drilling, packer test results along the borehole and well installation details are documented in Golder (2016b). A schematic of the Westbay well instrument that was installed in borehole AMQ16-626 is included in Attachment A for reference.

**Table 1: Borehole AMQ16-626 Westbay System Zones**

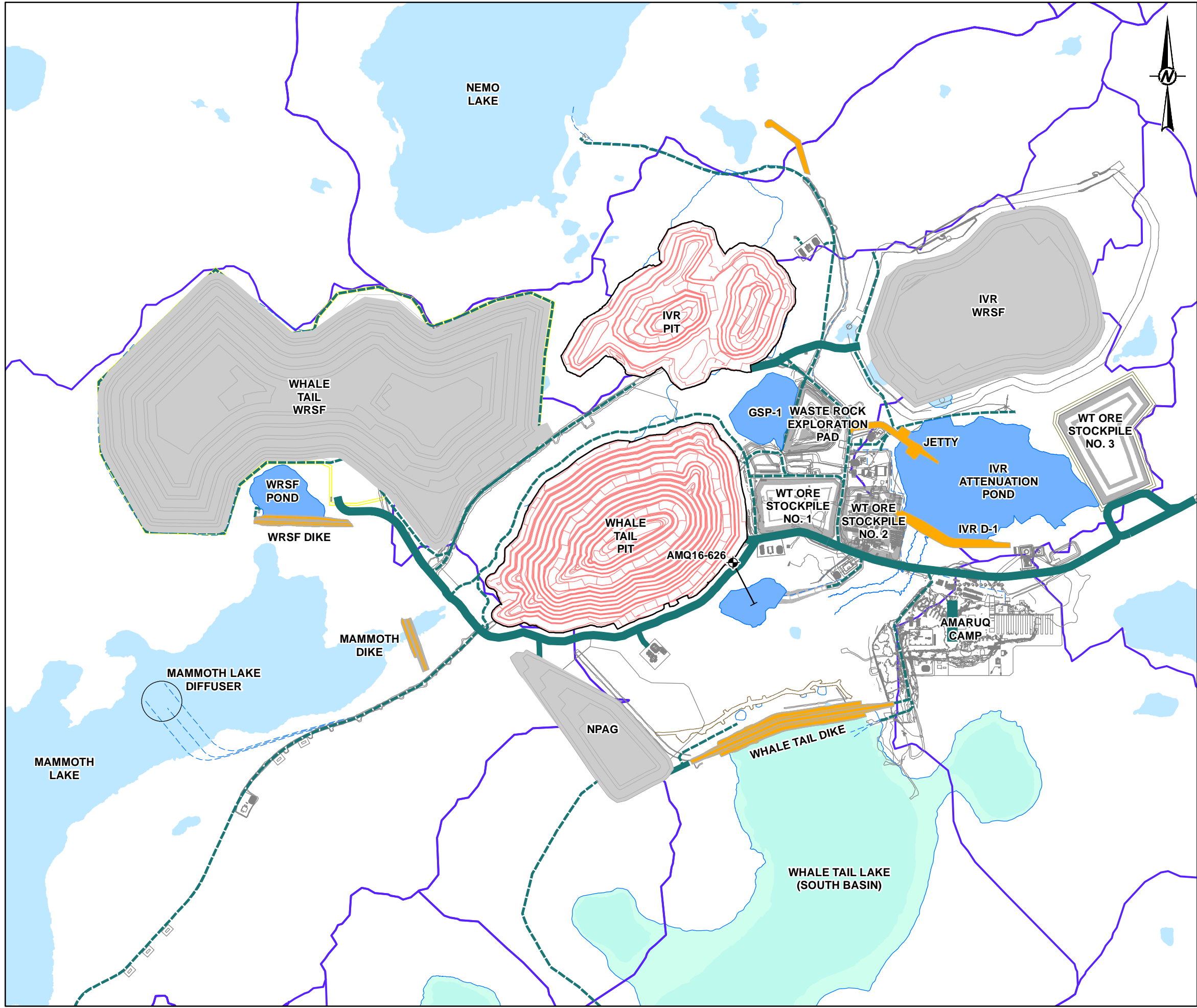
Sampling Interval	Depth Along Borehole			Depth Below Ground Surface			Elevation (masl)		
	From	To	Length	From	To	Thickness	From	To	Thickness
	(mah)	(mah)	(m)	(mbgs)	(mbgs)	(m)	(masl)	(masl)	(m)
Port 6	276.0	287.4	11.4	257.7	268.3	10.6	-103.2	-113.9	10.6
Port 5	298.9	310.3	11.4	279.0	289.7	10.6	-124.6	-135.2	10.6
Port 4	349.3	359.1	9.8	326.1	335.2	9.1	-171.6	-180.8	9.1
Port 3	381.3	392.7	11.4	356.0	366.6	10.6	-201.5	-212.5	10.6
Port 2	440.8	452.2	11.4	411.5	422.2	10.6	-257.1	-267.1	10.6
Port 1	488.1	499.0	10.9	455.7	465.9	10.2	-301.2	-311.4	10.2

**Notes:**

Depth values were provided by Westbay Instruments Completion Report.

m = metres; mah = metres along the hole, relative to top of hole; mbgs = metres below ground surface; masl = metres above sea level.

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**LEGEND**

- WESTBAY SYSTEM
- ACCESS ROAD
- PIT
- ROAD
- WT WRSF CONTACT WATER COLLECTION SYSTEM
- DIKE
- POND
- WATERBODY
- WATERSHED
- WHALE TAIL LAKE (SOUTH BASIN)

**REFERENCE(S)**

- INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED SHOWING PLANNED WHALE TAIL MINE OPERATIONS TO 2025. DESIGN INFRASTRUCTURE HAS SINCE BEEN MODIFIED.
- WATERBODY DATA OBTAINED FROM PHOTOSAT.

DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

**AGNICO EAGLE**

CLIENT

AGNICO EAGLE MINES LIMITED:  
MEADOWBANK DIVISION

PROJECT

2020 WESTBAY SYSTEM MONITORING PROGRAM  
WHALE TAIL MINE, NUNAVUT

TITLE

**SITE PLAN**

CONSULTANT	YYYY-MM-DD	2021-03-30
	DESIGNED	DH
	PREPARED	CDB
	REVIEWED	DH
	APPROVED	VJB

PROJECT NO.	DOC.	REV.	FIGURE
20148777	506	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Upon completion of the installation in 2016, the well was used to collect groundwater samples from select intervals that were within and below the proposed development; at Ports 3, 4, and 6 ranging in depths from 258 m to 367 metres. Sampling methods, data interpretation and water quality results were presented in Golder 2016a. The total dissolved solids (TDS) content in the Formation groundwater<sup>2</sup> was determined to range between 3,198 mg/L and 4,042 mg/L based on groundwater samples collected at that time (Golder 2016a). These data are re-evaluated herein, after more flushing of the interval, as part of the 2020 monitoring program.

The groundwater quality was used to predict the salinity of groundwater inflow into future mine developments, which were used as input to operational and post-closure hydrogeological and permafrost models (Golder 2018a), and as input to the Whale Tail pit lake hydrodynamic model (Golder 2018b). These models have been, and continue to be, utilised to assess potential effects of mining on site contact water quality during development, operations and closure and on pit lake water quality during closure and post-closure.

The results of the compendium of these studies indicated that mass transfer from the pit to the pit lake would be very low largely because the volume of groundwater seepage into and out of the pit lake would be negligible, particularly compared to surface water exchanged annually during post-closure when flows between the flooded pit lake and downstream lakes are re-established. The combination of results suggests that the hydrogeological regime around the pit lake is not critical to pit lake water quality post-closure.

Groundwater quality and hydraulic head data collected as part of the 2018 (Golder 2019a) and 2019 (Golder 2019b) monitoring programs add to the pre-operational database of results and were used to compare against model inputs and model outcomes pre-development. The data collected as part of the 2020 monitoring program add to the operational database of results and are used to continue to verify model inputs and model outcomes obtained to date. The operational data will also be used to develop an appropriate monitoring plan for closure.

## **3.0 2020 WESTBAY SYSTEM GROUNDWATER MONITORING PROGRAM**

### **3.1 Objectives**

The objectives of the program are as follows:

- To collect site-specific hydraulic head data through the measurement of the hydrostatic pressure profile from the existing Westbay System installed in borehole AMQ16-626.
- Assess the vertical hydraulic gradient and groundwater flow direction in that location.
- Collect groundwater samples from the Westbay System for chemical analysis at target depth intervals, adding to the database of groundwater quality results which will be used to compare against water quality data from samples collected from the open pit during operation and closure.

### **3.2 Methodology**

#### **3.2.1 Hydraulic Head Measurements and Assessment of Vertical Hydraulic Gradients**

Hydraulic heads were calculated from the Formation pressures measured at each monitoring port installed in the Westbay System prior to development. The Formation pressure for each monitoring port was measured on 9

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<sup>2</sup> Formation water in this report refers to the natural groundwater in the rock formation, as opposed to sampled water which is a mixture of drilling water and true groundwater.

October 2020 using the Mosdax sampler manufactured and supplied by Westbay Instruments (refer to Attachment B for instrument calibration record).

### 3.2.2 Hydraulic Pressure Measurements and Groundwater Sampling

As part of the designated 2020 program hydraulic pressure measurements were measured at all ports whereas groundwater samples were collected from Ports 1, 2, 3, 4 and 6. Port 5 was never intended for groundwater sampling and was installed for pressure measurements only. As the upper part of the Westbay System is installed through permafrost, removal of groundwater for well development, purging and sampling cannot be carried out using the Westbay purge system. It must instead be carried out using a small volume sampler. This substantially lengthens the time required to purge and sample at each port (months). Consequently, the sampling program prioritizes key ports that optimize groundwater quality data collection. The rationale for ports selected for sampling is provided below.

- Ports 4 and 3, which are located within the anticipated ramp development zone, were targeted for sampling because these intervals had been successfully developed in 2016 (i.e. drill water had been largely removed from the interval).
- Port 6 is interpreted to be located within the cryopeg zone (where ground temperature is at or below 0 degrees Celsius but water still flows because of its elevated salinity). In the cryopeg, groundwater has the potential to yield variable water quality even following sufficient development (Golder 2019a) because this zone is partially frozen, and salt is expected to concentrate in the liquid phase as ice forms. The liquid phase is preferentially conveyed into the sampling device. Notwithstanding this, a groundwater sample was collected from Port 6 to compare against previous results.
- Ports 1 and 2 were sampled, although it is still insufficiently developed, to document if, and the degree to which, the aquifer is being naturally flushed of the drilling water over time.

Throughout the development and upon water sample collection, field chemical parameters (pH, conductivity, fluorescein content and temperature) were measured in order to track the removal of the fluid introduced into the Formation by drilling, during development and sampling of groundwater. Fluorescein tracer was added to the 2016 drilling water to differentiate between the drilling fluid and the Formation water. It is assumed that drilling water is the only source of fluorescein introduced during the 2016 drilling activities of borehole AMQ16-626 such that it is a reliable tracer of introduced water into the Formation. Fluorescein content was measured using the AquaFluor handheld Fluorometer manufactured by Turner Designs. Temperature and pH and values were measured with a Hanna Combo tester (HI 98130). Electrical conductivity was measured using a YSI Pro 30 Conductivity Probe. A drilling water content of less than 10% original drill brine content (estimated using fluorescein content) is targeted to provide a reliable estimate of Formation groundwater quality. Higher residual drilling fluid content can be used but can substantially decrease the precision of the calculation of groundwater quality. Information on each of the Ports that were purged is presented in Table 2.



Table 2: Summary of AMQ16-626 2020 Westbay Well Monitoring Program – 2016 to 2020 Development

Port	Sampling Port Interval (mah)		Final 2016 Sample Parameters		Volume of Water Purged in 2016 (L)	Final 2018 Sample Parameters		Volume of Water Purged in 2018 (L)	Final 2019 Field Parameters		Volume of Water Purged in 2019 (L)	Final 2020 Field Parameters		Volume of Water Purged in 2020 (L)	2016 – 2020 Cumulative Volume Purged(L)
	To	From	F	EC		F	EC		F	EC		F	EC		
6	276	287	48 [9%]	4.6	282	87 [17%]	9	8.25	63 [12%]	9.59	9	33 [6%]	6.57	9	308.25
4	350	359	93 [18%]	4.9	1850	73 [14%]	14.8	13.25	120 [22%]	22.08	41	34 [7%]	4.83	41	1945.25
3	382	392	114 [22%]	7.5	177	97 [19%]	7.6	12.5	44 [9%]	5.27	76	41 [8%]	3.4	76	341.5
2	441	452	120 [23%]	23	424	78 [15%]	17.7	6.25	202 [39%]	32.48	8	81 [16%]	17.7	8	446.25
1	488	499	550 [107%]	4.8	50	248 [48%]	9.4	0.25	137 [27%]	10.69	2	146 [29%]	3.22	2	54.25

**Notes:**  
mah = metres along hole, relative to ground surface; F = fluorescein content (ppb); [%] = percent drill fluid remaining; EC = electrical conductivity (mS/cm)  
F target for sampling based on removal of most of the drilling water introduced into the Formation in 2016, determined based on F content of the raw water sample. A minimum of 10% drill fluid removal is targeted (51 ppb F is 10% of 512 ppb). The average F content of drill water in 2016 was 512 ppb (F ranged between 173 and 1000 ppb during 2016 drilling activities)  
2016 Sampling Targets – 10% drill fluid remaining was not achieved during the allocated development period. Sample collected upon stabilization of field parameters (EC and F)  
2018 Sampling Targets – document groundwater quality information  
2019 Sampling Targets – Port 3 (50 ppb, 10% target of initial F measured in 2016), Port 4 (coupled decreasing trends of F and EC as time permits) and Ports 2 and 6 (document groundwater quality information).  
2020 Sampling Targets – Ports 3 and 4 (50 ppb, 10% initial F measurement in 2016) and Ports 1, 2 and 6 (document groundwater quality information)

Groundwater sampling was performed using the Westbay Mosdax sampler following a similar method as the previous development and sampling programs completed in 2016, 2018 and 2020. The Mosdax sampler collects 1 Litre of groundwater at a time (per sampling instrument descent into the well, equivalent to one 'run'); multiple sampler runs were carried out to collect one complete groundwater sample set from each interval. Information on the sampling completed in each Port is presented in Table 2 and Table 3.

**Table 3: Summary of AMQ16-626 Westbay Well 2020 Monitoring Program – Sample Collection**

Sample Port	Sampling Interval (mah)		Volume of Water Purged in 2020 (L)	2016-2020 Cumulative Volume Purged (L)	2020 Sample Date	Groundwater Parameters at Sampling Period (average field measurement for all runs for the sample collected)		
	From	To				Fluorescein (ppb)	Electrical Conductivity (mS/cm)	pH
6	276.0	287.4	15	314.25	18 October	42 ± 6	5,404	6.96
4	349.3	359.1	48	1957.25	19 October	31 ± 6	4,378	6.23
3	381.3	392.7	46	311.5	13 October	47 ± 8	3,346	7.14
2	440.8	452.2	15	453.25	16 October	65 ± 12	13,964	8.61
1	488.1	499.0	17	69.25	19 October	81 ± 4	4,559	7.85

**Notes:** m = metres; mah = metres along hole relative to ground surface; L = litres; ± standard deviation

Groundwater samples were collected in triplicate from Ports 6, 4, 3 and 2 and in duplicate from Port 1 due to time constraints. Groundwater samples were filtered and preserved in the field, as required, and collected in laboratory-supplied bottles which were packed and shipped to the analytical laboratory following the collection of each sample. Duplicate samples collected from Ports 6, 4, 3, and 2 were submitted for analysis, while the extra sample set was kept on site as backup and disposed of upon receipt of the samples by the analytical laboratory. An equipment blank and a trip blank were also collected for quality assurance/quality control (QA/QC) purposes. Analysis of general chemistry was completed at ALS Environmental (ALS) in Vancouver for the parameters listed in Section 4.2 of the GWMP and in Schedule I Table 2 of the Water License, as follows:

- Hardness, pH, conductivity, total suspended solids (TSS), total dissolved solids (TDS) and turbidity
- Anions and nutrients, including alkalinity, ammonia, bicarbonate, bromide, carbonate, chloride, fluoride, nitrate, nitrite, ortho-phosphate, total phosphorus, reactive silica and sulphate.
- Metals (dissolved and total), including aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, mercury, molybdenum, nickel, selenium, silicon, silver, sodium, strontium, sulfur, tellurium, thallium, tin, titanium, uranium, vanadium and zinc. Additional metals were also analyzed by the laboratory as part of the metals package, however they are not of interest to the project and will not be discussed herein out: cesium, rubidium, sulfur, thorium, tungsten and zirconium.
- Radium 226.

Radium 226 is not included in the license, however it was analyzed as it previously occurred at concentrations higher than the Canadian effluent guidelines at some sample ports during previous sampling events. Radium 226 is a naturally occurring element in deep bedrock groundwater.

It is noted that the samples were not analyzed for total organic carbon (TOC) nor dissolved organic carbon (DOC) which are listed under Schedule I Table 1 of the water license and the GWMP.

Certificates of analysis from ALS are included in Attachment C.

### 3.3 Evaluation of Formation Water Quality

To properly assess the quality and salinity of Formation groundwater, the drilling fluid present in the sampling interval must be removed as much as possible by purging. The amount of drilling fluid present in the Formation is estimated from the difference between the concentration of fluorescein in the raw groundwater sample at each interval, and the fluorescein content of the drilling fluid used. In 2016 upon well installation, the sampling intervals were purged to remove as much of the drilling fluid as possible within the task schedule, prior to collecting a sample for chemical analysis.

In 2020, the fluorescein and electrical conductivity of groundwater was monitored in the field during sampling and was compared to data from the end of development in 2016, 2018 and 2019 to assess whether the interval remained purged and still reflected true Formation groundwater quality. Fluorescein and conductivity in 2020 were the lowest values reported to date at all sample Ports and were within the range of values recorded in 2016 for Port 6. This suggests that natural flushing occurred since the 2019 sampling round. Groundwater samples were collected and submitted for chemical analysis from Ports 1, 2, 3, 4 and 6.

The following summarizes the calculations made to estimate true Formation water quality and TDS from field measurements of electrical conductivity and laboratory analytical results of raw groundwater samples in 2020 and drilling water fluid in 2016, consistent with the approach used to calculate the Formation water quality from the 2018 and 2019 investigations (Golder 2019a, 2019d).

- 1) **Estimation of the chemistry of the drilling fluid introduced in the Formation during the 2016 well borehole drilling and installation activities.** The drilling fluid consisted of very low TDS lake water to which was added a concentrated brine. The range of composition of the drill fluid (the dilute brine) was estimated by comparing the initial and maximum conductivity values measured in samples from the Formation (for each Port 6, 4, 3, 2 and 1 the electrical conductivity of water varied between sampling ports) against the conductivity of the concentrated brine<sup>3</sup>. This Dilute Brine Factor was used to calculate composition of the drilling fluid introduced into the sampling interval during the 2016 drilling and well installation activities as per equation (1) below.

$$(1) \quad \text{Dilute Brine Factor}_{Port\ i} = \frac{\text{Field Conductivity}_{Port\ i}}{\text{Brine Conductivity}_{calculated}}$$

This calculation assumes an insignificant proportion of Formation water is present immediately after drilling, which is a fair assumption given that a high volume of drilling fluid was lost to the Formation (Golder, 2016a).

The drilling brine composition for each parameter was calculated from the product of the dilution brine factors and the chemistry of the drilling brine fluid for each port per equation (2).

$$(2) \quad \text{Dilute Brine}_{Port\ i} = \text{Laboratory Result}_{Brine} \times \text{Dilution Brine Factor}_{Port\ i}$$

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<sup>3</sup> Brine conductivity was estimated from the calculated TDS of the drilling brine fluid using a conversion factor of 0.75 which is appropriate for brine solutions (Rusydi, 2017). Brine TDS was calculated to be 130,500 mg/L based on constituent concentrations (refer to Table 4). Laboratory-reported TDS (36,946 mg/L) and conductivity (55.42 mS/cm) were not reliable as they exceeded instrument calibration.

- 2) **Calculation of the proportion of drill brine remaining in the Formation upon sampling.** This was calculated based on the amount of residual fluorescein measured upon sample collection at each port in 2020 compared to the initial fluorescein content of the drilling fluid measured in 2016 (i.e. 512.7 ppb).
- 3) **Removal of the drilling fluid chemistry from the raw groundwater sample analysis.** The concentration of constituents from the drilling fluid are removed from the reported analytical results for each chemical constituent per the below equation (3). The 2020 laboratory results are provided in Attachment C.

$$(3) \text{ Groundwater Quality}_{corrected} = \frac{\text{Laboratory Result} - \text{Proportion of Drill Brine} \times \text{Dilute Brine Chemistry}}{\text{Proportion of Formation Water}}$$

The estimated chemistry of the drilling brine, proportion of residual drilling brine and Formation water for each sampling port are summarized in Table 4. The calculated groundwater quality for Ports 3, 4 and 6 are summarized in Table 5.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Hydraulic Head Profile and Groundwater Flow Direction Below Whale Tail Lake

The Whale Tail Pit is located below the North Basin of Whale Tail Lake. The talik in the area of the pit is closed at depth but transitions to open talik towards the South Basin due to the increased width and depth of the lake towards the south. The water table below both basins is equivalent to the lake surface elevation.

Permafrost underlies the land surrounding the lake, which restricts the lateral flow of groundwater to the talik and restricts the recharge of the sub-permafrost groundwater flow system by precipitation. Groundwater flow is controlled by surface water elevations in lakes with open talik; water moves vertically through the open talik to the underlying sub-permafrost groundwater flow system. In effect, lakes with open taliks in continuous permafrost regions are equivalent to large monitoring wells.

AMQ16-626 was installed to evaluate groundwater quality in the unfrozen bedrock and to verify the hydraulic gradient that exists below Whale Tail Lake. The hydraulic gradient, in combination with the bedrock hydraulic conductivity, will control the potential flux to or from Whale Tail Lake, and the flooded Whale Tail Pit post-closure.

Table 6 summarizes the calculated hydraulic heads based on the measured pressure in each sampling port. Although Port 6 (shallowest interval) is included in Table 6, it is suspected that this port may be in the cryopeg near the permafrost contact, which could affect the measured hydraulic head. This inference is supported by the Formation temperature measured in 2018 using the Mosdax sampler, which was less than zero (Golder 2019a). The temperature measurements recorded at each Port in 2020 are not representative of stabilized readings, therefore the temperature profile data is not presented in this report. Data from the deeper ports, which are confirmed to be in unfrozen rock based on the Formation temperature measured in 2018, were used to assess the vertical gradient.

**Table 6: AMQ16-626 Westbay Well Hydraulic Head Measurements**

Port	Port Position (mbgs)	Port Position (masl)	9 November 2018		16 March 2019		9 October 2020	
			Calculated Depth to Water (mbgs)	Calculated Hydraulic Head (masl)	Calculated Depth to Water (mbgs)	Calculated Hydraulic Head (masl)	Calculated Depth to Water (mbgs)	Calculated Hydraulic Head (masl)
6	257.9	-103.4	1.9	154.0	1.3	153.2	6.2	148.3
5	289.7	-124.8	--	--	--	--	5.5	149.0
4	326.3	-171.8	1.6	153.6	1.4	153.1	3.9	150.6
3	356.2	-201.7	1.1	153.4	0.8	153.7	4.0	150.5
2	411.7	-257.2	0.9	152.9	1.9	152.6	4.1	150.4
1	455.9	-301.4	0.5	152.6	2.2	152.3	4.1	150.4

**Notes:** mbgs = metres below ground surface (vertical down from surface); masl = metres above sea level (elevation); -- = not measured

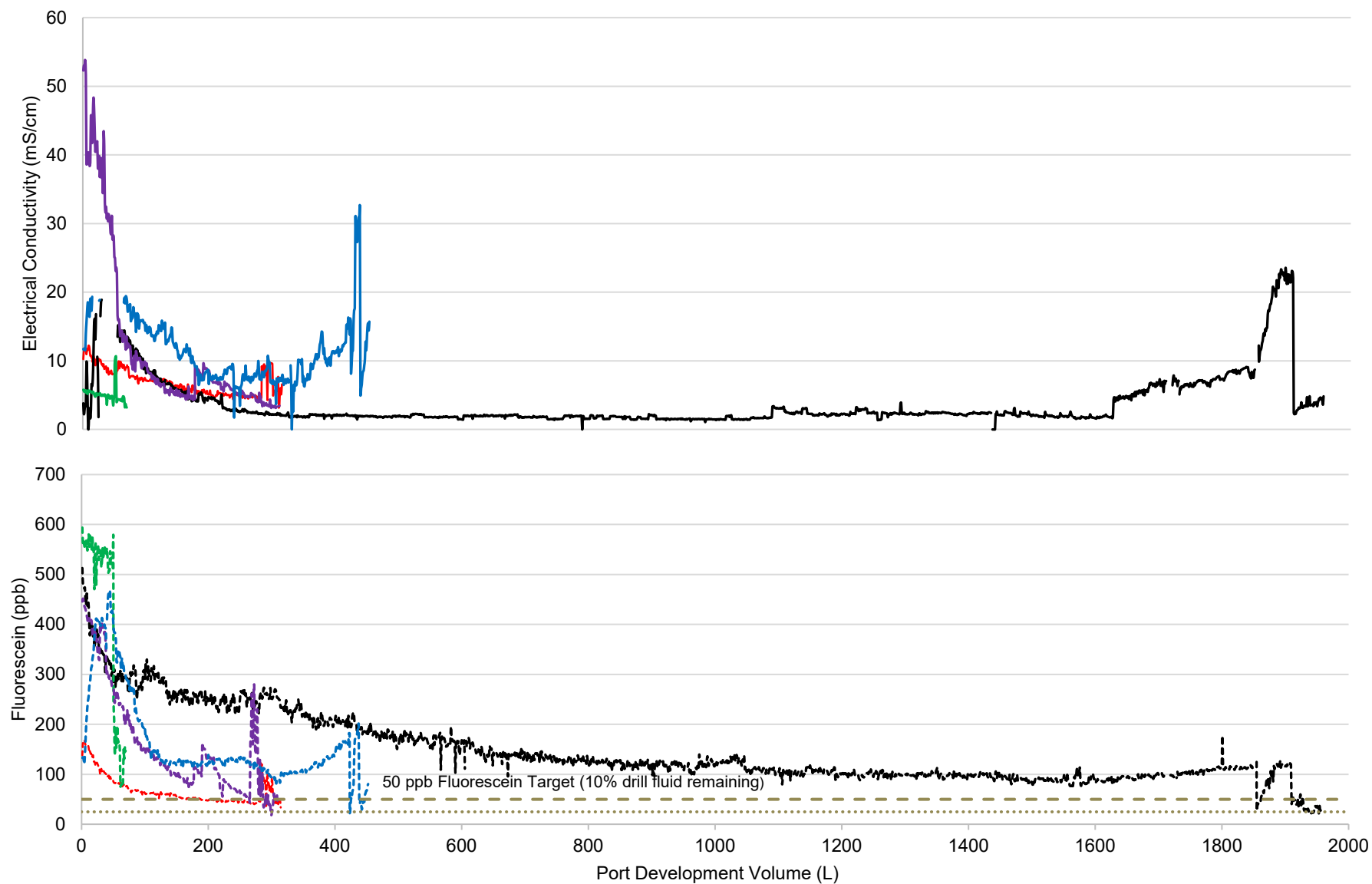
The 2020 hydraulic pressure data collected at AMQ16-626 indicates the hydraulic head measured at the ports is lower than the values measured in previous years. This reduction in hydraulic head is attributed to the dewatering of the North Basin in 2019 and 2020 and the initiation of excavation of the open pit in 2020. In general, a consistent downward hydraulic gradient was measured in 2018 and 2019, but in 2020, a local upward gradient was measured between ports 4 and 5, which is attributed to the dewatering of the North Basin. A downward hydraulic gradient is still observed in the deeper ports, which is expected since surface water is retained behind a berm in the South Basin. The downward hydraulic gradient observed in 2020 between Ports 4 and 1 is 0.001 m/m. This hydraulic gradient is lower to what was previously measured in 2018 (0.008 m/m) and 2019 (0.006 m/m) during the pre-development phase. The change is expected to result from pit dewatering activities.

## 4.2 Groundwater Quality

The field measured electrical conductivity and fluorescein concentrations in groundwater accessed from Ports 1, 2, 3, 4 and 6 throughout the sampling programs since 2016, are summarized in Figure 2. The sequence of measurements collected during the 2020 field program is shown on Figure 3. Field measurements of electrical conductivity and fluorescein concentrations recorded at the time of sampling are summarized in Table 3. The values are averages from the subsamples collected from multiple 'runs' to obtain the required volume of water for analysis.

Figure 4 depicts the hydraulic conductivity measured at the borehole prior to installing the Westbay well (Golder, 2016c), along with fluorescein content and electrical conductivity measured after purging and prior to sampling in the 2016, 2018, 2019 and 2020 field programs. This figure illustrates that the fluorescein content is relatively stable at Ports 3, 4 and 6; it is trending toward stability at Port 2; and is still elevated at Port 1 but the declining trend likely represents natural flushing over time. Elevated fluorescein content in samples is indicative of a high proportion of drilling fluid in groundwater and therefore, the sample is not strictly representative of Formation groundwater.

Stiff diagrams for the 2020 samples are presented in Figure 5, along with the 2016 brine fluid chemistry. Stiff diagrams are used to illustrate the major ion composition of a water sample in order to rapidly compare 'signatures' from different sources, such as natural groundwater compared to brine fluid water chemistry. The stiff diagrams illustrate how the major ion composition of the samples collected from Ports 1, 2, 3, 4 and 6 is dominated by calcium and chloride, like the drilling brine but slightly less pronounced peaks of calcium and chloride in natural groundwaters.



Notes:  
 Conductivity ———  
 Fluorescein - - - - -  
 Colours Port 6, Port 4, Port 3, Port 2 and Port 1

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PROJECT

2020 WESTBAY SYSTEM MONITORING PROGRAM  
 WHALE TAIL MINE, NUNAVUT

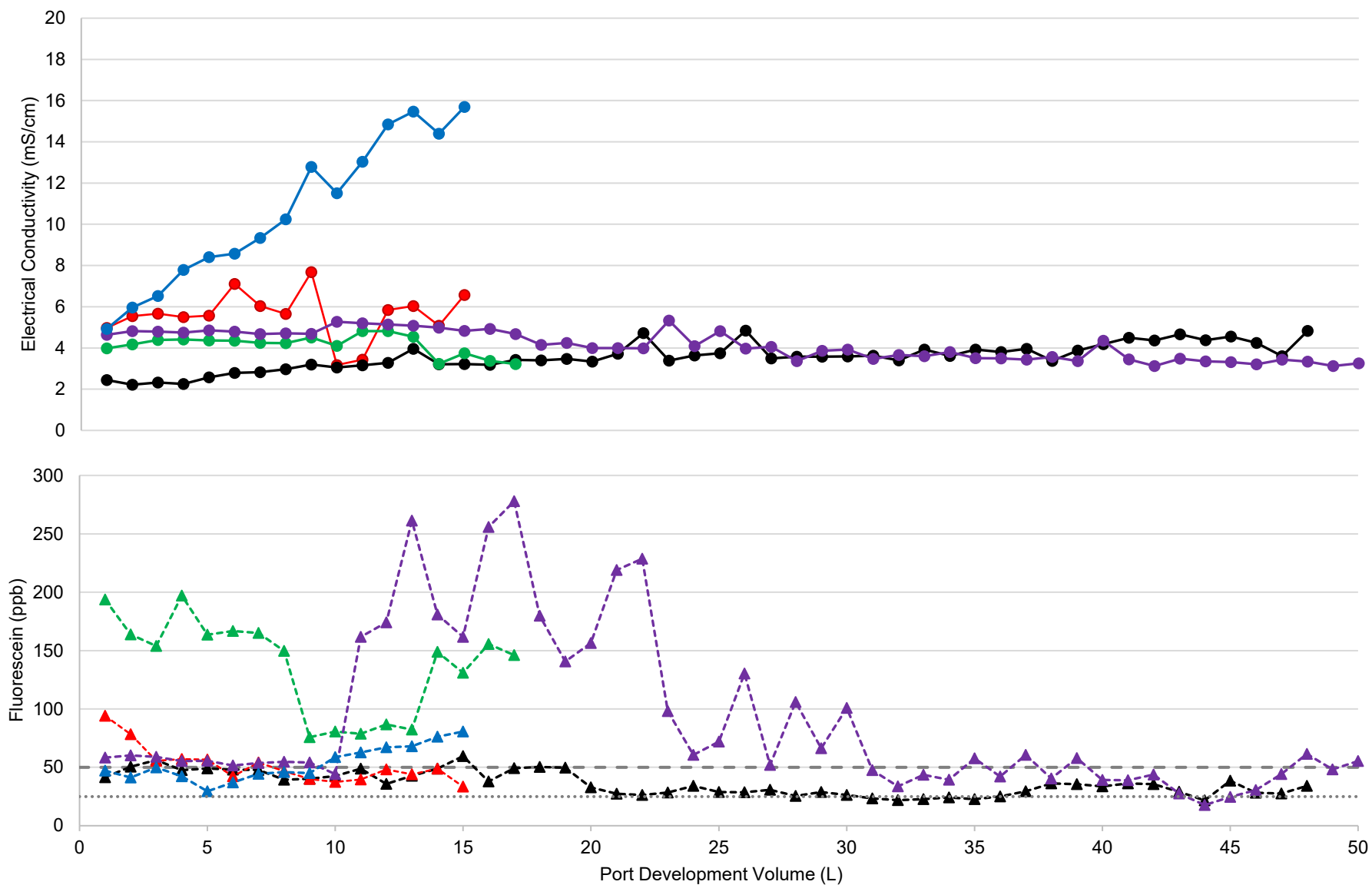
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2016 to 2020 AMQ16-626 DEVELOPMENT RECORD

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Notes:  
 Conductivity —●—  
 Fluorescein —▲—  
 Colours Port 6, Port 4, Port 3, Port 2 and Port 1

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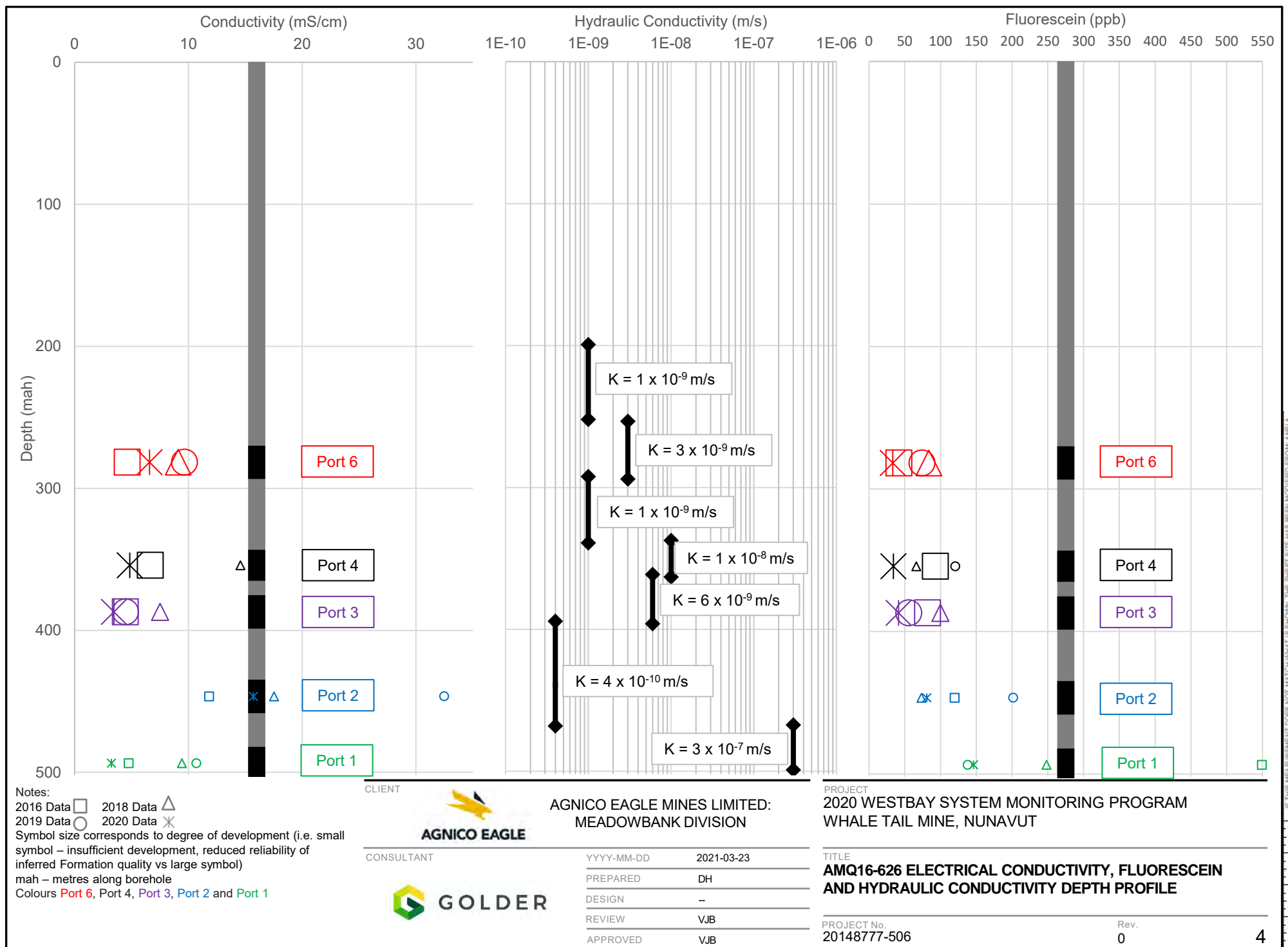
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Groundwater quality at depth in the Canadian Shield, away from the influence of sea water (such as is the case at Meadowbank and Whale Tail) are expected to be dominated by calcium and chloride (Gascoyne, 2000; Frappe and Fritz, 1987), however the intensity of the peaks could also reflect some residual content of the calcium chloride brine fluid introduced into the Formation during well installation (Golder 2016b). Water quality from Ports 1, 2, 3, 4 and 6 continues to trend towards Formation groundwater quality with additional development and natural flushing (particularly noticeable in Port 1) and concentrations of calcium and chloride are observed to decrease slightly over time.

Figure 5 also includes the stiff diagram for representative groundwater quality from Meadowbank monitoring well MW-IPD-01(d) for comparative purposes of groundwater containing a natural signature. It is noted that MW-IPD-01(d) was installed in a borehole drilled without the use of brine fluid. Environmentally friendly drill fluid DD2000 (copolymer of acrylamide and sodium acrylate) and heated water was circulated continuously through the borehole until the well was installed (SNCL 2019). Monitoring well MW-IPD-01(d) is screened within a shallower interval (162.5 to 181.4 metres depth) than any of the Westbay System sampling intervals, but it is also completed within the intermediate volcanic unit. Groundwater quality at MW-IPD-01(d) has similar concentrations of major ions calcium, chloride, magnesium and the sum of sodium and potassium compared to the 2020 monitoring results at Ports 1, 2, 3, 4 and 6 (Golder 2021). Ports 1, 2, 3, 4 and 6 have a similar chemical signature to the brine fluid chemistry, suggesting that the small amount of residual drill fluid present in the sample still affects the apparent chemical signature of the groundwater. As such, it is possible that the chemical signature of groundwater from these intervals change with additional development and natural flushing over time. Stiff diagram chemical signatures highlight the importance of removing brine fluid introduced during the drilling as much as possible to reduce the uncertainty associated with the calculated Formation water quality.

The field schedule allowed for limited development of Ports 1 and 2. Elevated concentrations of fluorescein and electrical conductivity values at Port 1 (29% drill fluid remaining) and Port 2 (16% drill fluid remaining) in 2020 indicate that these zones still contain too much drill brine to effectively extrapolate (calculate) Formation groundwater quality at these Ports. They were nonetheless sampled to track the evolution of groundwater quality with natural flushing which, in time, is expected to displace drilling fluids and return the interval to pre-drilling groundwater quality.

Calculated Formation groundwater quality for Ports 3, 4 and 6 are shown in Table 5 at the end of the report, presenting the calculated range of constituent concentrations of Formation water at each Port sampled in 2016, 2018, 2019 (Ports 3 and 6 only) and 2020. Analytical results on raw 2020 samples are included in Attachment C. The results of the 2020 groundwater quality data for Ports 3 and 6 are generally within the same order of magnitude to those reported in 2016, albeit slightly higher, except for a few parameters. In general, the results of the groundwater quality data for Port 4 are within the same order of magnitude of the 2016 data, albeit lower. This is attributed to the lower proportion of drilling brine fluid in the Formation from samples collected in 2020 compared to 2016. Formation groundwater quality at Ports 1 and 2 was calculated but results are considered highly uncertain at this time because of the elevated proportion of drilling brine in the samples.

The following provides an assessment of water quality at each Port.

## Port 6

The temperature measured by the Mosdax sampler during the 2018 pressure profile at Port 6 was below zero ( $-0.17^{\circ}\text{C}$ ; Golder, 2019a). Considering the calculated freezing point depression of  $0.2^{\circ}\text{C}$  suggests Port 6 may be within the basal cryopeg. The cryopeg zone is interpreted to extend to at least 258 m depth (top interval of Port 6) within the vicinity of the Westbay System. Groundwater within the cryopeg would flow through the permeable (unfrozen) sections of the aquifer. Throughout the 2020 monitoring program and similar to previous years, electrical conductivity and fluorescein progressed at different rates during purging (conductivity was variable while fluorescein content continued to decrease over time; Figures 2 and 3) possibly because of partial freezing of drilling water and likely exclusion of fluorescein in ice (i.e., potential variability of fluorescein within the cryopeg).

The estimation of true Formation groundwater quality was carried out per the method described in Section 3.3. Table 5 presents the minimum and maximum of the range of calculated concentrations of Formation water at Port 6 sampled in 2020 and in 2016, 2018 and 2019 for comparison.

The 2020 field-measured groundwater fluorescein content were similar, but lower to the values recorded at the end of the well development period in 2016 (refer to Table 2 and Figure 2). This suggests that groundwater quality at that location remained relatively stable and thus, is anticipated to be representative of Formation water. It is noted that the 2020 field-measured electrical conductivity was variable throughout the development period and is elevated compared to the 2016 monitoring program, despite the lower proportion of fluorescein remaining in the final 1 Litre sample run. As Port 6 is interpreted to be located in the cryopeg zone, the liquid phase is preferentially conveyed into the sampling device. Groundwater collected from Port 6 has the potential to yield variable water quality even following sufficient development (Golder 2019a) because this zone is partially frozen, and salt is expected to concentrate in the liquid phase as ice forms. The concentrations of laboratory-measured constituents in the 2020 groundwater quality estimation (Table 5) are within the same order of magnitude but slightly higher than those previously reported, with the exception of a few parameters such as alkalinity, potassium, silicon and zinc.

Based on the 2020 calculations of groundwater quality at Port 6, the concentration of trace metals and arsenic in groundwater is low. For comparative purposes only, the 2020 calculated radium-226 concentration is estimated to be between 0.7 to 1.2 Bq/L, which is above the Metal and Diamond Mining Effluent Regulations (MDMER) limit of 0.37 Bq/L. The 2020 calculated radium-226 concentration is also slightly higher than the 2016 concentration range (i.e., 0.43 to 0.52 Bq/L). Radium 226 is a naturally occurring element in deep bedrock groundwater.

The 2020 data remain valid to estimate water quality at Port 6, although the 2016 results may be a more accurate representation of Formation groundwater quality than 2020 based on the slightly lower average fluorescein content measured in the sample. The initial model input is still considered accurate and consistent with the 2020 data and therefore the new data does not warrant revising the conceptual model of groundwater TDS.

## Port 4

The 2020 field-measured groundwater fluorescein content and electrical conductivity at Port 4 were lower than values recorded at the end of the well development period in 2016, 2018 and 2019. An increasing trend was observed in 2018 and 2019, followed by a sharp decline in 2020, where conductivity and fluorescein trended toward stabilization at the end of the 2020 program. Lower 2020 fluorescein content and electrical conductivity is believed to result from natural flushing of the Port area groundwater since 2019. The lower proportion of drilling fluid in the Formation and in the samples collected results in an increase reliability of calculated groundwater quality from the Port 4 samples collected in 2020 compared to those collected in 2016.

Estimation of Port 4 Formation groundwater quality is included in Table 5 for 2016, 2018 and 2020. The results of the 2020 groundwater quality data are within the same magnitude of those reported in 2016, albeit slightly lower with the exception of a few key parameters such as TDS and potassium. The concentration of trace metals and arsenic in groundwater is low. The 2020 calculated radium-226 concentration is estimated to be between 0.3 and 0.4 Bq/L, which, for comparative purposes, is slightly above the MDMER limit of 0.37 Bq/L and higher than the 2016 concentration value (of <0.1 Bq/L).

Port 4 2020 data is considered to be reliable in representing Formation groundwater quality with a calculated TDS range (3,379 to 4,904 mg/L) that is slightly higher than previously reported (3,581 to 3,966 mg/L). The initial model input is still considered accurate, and the new data does not warrant revising the conceptual model of groundwater TDS.

### Port 3

The 2020 field-measured fluorescein content and electrical conductivity at Port 3 were similar to values recorded at the end of the well development period in 2016, suggesting that water quality remains representative of Formation groundwater in this zone. Concentrations of fluorescein and electrical conductivity stabilized towards the end of the 2020 monitoring program in Port 3 (Figure 3), to fluorescein levels that were lower than in 2016 samples but similar brine fluid 2020 (9% brine fluid in 2020, compared to 8 to 18% brine fluid in 2016).

Estimated Port 3 Formation groundwater quality is included in Table 5. The 2020 groundwater quality data are within the same order of magnitude to those reported in 2016, albeit slightly lower with the exception of a few parameters.

Arsenic and radium-226 concentrations at Port 3 in 2020 are estimated to be low and in the same order of magnitude as concentration ranges calculated in 2016. Calculated concentrations arsenic and radium-226 at Port 3 meet the Water license and MDMER criteria, respectively.

The 2020 water sample had a lower fluorescein content than previously and is therefore considered to more closely represent Formation groundwater quality. The 2020 data are considered to be valid and are consistent with the 2016 data. Thus, the initial model input is still considered accurate, and the new data does not warrant revising the conceptual model of groundwater TDS.

### Port 2

The 2020 field-measured groundwater fluorescein content and electrical conductivity increased throughout the limited development program (refer to Figure 3). Values were initially lower than in 2016 and 2019 but increase throughout the brief purging period in 2020. Given the continued high proportion of drilling brine, a proper estimation of Formation groundwater quality is not deemed possible for from this Port at this time.

### Port 1

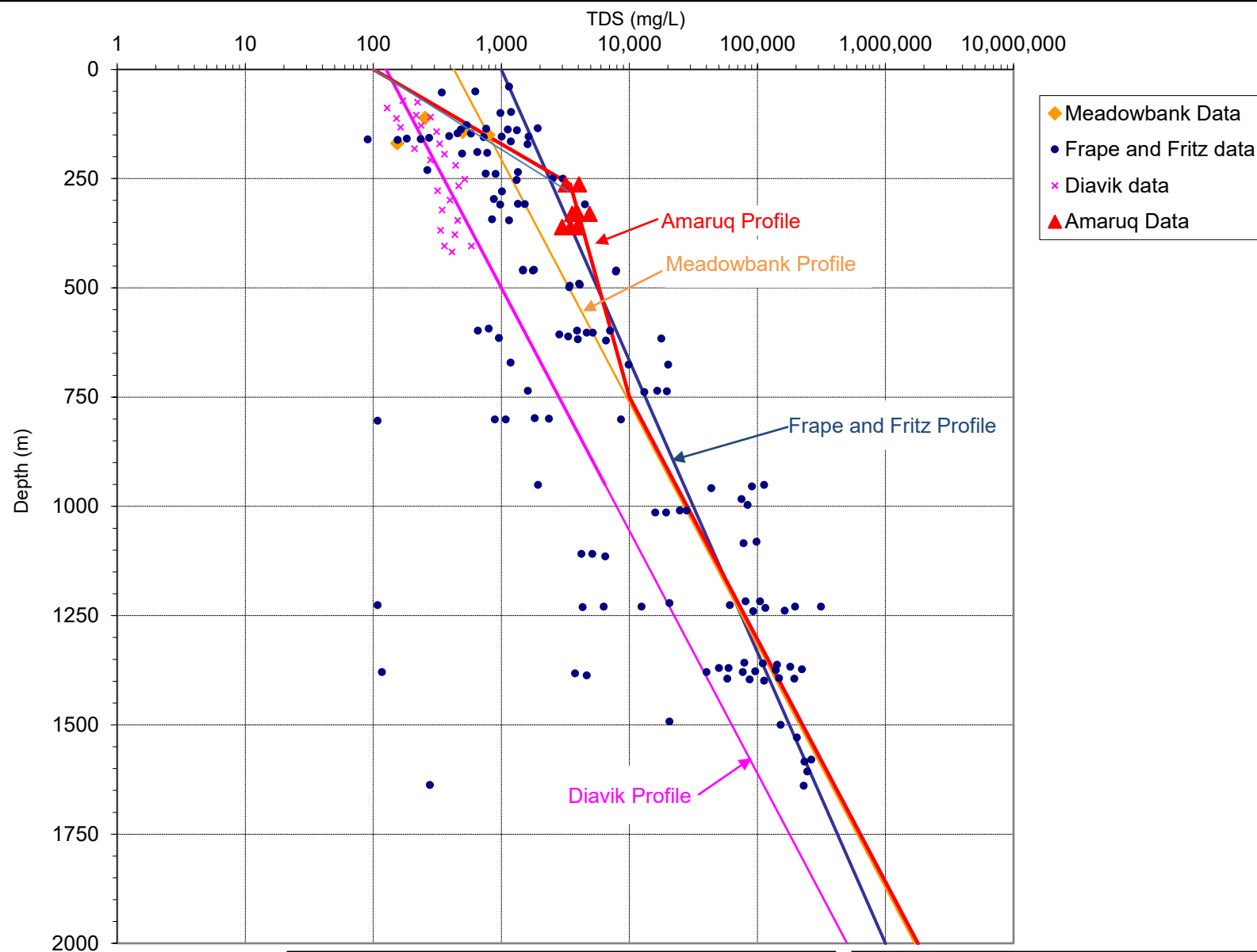
The 2020 field-measured groundwater fluorescein content and electrical conductivity decreased throughout the limited development program (refer to Figure 3). Values were lower than previously measured but remain too high to provide a defensible estimation of Formation groundwater quality at this time.

### Summary

Based on the groundwater monitoring programs completed to date, the Formation groundwater quality calculated as part of the 2016 and 2020 investigation at Ports 6 and 4, and the 2016, 2019 and 2020 investigation at Port 3 are considered reliable.

Based on data from Ports 6, 4 and 3, the TDS content of Formation groundwater is estimated to range between 2,980 mg/L and 4,904 mg/L. The TDS profile that was adopted in the FEIS for the Approved Project is presented in Figure 6, along with the TDS data that are considered to be reliable from 2016 and 2020.





Notes:

<sup>1</sup>Amaruq data presented from Port 3 (2016, 2019 and 2020), Port 4 (2016 and 2019) and Port 6 (2016)

<sup>2</sup>Amaruq Data (Golder 2016, Golder 2019d)

<sup>3</sup>Diavik Data (Blowes & Logson 1997; Kuchling et al. 2000)

<sup>4</sup>Frape and Fritz Data (Frape & Fritz 1987)

<sup>5</sup>Meadowbank Data (Golder 2004)

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PROJECT

2020 WESTBAY SYSTEM MONITORING PROGRAM  
WHALE TAIL MINE, NUNAVUT

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The TDS measured at Port 4 in 2020 (4,904 mg/L) is higher than previous measurements, but similar to the assumed TDS profile in groundwater (refer to Figure 6). No changes to the TDS profile is warranted at this time.

Arsenic concentrations in samples collected from the groundwater sampling Ports in 2020 were low and consistent with previous reliable data collected from the Westbay System. Radium-226 in groundwater is slightly higher in 2020 at Ports 3, 4 and 6, this constituent for comparison purposes only may exceed MDMER criteria in Formation groundwater.

## 5.0 QUALITY ASSURANCE/QUALITY CONTROL

Groundwater samples were collected from Ports 2, 3, 4 and 6 in triplicate and submitted in duplicate for analysis to the analytical laboratory as part of the quality assurance/quality control ('QA/QC') protocol. In addition, a field and trip blank were also submitted for analysis of select parameters. The analytical laboratory performs equipment blanks as a method of internal QA/QC verification.

The concentration of main anions (bicarbonate, bromide, chloride, fluoride and sulphate) and cations (calcium, magnesium, sodium and potassium) of groundwater were used to calculate the Charge Balance Error (CBE) as a reliability check for the laboratory analysis, where the sum ( $\Sigma$ ) of cations (in meq/L) should equal the sum of anions (in meq/L) as follows (Hounslow 1995):

$$CBE = \frac{[\Sigma Cations - \Sigma Anions]}{[\Sigma Cations + \Sigma Anions]} \times 100$$

The USEPA (1994) recommends a charge imbalance error of +/- 10% or less for the laboratory results to be considered acceptable.

The calculated charge balance error for all samples was equal to or below -8% (refer to Table 7), therefore the reported laboratory results are considered acceptable.

Analytical repeatability was tested by assessing the similarity between duplicate pairs of results. For each duplicate pairs of analysis where both results were higher than 5 times the method detection limit (MDL), the relative percent difference (RPD) was calculated as follows:

$$RPD = \frac{\text{absolute [difference (concentration of a given parameter)]}}{[\text{average (concentration of a given parameter)}]} \times 100$$

Per USEPA recommended methods (USEPA, 1994), an RPD of 20% or less was considered acceptable. Where one or both results of the duplicate pair were less than 5 times the MDL, a margin of +/- MDL was considered acceptable.

Table 7 presents the RPD or +/- MDL value calculated from the duplicate pair of results. Approximately 51% of duplicate pairs of analyses had one or both results below the method detection limit and consequently could not be assessed for repeatability. QA/QC results for the duplicate samples were within acceptable tolerance limits (RPD or +/- MDL) with the exception of duplicate concentrations of total chromium and zinc in Port 3 as well as duplicate concentrations of radium 226 in Ports 2, 4 and 6. All other trace components and major elements for samples are considered adequately repeatable.

The trip and equipment blanks returned concentrations that were very low or below the laboratory detection limits of all parameters, with a few exceptions. The equipment blank (VA20B9403-001) had higher concentrations TKN, ammonia, orthophosphate, total phosphorus, boron, calcium, magnesium, sodium, strontium and zinc than

expected, but the results are an order of magnitude or more, lower than the sampled Westbay Ports and therefore would not affect the significance of groundwater quality results. The source of the elevated concentration of these parameters could be attributed to incompletely de-ionized water used for the samples and/or insufficient rinsing of the stainless steel Westbay sample bottles after they were washed with Alconox disinfectant between sample runs.

TDS values were also calculated from the laboratory results in order to assess potential discrepancies between the ionic balance and uncertainty of the results (refer to Tables 4 and 7). The results of the field values, calculated values, and laboratory values were within reasonable range limits for all samples.

Uncertainty in the calculated groundwater water quality results from the variability in drill water composition augmented by probable mixing between aquifer zones having different levels of development (purging of drill water); this has an influence on the accuracy of all calculated groundwater quality; the effect of which is decreased with lower drilling brine proportion. The 2020 data remain valid to estimate water quality at Ports 3, 4 and 6, however the Port 6 2016 results may be a more accurate representation of Formation groundwater quality than 2020 based on the lower average fluorescein content measured in the samples. Based on the elevated concentrations of electrical conductivity, fluorescein content and lab measured TDS values, all indicative of the presence of drilling brine, samples collected from Ports 1 and 2 in 2020 do not offer an accurate representation of Formation groundwater quality.

## 6.0 CONCLUSION

The 2020 AMQ16-626 Westbay System groundwater monitoring program was carried out in support of the Whale Tail Pit Project Certificate No. 008 and in accordance with Section 3.1 of the Whale Tail Pit Project Groundwater Monitoring Plan Version 3\_NWB dated May 2019. During the visit, groundwater samples were also collected from the Westbay Well to continue to monitor the TDS and groundwater quality. These data were used to verify modelling assumptions related to the groundwater quality and the hydraulic gradient near the mine development areas.

The 2020 hydraulic heads measured in the Westbay System have decreased from the pre-development phase and are attributed to the dewatering of the North Basin and active excavation of the A21 Open Pit. Hydraulic head measurements in 2020 indicates an upward gradient is present between Ports 4 and 6 and a downward gradient is present between the deeper Ports. The upgrade gradient observed in the shallow ports in 2020 is anticipated to the depressurization induced from dewatering in the North Basin, and the deeper downward gradient is interpreted to be maintained by the continued retention of water in the South Basin of Whale Tail Lake.

Groundwater quality was estimated from the samples collected in 2020, subtracting the effect of residual drilling water in the Formation (in the raw water sample). The 2020 program estimated groundwater quality at Ports 3, 4 and 6 are in the same range as estimated in 2016. The data collected from these ports are considered reliable. Given the continued high proportion of drilling brine remaining in Ports 1 and 2, an accurate estimation of Formation groundwater quality is not possible at this time. The assumptions for the conceptual model, which were developed based on 2016 data are consistent with the recent data collection in Ports 3, 4 and 6, and are therefore still considered to be appropriate. Changes to the water management plan are not considered necessary based on the data presented in this report.

The concentrations of metals and arsenic in groundwater at Ports 3, 4 and 6 are low, similar to previous reliable data. Given that the arsenic concentrations remain similar to the assumptions adopted in the geochemical models (low arsenic in Formation groundwater), the contention that the natural content of arsenic in groundwater is not likely to have a significant effect on mine surface water quality is still valid.

The TDS measured at Port 4 in 2020 is higher than previous measurements, but similar to the assumed TDS profile in groundwater. No changes to the TDS profile is warranted at this time.

## 7.0 RECOMMENDATIONS

A drill fluid content of 5 to 10% has previously been targeted to provide a reasonable estimate of Formation groundwater quality at the AMQ16-626 Westbay System. Although the drill water content below 10% were achieved in Ports 3, 4 and 6 in 2020, calculated Formation water quality is still displaying a signature influenced by drilling brine. More accurate Formation groundwater quality estimates can be calculated as the Ports naturally flush more drill fluids. This can be accelerated by further developing the Ports prior to collecting the water sample (i.e., more than 3 days of purging Ports 3 and 4 prior to collecting a groundwater sample).

It is recommended that additional development and groundwater sampling be carried out at Port 1 and 2 on an annual basis as time permits to accelerate the removal of drill fluid remaining in the aquifer at these locations. Ports 1 and 2 are located below the anticipated ramp development zone (0 to 385 mbgs), however the water quality data at these deeper intervals (412 and 456 mbgs) is of interest in developing the salinity profile of the Whale Tail Lake talik. This water quality information will be of use in identifying and mitigating the effect of salinity (which is expected to increase with depth) prior to mining from greater depths. Port 1 representing a more conductive zone, it is of interest to have an accurate evaluation of groundwater quality which can represent a significant volume of water to be pumped during operations.

## 8.0 STUDY LIMITATIONS

This technical memorandum was prepared for the exclusive use of Agnico Eagle Mines Limited. The technical memorandum, which specifically includes all tables and attachments, is based on data and information collected by Golder Associates Ltd. and is based solely on the conditions of the property at the time of the work, supplemented by historical information and data obtained by Golder Associates Ltd. as described in this technical memorandum.

Golder Associates Ltd. has relied in good faith on all information provided and does not accept responsibility for any deficiency, misstatements, or inaccuracies contained in the technical memorandum as a result of omissions, misinterpretation, or fraudulent acts of the persons contacted or errors or omissions in the reviewed documentation.

The services performed, as described in this technical memorandum, were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

Any use which a third party makes of this technical memorandum, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Golder Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this technical memorandum.

The findings and conclusions of this technical memorandum are valid only as of the date of this technical memorandum and for the locations investigated. If new information is discovered in future work, including excavations, borings, or other studies, Golder Associates Ltd. should be requested to re-evaluate the conclusions of this technical memorandum and provide amendments as required.

## 9.0 CLOSURE

We trust this technical memorandum meets your current requirements. If you have any questions regarding this technical memorandum, please contact the undersigned.

**Golder Associates Ltd.**

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Attachments: Tables 4, 5 and 7

Attachment A – AQM16-626 Westbay System Installation Details

Attachment B – Westbay Instruments Mosdax Sampler Calibration Reports

Attachment C – 2020 Laboratory Certificates of Analysis

**PERMIT TO PRACTICE  
GOLDER ASSOCIATES LTD.**

Signature

*V. Bertrand*

Date

08-04-2021

**PERMIT NUMBER: P 049**

NT/NU Association of Professional  
Engineers and Geoscientists

## 10.0 REFERENCES

- Agnico Eagle (Agnico Eagle Mines Limited). 2018. Whale Tail Pit Management Plans - AEM RESPONSES TO ECCC & CIRNAC Reply - Waste Rock Management Plan, Water Management Plan, Water Quality and Flow Monitoring Plan. November 23, 2018.
- Agnico Eagle. 2019. Whale Tail Pit Project Groundwater Monitoring Plan. Version 3\_NWB. May 2019.
- Blowes DW, Logson MJ. 1997. Diavik Geochemistry 1996-1997 Baseline Report. Prepared for Diavik Diamond Mines Inc.
- Frape SK, Fritz P. 1987. Geochemical Trends for Groundwaters from the Canadian Shield. In: Saline Water and Gases in Crystalline Rocks, Editors: P. Fritz and S.K. Frape, Geological Association of Canada Special Paper 33.
- Gascoyne, M. 2000. A review of published literature on the effects of permafrost on the hydrogeochemistry of bedrock. Finland: Technical Report No. POSIVA-09. Prepared by Gascoyne GeoProjects Inc. Canada. June 2000.
- Golder. 2004. Predictions of Brackish Water Upwelling in Open Pits, Meadowbank Project Nunavut.
- Golder. 2016a. Groundwater Quality Investigation, Amaruq, Nunavut. Technical Memorandum 1649355-080 prepared for Agnico Eagle Mines Ltd. November 15, 2016.
- Golder. 2016b. Westbay System Installation Summary – Whale Tail Pit Project, Nunavut. Technical Memorandum 1649355-033-TM-Rev0-4000 prepared for Agnico Eagle Mines Ltd. July 7, 2016.
- Golder. 2016c. Hydrogeological Model Pre-Mining, During Mining, and Closure. Submitted as Volume 6, Appendix 6-B in the Whale Tail Pit and Haul Road Final Environmental Impact Statement. June 2016.
- Golder. 2016d. Hydrogeology Baseline Report – Whale Tail Project. Submitted as Volume 6, Appendix 6-A in the Whale Tail Pit and Haul Road Final Environmental Impact Statement. June 2016.
- Golder. 2018a. Hydrogeological Assessment and Modelling, Whale Tail Pit – Expansion Project. Submitted to Agnico Eagle Mines Limited. (Reference No. 1789310-213-RPT-Rev0). November 2018.
- Golder. 2018b. Whale Tail Pit Project, Hydrodynamic Modelling of Whale Tail Pit Lake. Submitted to Agnico Eagle Mines Limited. (Reference No. 1789310-181-TM-Rev0). Dated June 26, 2018.
- Golder. 2018c. Whale Tail Pit Post-Closure Hydrogeological Assessment for the Whale Tail Open Pit. Dated 27 June 2018.
- Golder. 2018d. Hydrogeological Assessment and Modelling Whale Tail Pit – Expansion Project. Submitted as Volume 6, Appendix 6-B in the Expansion Project Environmental Impact Statement. December 2018.
- Golder. 2019a. 2018 Westbay System Groundwater Investigation, Amaruq, Nunavut. Submitted to Agnico Eagle Mines Ltd. ((Reference No. 1789310-244-TM-Rev0). Dated 8 February 2019.
- Golder. 2019b. Whale Tail Project – Groundwater Management Monitoring Report. (Reference 19119750-279-TM-Rev0). Dated 22 March 2019.



- Golder. 2019c. Updated Hydrogeological Assessment, Whale Tail Pit, Expansion Project. Submitted to Agnico Eagle Mines Limited. (Reference No. 18108905-291-TM-Rev0). Dated 6 May 2019.
- Golder. 2019d. 2019 AMQ16-626 Westbay Groundwater Monitoring Investigation, Amaruq, Nunavut. Submitted to Agnico Eagle Mines Limited. (Reference No. 18108905-303-TM-Rev0). Dated 29 July 2019.
- Golder. 2021. 2020 Groundwater Monitoring Report Meadowbank Mine, Nunavut. Submitted to Agnico Eagle Mines Limited. (Reference No. 20148777-504-R-RevA). Dated X February 2021.
- Kuchling K, Chorley D, Zawadzki W. 2000. Hydrogeological Modeling of Mining Operations at the Diavik Diamonds Project. Proceedings of the Sixth International Symposium on Environmental Issues and Waste Management in Energy and Mineral Production. University of Calgary, Calgary, AB.
- NIRB (Nunavut Impact Review Board). 2018. Whale Tail Pit Project, NIRB Project Certificate No.: 008. Issued March 15, 2018.
- Rusydi, A. 2017. Correlation between conductivity and total dissolved solids in various types of water: A review. Global Colloquium on GeoSciences and Engineering 2017. IOP Conf. Series: Earth and Environmental Science 118 (2018) 012019. IOP Publishing. Pp. 1-6.
- SNCL (SNC-Lavalin). 2019. 2018 Groundwater Monitoring Program Report. Document No. 645182-3000-4EER-001. December 12, 2018.

**Table 4**  
**Drilling Brine Composition Westbay System AMQ16-626**  
**Agnico Eagle Mines Limited, Whale Tail Mine, Nunavut**

Sample	Units	Brine Fluid	Calculated Dilute Brine Port 6		Calculated Dilute Brine Port 4		Calculated Dilute Brine Port 3	
			Initial Brine	Maximum Brine	Initial Brine	Maximum Brine	Initial Brine	Maximum Brine
Date		17-Apr-16	21-Jul-16	21-Jul-16	24-Apr-16	27-Apr-16	02-Sep-16	02-Sep-16
<b>Field measured parameters</b>								
Fluorescein Concentration	mg/L	512.70	138.00	158.10	512.70	341.90	445.90	437.20
Drilling Fluid Proportion		1.00	0.27	0.31	1.00	0.67	0.87	0.85
Formation Water Proportion		0.00	0.73	0.69	0.00	0.33	0.13	0.15
Initial Conductivity Reading	uS/cm	0	10240	12210	3810	19400	52280	53800
Dilution of Brine Factor in Port		0.00	0.06	0.07	0.02	0.11	0.30	0.31
<b>Conventional Parameters</b>								
Conductivity (lab)	uS/cm	55420	-	-	-	-	-	-
Conductivity (calculated)	uS/cm	174000	10240	4684	3810	19400	52280	53800
Alkalinity	mg CaCO <sub>3</sub> /L	145.0	8.5	38.0	3.2	16.2	43.6	44.8
Hardness (as CaCO <sub>3</sub> ), from dissolved Ca/Mg	mg CaCO <sub>3</sub> /L	105554	6212	2230	2311	11769	31715	32637
pH	S.U.	10	11.25	7.40	11.68	10.97	10.54	10.53
Total dissolved solids (calculated)	mg/L	130500	7680	3122	2858	14550	39210	40350
Total dissolved solids (lab)	mg/L	36946	-	-	-	-	-	-
TSS	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-
Alkalinity, hydroxide (as CaCO <sub>3</sub> )	mg CaCO <sub>3</sub> /L	-	-	-	-	-	-	-
Alkalinity, carbonate (as CaCO <sub>3</sub> )	mg CaCO <sub>3</sub> /L	-	-	-	-	-	-	-
Alkalinity, bicarbonate (as CaCO <sub>3</sub> )	mg CaCO <sub>3</sub> /L	27.0	1.6	38.0	0.6	3.0	8.1	8.3
Chemical oxygen demand [COD]	mg/L	-	-	-	-	-	-	-
<b>Anions and Nutrients</b>								
Kjeldahl nitrogen, total [TKN]	mg/L	-	-	-	-	-	-	-
ammonia, total (as N)	mg/L	-	-	-	-	-	-	-
Bromide (Br)	mg/L	1066	63	75	23	119	320	330
Chloride (Cl)	mg/L	83700	4926	5873	1833	9332	25149	25880
Fluoride (F)	mg/L	0.06	0.004	0.004	0.001	0.01	0.02	0.02
Nitrates (NO <sub>3</sub> )	mg/L	0.54	0.03	0.04	0.01	0.06	0.2	0.2
nitrate + nitrite (as N)	mg/L	-	-	-	-	-	-	-
Nitrites (NO <sub>2</sub> )	mg/L	0.06	0.004	0.004	0.001	0.007	0.02	0.02
phosphate, ortho-, dissolved (as P)	mg/L	-	-	-	-	-	-	-
phosphorus, total	mg/L	-	-	-	-	-	-	-
silicate (as SiO <sub>2</sub> )	mg/L	-	-	-	-	-	-	-
Sulphate (SO <sub>4</sub> )	mg/L	<0.6	0	0	0	0	0	0
<b>Metals (dissolved)</b>								
Aluminium (Al)	mg/L	0.5	0.03	0.03	0.01	0.06	0.1	0.2
Antimony (Sb)	mg/L	0.035	0.002	0.002	0.001	0.004	0.011	0.011
Arsenic (As)	mg/L	0.8	0.05	0.05	0.02	0.09	0.2	0.2
Barium (Ba)	mg/L	0.1	0.007	0.008	0.002	0.01	0.03	0.03
Beryllium (Be)	mg/L	<0.0005	0	0	0	0	0	0
Bismuth (Bi)	mg/L	<0.0005	0	0	0	0	0	0
Boron (B)	mg/L	13.2	0.8	0.9	0.3	1.5	4.0	4.1
Cadmium (Cd)	mg/L	<0.00002	0	0	0	0	0	0
Calcium (Ca)	mg/L	42266	2487	2966	925	4712	12699	13068
Chromium (Cr)	mg/L	<0.0006	0	0	0	0	0	0
Cobalt (Co)	mg/L	0.0406	0.002	0.003	0.001	0.005	0.012	0.013
Copper (Cu)	mg/L	0.0039	0.0002	0.0003	0.0001	0.0004	0.0012	0.0012
Iron (Fe)	mg/L	2.6	0.2	0.2	0.1	0.3	0.8	0.8
Lead (Pb)	mg/L	<0.0003	0	0	0	0	0	0
Lithium (Li)	mg/L	34.52	2.0	2.4	0.8	3.8	10.4	10.7
Magnesium (Mg)	mg/L	3.9	0.2	0.3	0.1	0.4	1.2	1.2
Manganese (Mn)	mg/L	<0.0005	0	0	0	0	0	0

**Table 4**  
**Drilling Brine Composition Westbay System AMQ16-626**  
**Agnico Eagle Mines Limited, Whale Tail Mine, Nunavut**

Sample	Units	Brine Fluid	Calculated Dilute Brine Port 6		Calculated Dilute Brine Port 4		Calculated Dilute Brine Port 3	
			Initial Brine	Maximum Brine	Initial Brine	Maximum Brine	Initial Brine	Maximum Brine
<b>Date</b>		17-Apr-16	21-Jul-16	21-Jul-16	24-Apr-16	27-Apr-16	02-Sep-16	02-Sep-16
Dissolved Mercury (Hg)	mg/L	-	0.00002	0.00003	0.00001	0.00004	0.00012	0.00012
Molybdenum (Mo)	mg/L	<0.0005	0	0	0	0	0	0
Nickel (Ni)	mg/L	1.35	0.08	0.09	0.03	0.15	0.41	0.42
Potassium (K)	mg/L	1717	101	120	38	191	516	531
Selenium (Se)	mg/L	3.83	0.23	0.27	0.08	0.43	1.15	1.18
Silicon (Si)	mg/L	2.93	0.17	0.21	0.06	0.33	0.88	0.91
Silver (Ag)	mg/L	<0.0001	0	0	0	0	0	0
Sodium (Na)	mg/L	838	49	59	18	93	252	259
Strontium (Sr)	mg/L	656.0	38.61	46.03	14.36	73.14	197.1	202.83
Telluride (Te)	mg/L	<0.0005	0	0	0	0	0	0
Thallium (Tl)	mg/L	<0.002	0	0	0	0	0	0
Tin (Sn)	mg/L	<0.001	0	0	0	0	0	0
Titanium (Ti)	mg/L	45.2	2.66	3.17	0.99	5.04	13.58	13.98
Uranium (U)	mg/L	-	0	0	0	0	0	0
Vanadium (V)	mg/L	<0.001	0	0	0	0	0	0
Zinc (Zn)	mg/L	<0.0005	0	0	0	0	0	0
<b>Radioactive Ions</b>								
Radium (Ra 226)	Bq/L	<0.066	0	0	0	0	0	0
<b>Hydrocarbons</b>								
Hydrocarbons (C10-C50)	mg/L	0	0	0	0	0	0	0
<b>QA/QC</b>								
Calculated TDS (lab)	-	130500	-	-	-	-	-	-
Lab measured vs Calculated TDS	-	28%	-	-	-	-	-	-
Lab measured TDS vs Conductivity	-	0.7	-	-	-	-	-	-
Calculated TDS vs Calculated Conductivity	-	0.8	-	-	-	-	-	-

**Notes:**

- denotes parameter was not analyzed

**Table 5**  
**Westbay System AMQ16-626 Rock Formation Groundwater Quality Corrected to Remove Residual Drilling Water Whale Tail Lake Talik**  
**Agnico Eagle Mines Limited, Whale Tail Mine, Nunavut**

Sample		Port 6								Port 4					
Date		2-Aug-2016		13-Nov-2018		3-Apr-2019		18-Oct-2020		20-Jul-2016		11-Nov-2018		19-Oct-2020	
Drilling Fluid Proportion		0.04	0.24	0.16		0.14		0.08		0.09	0.18	0.13		0.06	
Formation Water Proportion		0.96	0.76	0.84		0.86		0.92		0.91	0.82	0.87		0.94	
Sampling interval depth (metres along borehole)		276.0 m - 287.4 m								349.3 m - 359.1 m					
Sampling interval vertical depth (metres)		257.7 m - 268.3 m								326.1 m - 335.2 m					
Estimated concentration range (calculated)		minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
Average Field measured parameters															
Fluorescein	ppb	41.77		83.54		74.08		42.00		93.00		66.21		31	
pH	S.U.	-	-	6.36		6.27		6.32		-	-	7.50		6.23	
Conductivity	uS/cm	4610		9083		9644		5404		6650		14555		4378	
Conventional parameters															
Conductivity (lab)	uS/cm	4797	6042	8041	8496	8388	8720	9260	9886	5366	5938	13084	15511	6394	7695
Alkalinity	mg CaCO <sub>3</sub> /L	40	51	30	31	34	34	24	28	18	20	9	11	24	25
Hardness (as CaCO <sub>3</sub> ), from dissolved Ca/Mg	mg CaCO <sub>3</sub> /L	2397	3030	2883	3127	3167	3369	3498	3940	2627	2910	4169	5582	2148	2789
pH	S.U.	7.41	7.27	6.50	6.57	6.29	6.29	6.16	6.53	7.87	7.82	6.88	6.91	6.32	6.50
Total dissolved Solids (TDS)	mg/L	3198	4042	4681	5171	5712	5962	5066	5756	3581	3966	7970	9945	3779	4904
Total Suspended Solids (TSS)	mg/L	-	-	8.3	9.5	5.1	5.1	<3.0	<3.0	-	-	20.3	24.3	<3.0	<3.0
Turbidity	mg/L	-	-	-	-	-	-	2.6	2.7	-	-	-	-	2.0	2.1
Alkalinity, carbonate (as CaCO <sub>3</sub> )	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	<1.0	<1.0	<1.0	<1.0
Alkalinity, bicarbonate (as CaCO <sub>3</sub> )	mg/L	40	51	31	32	35	35	24.1	28.4	18	20	11	12	24.9	25.5
Chemical oxygen demand [COD]	mg/L	-	-	-	-	-	-	3100	3200	-	-	-	-	580	633
Anions and Nutrients															
Kjeldahl nitrogen, total [TKN]		-	-	-	-	-	-	0.892	0.900	-	-	-	-	0.325	0.349
ammonia, total (as N)	mg/L	-	-	<0.437	<0.443	<0.466	<0.466	0.510	0.517	-	-	<0.157	<0.158	0.129	0.129
Bromide (Br)	mg/L	25	32	34	37	40	42	40	41	32	35	51	77	22	29
Chloride (Cl)	mg/L	2089	2641	2453	2697	2959	3119	3027	3111	2582	2860	3818	5722	1879	2405
Fluoride (F)	mg/L	0.21	0.27	<1.0	<1.0	<1.0	<1.0	<1.00	<1.00	0.5	0.5	<1.0	<1.0	<1.00	<1.00
Nitrates (NO <sub>3</sub> )	mg/L	0.063	0.079	<0.25	<0.25	<0.25	<0.25	<0.250	<0.250	0.06	0.06	<0.25	<0.25	<0.250	<0.250
Nitrites (NO <sub>2</sub> )	mg/L	0.010	0.013	<0.050	<0.050	<0.050	<0.050	<0.0500	<0.0500	0.011	0.012	<0.050	<0.050	<0.0500	<0.0500
phosphate, ortho-, dissolved (as P)	mg/L	-	-	-	-	-	-	<0.0010	<0.0010	-	-	-	-	<0.0010	<0.0010
phosphorus, total	mg/L	0.021	0.026	<0.0043	<0.0043	<0.0020	<0.0020	<0.0020	<0.0020	0.011	0.012	0.01	0.01	0.008	0.010
Reactive Silica	mg/L	-	-	-	-	<50	<50	7.0	7.3	<0.1	<0.1	-	-	6.1	6.2
Sulphate (SO <sub>4</sub> )	mg/L	-	-	<15	<15	<15	<15	<15.0	<15.0	-	-	<15	<15	<15.0	<15.0
Metals (dissolved)															
Aluminium (Al)	mg/L	<0.006	<0.006	<0.0050	<0.0050	<0.0050	<0.0050	<0.0100	0.003	-	-	0.0005	0.008	0.005	0.008
Antimony (Sb)	mg/L	0.0002	0.0003	0.001	0.001	<0.0010	<0.0010	<0.00100	0.000	0.003	0.004	0.001	0.002	0.001	0.002
Arsenic (As)	mg/L	0.0050	0.0063	<0.0021	<0.0024	<0.0025	<0.0025	<0.00272	<0.00278	0.0031	0.0035	<0.0020	<0.0020	0.002	<0.00311
Barium (Ba)	mg/L	0.528	0.667	0.947	0.976	0.999	0.999	0.880	0.978	0.134	0.148	0.533	0.561	0.187	0.191
Beryllium (Be)	mg/L	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.00100	<0.00100	<0.0005	<0.0005	<0.00050	<0.00050	<0.000100	<0.000100
Bismuth (Bi)	mg/L	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.000500	<0.000500	<0.0005	<0.0005	<0.00050	<0.00050	<0.000250	<0.000250
Boron (B)	mg/L	0.3	0.4	0.2	0.3	0.2	0.2	0.3	0.3	0.6	0.6	0.8	1.0	0.5	0.6
Cadmium (Cd)	mg/L	-	0.00003	<0.000050	<0.000050	0.00002	0.00002	<0.0000500	<0.0000500	<0.00002	<0.00002	<0.000050	<0.000050	<0.0000250	<0.0000250
Calcium (Ca)	mg/L	960	1213	1071	1164	1194	1275	1293	1368	1032	1143	1563	2125	846	1101
Chromium (Cr)	mg/L	0.007	0.009	<0.00050	<0.00050	<0.00050	<0.00050	<0.00100	<0.00100	0.005	0.006	<0.00050	<0.00050	<0.00250	<0.00250
Cobalt (Co)	mg/L	0.002	0.002	<0.000050	<0.000050	<0.000050	<0.000050	<0.00100	<0.00100	0.002	0.002	<0.000050	<0.000050	<0.00050	<0.00050
Copper (Cu)	mg/L	0.005	0.007	<0.00050	<0.00050	<0.00020	<0.00020	<0.00200	<0.00200	0.0020	0.0023	<0.00050	<0.00050	<0.00100	<0.00100
Iron (Fe)	mg/L	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.2	0.1	0.1	<0.050	<0.050
Lead (Pb)	mg/L	<0.0003	<0.0003	<0.00030	<0.00030	<0.000050	<0.000050	<0.000500	<0.000500	0.0027	0.003	<0.00030	<0.00030	<0.000250	<0.000250
Lithium (Li)	mg/L	0.3	0.4	0.1	0.2	0.1	0.2	0.2	0.3	0.6	0.7	1.1	1.6	0.4	0.7
Magnesium (Mg)	mg/L	22	27	51	51	44	44	41	42	12	14	62	66	8	9
Manganese (Mn)	mg/L	0.04	0.05	0.11	0.12	0.11	0.11	0.10	0.10	0.02	0.02	0.09	0.10	0.03	0.03
Dissolved Mercury (Hg)	mg/L	0.0005	0.0006	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0031	0.0034	<0.000010	<0.000010	<0.0000050	<0.0000050
Molybdenum (Mo)	mg/L	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.01
Nickel (Ni)	mg/L	0.05	0.06	<0.00050	<0.00050	<0.00050	<0.00050	<0.00500	<0.00500	0.05	0.05	<0.00050	<0.00050	<0.00250	<0.00250
Phosphorus (P)	mg/L	<0.0003	<0.0003	<0.00030	<0.00030	<0.000050	<0.000050	<0.500	<0.500	0.0027	0.0030	<0.00030	<0.00030	<0.250	<0.250
Potassium (K)	mg/L	8	10	<20	<20	11	11	1	3	38	42	67	67	22	35

**Table 5**  
**Westbay System AMQ16-626 Rock Formation Groundwater Quality Corrected to Remove Residual Drilling Water Whale Tail Lake Talik**  
**Agnico Eagle Mines Limited, Whale Tail Mine, Nunavut**

Sample		Port 6								Port 4					
Date		2-Aug-2016		13-Nov-2018		3-Apr-2019		18-Oct-2020		20-Jul-2016		11-Nov-2018		19-Oct-2020	
Drilling Fluid Proportion		0.04	0.24	0.16		0.14		0.08		0.09	0.18	0.13		0.06	
Formation Water Proportion		0.96	0.76	0.84		0.86		0.92		0.91	0.82	0.87		0.94	
Sampling interval depth (metres along borehole)		276.0 m - 287.4 m								349.3 m - 359.1 m					
Sampling interval vertical depth (metres)		257.7 m - 268.3 m								326.1 m - 335.2 m					
Estimated concentration range (calculated)		minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
Selenium (Se)	mg/L	0.1	0.1	<0.0020	<0.0020	<0.00050	<0.00050	<0.0025	<0.000658	0.12	0.13	<0.0020	<0.0020	<0.000250	0
Silicon (Si)	mg/L	4.0	5.1	3.2	3.3	3.2	3.2	3.445	3.503	4.2	4.6	2.5	2.6	3.044	3.093
Silver (Ag)	mg/L	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	<0.000100	<0.0001	<0.0001	<0.00010	<0.00010	<0.000050	<0.000050
Sodium (Na)	mg/L	232	293	287	293	308	310	304	306	267	296	341	365	279	290
Strontium (Sr)	mg/L	13.2	16.7	14.3	16.0	16.0	17.2	20.1	21.8	18.9	20.9	27.7	36.5	13.0	18.8
Telluride (Te)	mg/L	<0.0005	<0.0005	<0.00050	<0.00050	0.001	0.001	<0.00200	0.001	<0.0005	<0.0005	<0.00050	<0.00050	0.002	0.002
Thallium (Tl)	mg/L	<0.0008	<0.0008	<0.000050	<0.000050	<0.000050	<0.000050	<0.000100	<0.000100	<0.0008	<0.0008	<0.000050	<0.000050	<0.000050	<0.000050
Tin (Sn)	mg/L	0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00100	0.0011	0.0012	<0.0010	<0.0010	<0.00050	<0.00050
Titanium (Ti)	mg/L	0.3	0.4	<0.0050	<0.0050	<0.0050	<0.0050	<0.00150	<0.00300	0.3	0.4	<0.0050	<0.0050	<0.00150	<0.00150
Uranium (U)	mg/L	<0.001	<0.001	0.02	0.03	0.03	0.03	<0.000050	<0.000100	<0.001	<0.001	0.05	0.05	0.000	0.000
Vanadium (V)	mg/L	0.002	0.002	<0.000050	<0.000050	<0.000050	<0.000050	<0.00250	<0.00500	<0.0005	<0.0005	<0.000050	<0.000050	<0.00250	<0.00250
Zinc (Zn)	mg/L	1.3	1.7	<0.00050	<0.00050	<0.00050	<0.00050	0.026	0.026	0.63	0.70	<0.00050	<0.00050	0.010	0.014
Radioactive Ions															
Radium (Ra226)	Bq/L	0.43	0.52	-	-	0.99	0.99	0.72	1.20	0.13	0.13	-	-	0.31	0.38
Hydrocarbons															
Hydrocarbons (C10-C50)	mg/L	0.2	0.2	-	-	<0.52	<0.52	-	-	<0.1	<0.1	-	-	-	-

**Notes:**

Underline denotes estimated formation water quality

- denotes parameter was not analyzed

2019 Port 4 corrected sample was not representative of Formation groundwater quality due to elevated electrical conductivity and fluorescein content in sample (120 ppb, 23% drill fluid remain)

**Table 5**  
**Westbay System AMQ16-626 Rock Formation Groundwater Quality Corrected to Remove Residual Drilling Water Whale Tail Lake Talik**  
**Agnico Eagle Mines Limited, Whale Tail Mine, Nunavut**

Sample		Port 3							
Date		14-Sep-2016		12-Nov-2018		29-Mar-2019		13-Oct-2020	
Drilling Fluid Proportion		0.08 0.18		0.20		0.11		0.09	
Formation Water Proportion		0.92 0.82		0.80		0.89		0.91	
Sampling interval depth (metres along borehole)		381.3 m - 392.7 m							
Sampling interval vertical depth (metres)		356.0 m - 366.6 m							
Estimated concentration range (calculated)		minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
Average Field measured parameters									
Fluorescein	ppb	81.90		100.05		55.82		47	
pH	S.U.	-	-	8.35		6.93		7.14	
Conductivity	uS/cm	4450		7500		4747		3346	
Conventional parameters									
Conductivity (lab)	uS/cm	5220	5866	<7350	<7530	<4660	<4730	1275	1527
Alkalinity	mg CaCO <sub>3</sub> /L	52	58	51	52	54	54	56	58
Hardness (as CaCO <sub>3</sub> ), from dissolved Ca/Mg	mg CaCO <sub>3</sub> /L	1680	1891	<2600	<2740	<1300	<1320	<1890	<1950
pH	S.U.	7.96	7.91	7.31	7.41	6.73	6.84	6.77	6.79
Total dissolved Solids (TDS)	mg/L	3483	3918	<4980	<5100	<2980	<2990	<3770	<4040
Total Suspended Solids (TSS)	mg/L	-	-	7.5	7.9	<3.0	<3.0	<3.0	<3.0
Turbidity	mg/L	-	-	-	-	-	-	0.96	0.99
Alkalinity, carbonate (as CaCO <sub>3</sub> )	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
Alkalinity, bicarbonate (as CaCO <sub>3</sub> )	mg/L	52	58	60	61	58	59	59	61
Chemical oxygen demand [COD]	mg/L	-	-	-	-	-	-	1100	1120
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]		-	-	-	-	-	-	0.294	0.295
ammonia, total (as N)	mg/L	-	-	0.169	0.173	0.103	0.106	0.0854	0.086
Bromide (Br)	mg/L	22	25	<32.5	<32.7	<17	<18.2	<17.7	<17.8
Chloride (Cl)	mg/L	1714	1929	<2700	<2700	<1580	<1580	<1900	<1910
Fluoride (F)	mg/L	1.1	1.2	<1.0	<1.0	<0.80	<0.80	<1.00	<1.00
Nitrates (NO <sub>3</sub> )	mg/L	0.016	0.018	<0.25	<0.25	<0.10	<0.10	<0.250	<0.250
Nitrites (NO <sub>2</sub> )	mg/L	0.038	0.043	<0.050	<0.050	<0.020	<0.020	<0.0500	<0.0500
phosphate, ortho-, dissolved (as P)	mg/L	-	-	-	-	-	-	<0.0010	<0.0010
phosphorus, total	mg/L	0.049	0.055	0.01	0.01	0.003	0.005	0.0064	0.0067
Reactive Silica	mg/L	-	-	-	-	7.5	7.6	6.31	6.33
Sulphate (SO <sub>4</sub> )	mg/L	-	-	<15	<15	<6.0	<6.0	<15.0	<15.0
Metals (dissolved)									
Aluminium (Al)	mg/L	-	-	<0.0115	<0.0126	<0.0067	<0.0069	<0.0084	<0.0092
Antimony (Sb)	mg/L	0.0026	0.0029	0.001	0.001	0.00001	0.0002	0.0001	0.0002
Arsenic (As)	mg/L	<0.0005	<0.0005	<0.0034	<0.0034	<0.002	<0.002	<0.00174	<0.00177
Barium (Ba)	mg/L	0.057	0.065	0.098	0.104	0.064	0.065	0.075	0.075
Beryllium (Be)	mg/L	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.000200	<0.000200
Bismuth (Bi)	mg/L	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.000100	<0.000100
Boron (B)	mg/L	0.5	0.6	0.3	0.3	0.3	0.4	0.460	0.508
Cadmium (Cd)	mg/L	<0.00002	<0.00002	<0.000050	<0.000050	<0.000010	<0.000010	<0.0000100	<0.0000100
Calcium (Ca)	mg/L	671	756	<1040	<1090	<521	<528	<755	<779
Chromium (Cr)	mg/L	0.005	0.005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00020	0.00026
Cobalt (Co)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.00020	<0.00020
Copper (Cu)	mg/L	0.0046	0.0052	<0.00050	<0.00050	<0.00020	<0.00020	<0.00040	<0.00040
Iron (Fe)	mg/L	0.1	0.1	<0.018	<0.019	<0.010	<0.010	<0.020	<0.020
Lead (Pb)	mg/L	<0.0003	<0.0003	<0.00030	<0.00030	<0.000050	<0.000050	<0.000100	<0.000100
Lithium (Li)	mg/L	0.3	0.3	<0.749	<0.779	<0.156	<0.163	<0.334	<0.35
Magnesium (Mg)	mg/L	1	1	1	1	<1.0	<1.0	1	1
Manganese (Mn)	mg/L	0.01	0.01	0.02	0.02	0.005	0.01	0.008	0.010
Dissolved Mercury (Hg)	mg/L	0.00217	0.00244	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)	mg/L	0.02	0.02	0.02	0.02	0.005	0.005	0.002	0.002
Nickel (Ni)	mg/L	0.04	0.05	<0.00050	<0.00050	<0.00050	<0.00050	<0.00100	<0.00100
Phosphorus (P)	mg/L	<0.0003	<0.0003	<0.00030	<0.00030	<0.000050	<0.000050	<0.100	<0.100
Potassium (K)	mg/L	16	18	<38	<40	<11.5	<11.8	<15.8	<17



**Table 5**  
**Westbay System AMQ16-626 Rock Formation Groundwater Quality Corrected to Remove Residual Drilling Water Whale Tail Lake Talik**  
**Agnico Eagle Mines Limited, Whale Tail Mine, Nunavut**

Sample		Port 3							
Date		14-Sep-2016		12-Nov-2018		29-Mar-2019		13-Oct-2020	
Drilling Fluid Proportion		0.08	0.18	0.20		0.11		0.09	
Formation Water Proportion		0.92	0.82	0.80		0.89		0.91	
Sampling interval depth (metres along borehole)		381.3 m - 392.7 m							
Sampling interval vertical depth (metres)		356.0 m - 366.6 m							
Estimated concentration range (calculated)		minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
Selenium (Se)	mg/L	0.08	0.09	<0.0020	<0.0020	<0.00074	<0.00081	<0.000275	<0.000364
Silicon (Si)	mg/L	4.3	4.8	3.5	3.5	3.5	3.6	3.2	3.3
Silver (Ag)	mg/L	<0.0001	<0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020
Sodium (Na)	mg/L	306	344	285	313	323	332	293	316
Strontium (Sr)	mg/L	12.7	14.2	<16.9	<17.2	<8.7	<8.8	<12.8	<13.2
Telluride (Te)	mg/L	<0.0005	<0.0005	<0.00050	<0.00050	<0.00050	<0.00050	0.001	0.001
Thallium (Tl)	mg/L	<0.0008	<0.0008	<0.000050	<0.000050	<0.000050	<0.000050	<0.000020	<0.000020
Tin (Sn)	mg/L	<0.001	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.00020	<0.00020
Titanium (Ti)	mg/L	0.2	0.3	<0.0050	<0.0050	<0.0050	<0.0050	<0.00150	<0.00150
Uranium (U)	mg/L	0.06	0.07	0.09	0.09	<0.000050	<0.000050	<0.000020	0.000024
Vanadium (V)	mg/L	<0.001	<0.001	0.00020	0.00020	<0.00050	<0.00050	<0.00100	<0.00100
Zinc (Zn)	mg/L	<0.0005	<0.0005	<0.00050	<0.00050	0.004	0.005	<0.0020	<0.0020
Radioactive Ions									
Radium (Ra226)	Bq/L	0.15	0.16	-	-	0.21	0.22	0.30	0.36
Hydrocarbons									
Hydrocarbons (C10-C50)	mg/L	0.27	0.31	-	-	<0.52	<0.52	-	-

**Notes:**

Underline denotes estimated formation water quality

- denotes parameter was not analyzed

2019 Port 4 corrected sample was not representative of Formation

**Table 7**  
**QA/QC of Westbay System AMQ16-626 Rock Formation Groundwater Quality Whale Tail Lake Talik**  
**Agnico Eagle Mines Limited, Whale Tail Mine, Nunavut**

Location	Units	MDL	Port 3			MDL	Port 2			MDL
Date Sampled			13-Oct-2020	13-Oct-2020	RPD		16-Oct-2020	16-Oct-2020	RPD	
ALS Sample ID			VA20B8468-001	VA20B8468-002			VA20B9109-001	VA20B9109-002		
Analyte			Duplicate				Duplicate			
Physical Tests										
Conductivity	µS/cm	2	6090	6180	1%	2	20300	20400	0%	2
Alkalinity, total (as CaCO3)	mg/L	2	56.5	54.7	3%	1	43.2	43.8	1%	1
Hardness (as CaCO3), dissolved	mg/L	0.6	1890	1950	3%	1	8820	8610	2%	1
pH	pH units	0.1	7.13	7.12	0%	0.1	7.37	7.24	2%	0.1
Total Dissolved Solids [TDS]	mg/L	15 - 20	3770	3980 to 4040	5% to 7%	80	13300	14000	5%	40
Total Suspended Solids [TSS]	mg/L	3	<3.0	<3.0	--	3	<3.0	<3.0	--	3
Turbidity	NTU	0.1	0.96	0.99	3%	0.1	3.3	3.08	7%	0.1
Alkalinity, hydroxide (as CaCO3)	mg/L	2	<2.0	<2.0	--	1	<1.0	<1.0	--	1
Alkalinity, carbonate (as CaCO3)	mg/L	2	<2.0	<2.0	--	1	<1.0	<1.0	--	1
Alkalinity, bicarbonate (as CaCO3)	mg/L	2	56.5	54.7	3%	1	43.2	43.8	1%	1
Anions and Nutrients										
Total Kjeldahl Nitrogen [TKN]	mg/L	0.05	0.295	0.294	0%	0.05	0.415	0.408	2%	0.05
Ammonia, total (as N)	mg/L	0.005	0.0854	0.086	1%	0.005	0.144	0.139	4%	0.025
Bromide	mg/L	0.025	17.8	17.7	1%	5	96.8	98.7	2%	2.5
Chloride	mg/L	5	1900.00	1910.00	1%	50	7800	7780	0%	25
Fluoride	mg/L	1	<1.00	<1.00	--	2	<2.00	<2.00	--	1
Nitrate (as N)	mg/L	0.25	<0.250	<0.250	--	0.5	<0.500	<0.500	--	0.25
Nitrate + nitrite (as N)	mg/L	0.255	<0.255	<0.255	--	0.51	<0.510	<0.510	--	0.255
Nitrite (as N)	mg/L	0.05	<0.0500	<0.0500	--	0.1	<0.100	<0.100	--	0.05
Phosphate, ortho-, dissolved (as P)	mg/L	0.001	<0.0010	<0.0010	--	0.001	0.0024	0.0024	<MDL	0.001
Total Phosphorus	mg/L	0.002	0.0067	0.0064	<MDL	0.002	0.0104	0.0091	<MDL	0.002
Silicate (as SiO2)	mg/L	0.5	6.31	6.33	0%	5	6.47	6.43	<MDL	5
Sulfate (as SO4)	mg/L	15	<15.0	<15.0	--	30	<30.0	<30.0	--	15
Total Metals										
Aluminum	mg/L	0.015	<0.0150	<0.0150	--	0.0600	<0.0600	<0.0600	--	0.015 - 0.030
Antimony	mg/L	0.00050	0.00126	0.00122	<MDL	0.00200	<0.00200	<0.00200	--	0.0005 - 0.001
Arsenic	mg/L	0.00050	0.00204	0.002	<MDL	0.00200	<0.00200	<0.00200	--	0.0005 - 0.002
Barium	mg/L	0.00050	0.0742	0.0755	2%	0.002	0.0992	0.105	6%	0.0005 - 0.0010
Beryllium	mg/L	0.000500	<0.000500	<0.000500	--	0.00200	<0.00200	<0.00200	--	0.00050 - 0.0010
Bismuth	mg/L	0.000250	<0.000250	<0.000250	--	0.00100	<0.00100	<0.00100	--	0.00025 - 0.0005
Boron	mg/L	0.05	0.824	0.84	2%	0.2	1.76	1.8	2%	0.05 - 0.10
Cadmium	mg/L	0.0000250	<0.0000250	<0.0000250	--	0.000100	<0.000100	<0.000100	--	0.000025 - 0.000050
Calcium	mg/L	0.25	739	750	1%	0.25	3780	3830	1%	0.25 - 0.50
Cesium	mg/L	0.00001	0.000248	0.000236	5%	0.000200	0.00191	0.00182	5%	0.00005 - 0.0001
Chromium	mg/L	0.00050	0.00241	0.00108	>MDL	0.00200	0.00324	0.00258	<MDL	0.0005 - 0.0010
Cobalt	mg/L	0.00050	<0.00050	<0.00050	--	0.00200	<0.00200	<0.00200	--	0.0005 - 0.0010
Copper	mg/L	0.00250	<0.00250	<0.00250	--	0.0100	<0.0100	<0.0100	--	0.0025 - 0.0050
Iron	mg/L	0.050	<0.050	<0.050	--	0.200	<0.200	<0.200	--	0.050 - 0.10
Lead	mg/L	0.000250	<0.000250	<0.000250	--	0.001000	0.00141	0.00216	<MDL	0.000250 - 0.00050
Lithium	mg/L	0.005	0.309	0.317	3%	0.02	3.11	3.23	4%	0.050 - 0.01
Magnesium	mg/L	0.025	0.909	0.898	1%	0.1	1.21	1.01	18%	0.0250 - 0.050
Manganese	mg/L	0.0005	0.0074	0.00759	3%	0.002	0.016	0.0148	8%	0.00050 - 0.0010
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	--	0.0000050	<0.0000050	<0.0000050	--	0.000005
Molybdenum	mg/L	0.00025	0.00343	0.00326	5%	0.001	0.00836	0.0078	7%	0.00025 - 0.00050
Nickel	mg/L	0.0025	<0.00250	<0.00250	--	0.0100	<0.0100	<0.0100	--	0.0025 - 0.0050
Phosphorus	mg/L	0.25	<0.250	<0.250	--	1.00	<1.00	<1.00	--	0.25 - 0.50
Potassium	mg/L	0.25	18.3	18.4	1%	1	135	140	4%	0.25 - 0.51
Rubidium	mg/L	0.001	0.0245	0.0243	1%	0.004	0.178	0.175	2%	0.0010 - 0.0020
Selenium	mg/L	0.00025	<0.000250	0.000267	--	0.00100	<0.00100	<0.00100	--	0.00025 - 0.00050
Silicon	mg/L	0.5	3.18	3.35	5%	2	3.54	3.33	<MDL	0.50 - 1.0
Silver	mg/L	0.00005	<0.000050	<0.000050	--	0.000200	<0.000200	<0.000200	--	0.000050 - 0.0001
Sodium	mg/L	0.25	315	319	1%	1	441	449	2%	0.25 - 0.50
Strontium	mg/L	0.001	11.6	11.7	1%	0.004	58.9	58.6	1%	0.001 - 0.002
Sulfur	mg/L	0.25	<2.50	<2.50	--	10.0	<10.0	<10.0	--	2.5 - 5.0
Tellurium	mg/L	0.001	0.00179	0.00128	<MDL	0.00400	0.00416	0.00411	<MDL	0.0010 - 0.0020
Thallium	mg/L	0.00005	<0.000050	<0.000050	--	0.000200	<0.000200	<0.000200	--	0.00005 - 0.00010
Thorium	mg/L	0.0005	<0.00050	<0.00050	--	0.00200	<0.00200	<0.00200	--	0.0005 - 0.0010
Tin	mg/L	0.0005	<0.00050	<0.00050	--	0.00200	<0.00200	<0.00200	--	0.0005 - 0.0010
Titanium	mg/L	0.0015	<0.00150	<0.00150	--	0.00600	<0.00600	<0.00600	--	0.0015 - 0.0030
Tungsten	mg/L	0.0005	0.0361	0.0352	3%	0.00020	0.0546	0.054	1%	0.0005 - 0.002
Uranium	mg/L	0.00005	<0.000050	<0.000050	--	0.000200	<0.000200	<0.000200	--	0.000050 - 0.00010

**Table 7**  
**QA/QC of Westbay System AMQ16-626 Rock Formation Groundwater Quality Whale Tail Lake Talik**  
**Agnico Eagle Mines Limited, Whale Tail Mine, Nunavut**

Location	Units	MDL	Port 3			MDL	Port 2			MDL
Date Sampled			13-Oct-2020	13-Oct-2020	RPD		16-Oct-2020	16-Oct-2020	RPD	
ALS Sample ID			VA20B8468-001	VA20B8468-002			VA20B9109-001	VA20B9109-002		
Analyte				Duplicate				Duplicate		
Vanadium	mg/L	0.0025	<0.00250	<0.00250	--	0.0100	<0.0100	<0.0100	--	0.0025 - 0.0050
Zinc	mg/L	0.015	0.128	0.1	25%	0.060	0.138	0.155	<MDL	0.0150 - 1.0
Zirconium	mg/L	0.001	<0.00100	<0.00100	--	0.00400	<0.00400	<0.00400	--	0.001 - 0.0020
Dissolved Metals										
Auminum	mg/L	0.005	0.0084	0.0092	<MDL	0.02000	<0.0200	0.0163	--	0.0050 - 0.010
Antimony	mg/L	0.0002	0.00107	0.00112	5%	0.002000	<0.00200	0.00119	--	0.0005 - 0.0010
Arsenic	mg/L	0.0002	0.00177	0.00174	2%	0.002000	<0.00200	0.00194	--	0.0005 - 0.0010
Barium	mg/L	0.0002	0.0713	0.071	0%	0.002	0.101	0.0998	1%	0.0005 - 0.001
Beryllium	mg/L	0.0002	<0.000200	<0.000200	--	0.002000	<0.00200	<0.00100	--	0.0005 - 0.00100
Bismuth	mg/L	0.0001	<0.000100	<0.000100	--	0.001000	<0.00100	<0.000500	--	0.00025 - 0.00050
Boron	mg/L	0.02	0.792	0.825	4%	0.2	1.63	1.61	1%	0.05 - 0.1
Cadmium	mg/L	0.0000100	<0.0000100	<0.0000100	--	0.0001	<0.000100	<0.0000500	--	0.000025 - 0.00005
Calcium	mg/L	0.05	755	779	3%	1	3530	3450	2%	0.25 - 0.50
Cesium	mg/L	0.00001	0.000225	0.000234	4%	0.0002	0.00179	0.00183	2%	0.00005 - 0.0001
Chromium	mg/L	0.0001	0.00024	<0.00020	--	0.002	<0.00200	<0.00100	--	0.00005 - 0.0001
Cobalt	mg/L	0.0002	<0.00020	<0.00020	--	0.002	<0.00200	<0.00100	--	0.00005 - 0.0001
Copper	mg/L	0.0004	<0.00040	<0.00040	--	0.004	<0.00400	<0.00200	--	0.001 - 0.002
Iron	mg/L	0.02	<0.020	<0.020	--	0.2	<0.200	<0.100	--	0.05 - 0.10
Lead	mg/L	0.0001	<0.000100	<0.000100	--	0.001	<0.00100	<0.000500	--	0.00025 - 0.0005
Lithium	mg/L	0.002	0.334	0.35	5%	0.02	2.87	2.7	6%	0.005 - 0.010
Magnesium	mg/L	0.01	0.833	0.811	3%	0.1	0.79	0.79	0%	0.025 - 0.05
Manganese	mg/L	0.0002	0.00866	0.00711	20%	0.002	0.0141	0.0125	12%	0.0005 - 0.001
Mercury	mg/L	0.000005	<0.0000050	<0.0000050	--	0.000005	<0.0000050	<0.0000050	--	0.000005
MolybdenumI	mg/L	0.0001	0.00227	0.0021	8%	0.001	0.00782	0.00824	5%	0.000250 - 0.00050
Nickel	mg/L	0.001	<0.00100	<0.00100	--	0.01	<0.0100	<0.00500	--	0.0025 - 0.0050
PhosphorusI	mg/L	0.1	<0.100	<0.100	--	1.00	<1.00	<0.500	--	0.25 - 0.50
Potassium	mg/L	0.1	15.8	17	7%	1	118	116	2%	0.25 - 0.50
Rubidium	mg/L	0.0004	0.0236	0.0244	3%	0.004	0.144	0.145	1%	0.001 - 0.002
Selenium	mg/L	0.0001	0.000364	0.000275	<MDL	0.001	<0.00100	<0.000500	--	0.000250 - 0.00050
Silicon	mg/L	0.1	3.07	3.01	2%	1	3.32	3.2	<MDL	0.25 - 0.50
Silver	mg/L	0.00002	<0.000020	<0.000020	--	0.0002	<0.000200	<0.000100	--	0.00005 - 0.0001
Sodium	mg/L	0.1	290	310	7%	1	440	419	5%	0.25 - 0.50
Strontium	mg/L	0.0004	12.8	13.2	3%	0.004	57.3	58.7	2%	0.001 - 0.002
Sulfur	mg/L	1	<1.00	<1.00	--	10.00	<10.0	<5.00	--	2.5 - 5.0
Tellurium	mg/L	0.0004	0.00078	0.00066	<MDL	0.004	<0.00400	0.00385	--	0.0010 - 0.0020
Thallium	mg/L	0.00002	<0.000020	<0.000020	--	0.0002	<0.000200	<0.000100	--	0.000050 - 0.00010
Thorium	mg/L	0.0002	<0.00020	<0.00020	--	0.002	<0.00200	<0.00100	--	0.0005 - 0.0010
Tin	mg/L	0.0002	<0.00020	<0.00020	--	0.00	<0.00200	<0.00100	--	0.0005 - 0.0010
Titanium	mg/L	0.0015	<0.00150	<0.00060	--	0.006	<0.00600	<0.00300	--	0.00150 - 0.0003
Tungsten	mg/L	0.0002	0.0342	0.0331	3%	0.002	0.0529	0.054	2%	0.0005 - 0.0010
Uranium	mg/L	0.00001	0.000022	<0.000020	--	0.0002	<0.000200	0.00014	--	0.000050 - 0.00010
Vanadium	mg/L	0.0005	<0.00100	<0.00100	--	0.0100	<0.0100	<0.00500	--	0.0025 - 0.0050
Zinc	mg/L	0.001	<0.0020	<0.0020	--	0.0200	<0.0200	<0.0100	--	0.0050 - 0.010
Zirconium	mg/L	0.0002	<0.00040	<0.00040	--	0.00400	<0.00400	<0.00200	--	0.0015 - 0.0020
Aggregate Organics										
chemical oxygen demand [COD]	mg/L	80	1100	1120	2%	20	1430	1530	7%	20
Radiological Parameters										
radium-226	Bq/L	0.0092	0.33	0.27	20%	0.02	1.1	0.88	22%	0.013
QA/QC										
Calculated TDS	mg/L	-	3060	3113	-	-	12101	11982	-	-
Lab measured TDS vs Calculated TDS	%	-	81%	77 to 78%	-	-	91%	86%	-	-
Sum Cations	meq	-	55	55	-	-	224	223	-	-
Sum Anions	meq	-	51	53	-	-	189	193	-	-
Ionic Balance	%	-	-4%	-2%	-	-	-8%	-7%	-	-

**Notes:**

MDL = method detection limit

RPD = relative percent difference

Shaded denotes RPD value exceeds 20% or duplicate outside of MDL tolerance (both samples are between the MDL and 5 times the MDL)

-- denotes not calculated (one or both result below MDL)

- denotes parameter was not analyzed

**Table 7**  
**QA/QC of Westbay System AMQ16-626 Rock Formation Groundwater Quality Whale Tail Lake Talik**  
**Agnico Eagle Mines Limited, Whale Tail Mine, Nunavut**

Location	Units	Port 6			MDL	Port 4			MDL	QA/QC Samples		
Date Sampled		18-Oct-2020	18-Oct-2020	RPD		19-Oct-2020	19-Oct-2020	RPD		19-Oct-2020	20-Oct-2020	20-Oct-2020
ALS Sample ID		VA20B9109-003	VA20B9109-004			VA20B9224-001	VA20B9224-002			VA20B9224-003	VA20B9403-001	VA20B9403-002
Analyte		Duplicate				Duplicate				Field Blank	Trip Blank	
Physical Tests												
Conductivity	µS/cm	9340	9460	1%	2	7180	7460	4%	6950	2	3.4	<2.0
Alkalinity, total (as CaCO3)	mg/L	26.2	25.2	4%	1	24	23.6	2%	66.9	1	1.2	<1.0
Hardness (as CaCO3), dissolved	mg/L	3800	3720	2%	0.6	2760	2730	1%	2160	0.6	0.67	-
pH	pH units	6.6	6.58	0%	0.1	6.64	6.77	2%	7.44	0.1	6.01	5.30
Total Dissolved Solids [TDS]	mg/L	5280	5540	5%	10	4430	4780	8%	4310	10	<10	<10
Total Suspended Solids [TSS]	mg/L	<3.0	<3.0	--	3	<3.0	<3.0	--	5.2	3	<3.0	<3.0
Turbidity	NTU	2.6	2.69	3%	0.1	2.11	1.96	7%	6.32	0.1	0.24	<0.10
Alkalinity, hydroxide (as CaCO3)	mg/L	<1.0	<1.0	--	1	<1.0	<1.0	--	<1.0	1	<1.0	<1.0
Alkalinity, carbonate (as CaCO3)	mg/L	<1.0	<1.0	--	1	<1.0	<1.0	--	<1.0	1	<1.0	<1.0
Alkalinity, bicarbonate (as CaCO3)	mg/L	26.2	25.2	4%	1	24	23.6	2%	66.9	1	1.2	<1.0
Anions and Nutrients												
Total Kjeldahl Nitrogen [TKN]	mg/L	0.819	0.826	1%	0.05	0.328	0.305	7%	0.209	0.05	0.087	<0.050
Ammonia, total (as N)	mg/L	0.468	0.475	1%	0.005	0.121	0.121	0%	0.0493	0.005	0.0227	<0.0050
Bromide	mg/L	42.8	42.8	0%	2.5	28.3	28.7	1%	19	0.05	<0.050	<0.050
Chloride	mg/L	3260	3260	0%	25	2330	2370	2%	2250	0.5	<0.50	<0.50
Fluoride	mg/L	<1.00	<1.00	--	1	<1.00	<1.00	--	<1.00	0.02	<0.020	<0.020
Nitrate (as N)	mg/L	<0.250	<0.250	--	0.25	<0.250	<0.250	--	<0.250	0.0050	<0.0050	<0.0050
Nitrate + nitrite (as N)	mg/L	<0.255	<0.255	--	0.255	<0.255	<0.255	--	<0.255	0.0051	<0.0051	<0.0051
Nitrite (as N)	mg/L	<0.0500	<0.0500	--	0.05	<0.0500	<0.0500	--	<0.0500	0.0010	<0.0010	<0.0010
Phosphate, ortho-, dissolved (as P)	mg/L	<0.0010	<0.0010	--	0.001	<0.0010	<0.0010	--	<0.0010	0.0010	0.0079	<0.0010
Total Phosphorus	mg/L	<0.0020	<0.0020	--	0.002	0.0095	0.0076	<MDL	0.0165	0.0020	0.0287	<0.0020
Silicate (as SiO2)	mg/L	6.69	6.42	<MDL	5	5.87	5.77	<MDL	5.3	0.50	0.61	<0.50
Sulfate (as SO4)	mg/L	<15.0	<15.0	--	15	<15.0	<15.0	--	<15.0	0.30	0.37	<0.30
Total Metals												
Aluminum	mg/L	0.0219	<0.0300	--	0.015	0.0172	0.018	<MDL	0.228	0.003	0.007	<0.0030
Antimony	mg/L	0.00061	<0.00100	--	0.0005	0.00154	0.00155	<MDL	0.00463	0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.00235	0.00236	<MDL	0.0005	0.00429	0.00438	2%	0.0171	0.0001	0.00014	<0.00010
Barium	mg/L	0.866	0.87	0%	0.0005	0.181	0.181	0%	0.147	0.0001	0.00028	<0.00010
Beryllium	mg/L	<0.000500	<0.00100	--	0.00001	<0.000100	<0.000100	--	<0.000100	0.000100	<0.000100	<0.000100
Bismuth	mg/L	<0.000250	<0.000500	--	0.00025	<0.000250	<0.000250	--	<0.000250	0.000050	<0.000050	<0.000050
Boron	mg/L	0.375	0.411	<MDL	0.05	0.666	0.648	3%	1.29	0.010	0.027	<0.010
Cadmium	mg/L	<0.0000250	<0.0000500	--	0.000025	<0.0000250	<0.0000250	--	<0.0000250	0.000005	0.0000206	<0.0000050
Calcium	mg/L	1550	1600	3%	0.25	1130	1100	3%	894	0.050	0.195	<0.050
Cesium	mg/L	0.000164	0.000163	<MDL	0.00005	0.000286	0.0003	5%	0.000158	0.000010	<0.000010	<0.000010
Chromium	mg/L	0.00095	<0.00100	--	0.0025	<0.00250	<0.00250	--	0.0041	0.00010	<0.00010	<0.00010
Cobalt	mg/L	<0.00050	<0.00100	--	0.0005	<0.00050	<0.00050	--	<0.00050	0.00010	<0.00010	<0.00010
Copper	mg/L	<0.00250	<0.00500	--	0.0025	<0.00250	<0.00250	--	0.00272	0.00050	0.00117	<0.00050
Iron	mg/L	0.379	0.371	<MDL	0.05	0.087	0.096	<MDL	1.02	0.010	<0.010	<0.010
Lead	mg/L	0.000273	<0.000500	--	0.00025	0.000262	0.000273	<MDL	0.00328	0.000050	0.000975	<0.000050
Lithium	mg/L	0.533	0.504	6%	0.005	0.667	0.662	1%	0.0986	0.0010	<0.0010	<0.0010
Magnesium	mg/L	37.5	37.4	0%	0.025	8.07	8.04	0%	3.23	0.0050	0.0731	<0.0050
Manganese	mg/L	0.0938	0.095	1%	0.0005	0.026	0.0267	3%	0.0173	0.00010	0.00021	<0.00010
Mercury	mg/L	<0.0000050	<0.0000050	--	0.000005	<0.0000050	<0.0000050	--	<0.0000050	0.0000050	<0.0000050	<0.0000050
Molybdenum	mg/L	0.014	0.0134	4%	0.00025	0.00497	0.00507	2%	0.00113	0.000050	<0.000050	<0.000050
Nickel	mg/L	<0.00250	<0.00500	--	0.0025	<0.00250	<0.00250	--	<0.00250	0.00050	0.00063	<0.00050
Phosphorus	mg/L	<0.250	<0.500	--	0.25	<0.250	<0.250	--	<0.250	0.050	<0.050	<0.050
Potassium	mg/L	11.9	11.8	1%	0.25	35.5	34.7	2%	13.5	0.050	<0.050	<0.050
Rubidium	mg/L	0.0176	0.0176	0%	0.001	0.0385	0.0384	0%	0.0224	0.00020	<0.00020	<0.00020
Selenium	mg/L	0.000459	<0.000500	--	0.00025	<0.000250	0.00026	--	<0.000250	0.000050	<0.000050	<0.000050
Silicon	mg/L	3.36	3.23	<MDL	0.05	3.1	3.04	2%	3.38	0.10	0.51	<0.10
Silver	mg/L	<0.000050	<0.000100	--	0.00005	<0.000050	<0.000050	--	0.000803	0.000010	0.000039	<0.000010
Sodium	mg/L	295	282	5%	0.25	290	287	1%	489	0.050	0.298	<0.050
Strontium	mg/L	21.1	20.6	2%	0.001	18.8	18.6	1%	14.2	0.00020	0.00099	<0.00020
Sulfur	mg/L	<2.50	<5.00	--	2.5	<2.50	<2.50	--	<2.50	0.50	<0.50	<0.50
Tellurium	mg/L	0.00135	<0.00200	--	0.001	0.0019	0.00193	<MDL	0.00158	0.00020	<0.00020	<0.00020
Thallium	mg/L	<0.000050	<0.000100	--	0.00005	<0.000050	<0.000050	--	<0.000050	0.000010	<0.000010	<0.000010
Thorium	mg/L	<0.00050	<0.00100	--	0.0005	<0.00050	<0.00050	--	<0.00050	0.00010	<0.00010	<0.00010
Tin	mg/L	<0.00050	<0.00100	--	0.0005	<0.00050	<0.00050	--	<0.00050	0.00010	<0.00010	<0.00010
Titanium	mg/L	<0.00150	<0.00300	--	0.0015	<0.00150	<0.00150	--	0.0122	0.00030	<0.00030	<0.00030
Tungsten	mg/L	0.0196	0.0197	1%	0.0005	0.0371	0.0373	1%	0.031	0.00010	<0.00010	<0.00010
Uranium	mg/L	<0.000050	<0.000100	--	0.00005	0.000078	0.000078	<MDL	0.000101	0.000010	<0.000010	<0.000010

**Table 7**  
**QA/QC of Westbay System AMQ16-626 Rock Formation Groundwater Quality Whale Tail Lake Talik**  
**Agnico Eagle Mines Limited, Whale Tail Mine, Nunavut**

Location	Units	Port 6			MDL	Port 4			Port 1	MDL	QA/QC Samples	
Date Sampled		18-Oct-2020	18-Oct-2020	RPD		19-Oct-2020	19-Oct-2020	RPD	19-Oct-2020		20-Oct-2020	20-Oct-2020
ALS Sample ID		VA20B9109-003	VA20B9109-004			VA20B9224-001	VA20B9224-002		VA20B9224-003		VA20B9403-001	VA20B9403-002
Analyte		Duplicate				Duplicate			Field Blank		Trip Blank	
Vanadium	mg/L	<0.00250	<0.00500	--	0.0025	<0.00250	<0.00250	--	<0.00250	0.00050	<0.00050	<0.00050
Zinc	mg/L	0.281	0.284	<MDL	0.015	0.119	0.116	3%	0.063	0.003	0.0112	<0.0030
Zirconium	mg/L	<0.00100	<0.00200	--	0.001	<0.00100	<0.00100	--	<0.00100	0.00020	<0.00020	<0.00020
Dissolved Metals												
Auminum	mg/L	<0.0100	0.0053	--	0.005	0.0086	0.0079	<MDL	0.0119	0.0010	0.0038	-
Antimony	mg/L	<0.00100	0.00058	--	0.0005	0.00158	0.00171	<MDL	0.00452	0.00010	<0.00010	-
Arsenic	mg/L	0.00278	0.00272	<MDL	0.0005	0.00311	0.00306	2%	0.0147	0.00010	0.00015	-
Barium	mg/L	0.809	0.898	10%	0.0005	0.176	0.18	2%	0.141	0.00010	0.00035	-
Beryllium	mg/L	<0.00100	<0.000500	--	0.0001	<0.000100	<0.000100	--	<0.000100	0.000100	<0.000100	-
Bismuth	mg/L	<0.000500	<0.000250	--	0.00025	<0.000250	<0.000250	--	<0.000250	0.000050	<0.000050	-
Boron	mg/L	0.35	0.325	7%	0.05	0.603	0.562	7%	1.12	0.010	0.028	-
Cadmium	mg/L	<0.0000500	<0.0000250	--	0.00025	<0.0000250	<0.0000250	--	<0.0000250	0.000005	0.000007	-
Calcium	mg/L	1460	1430	2%	0.25	1090	1080	1%	858	0.050	0.168	-
Cesium	mg/L	0.000178	0.000164	<MDL	0.00005	0.000277	0.000307	10%	0.00012	0.000010	<0.000010	-
Chromium	mg/L	<0.00100	<0.00050	--	0.0025	<0.00250	<0.00250	--	<0.00250	0.00010	<0.00010	-
Cobalt	mg/L	<0.00100	<0.00050	--	0.0005	<0.00050	<0.00050	--	<0.00050	0.00010	<0.00010	-
Copper	mg/L	<0.00200	<0.00100	--	0.001	<0.00100	<0.00100	--	<0.00100	0.00020	0.00143	-
Iron	mg/L	0.26	0.271	--	0.05	<0.050	<0.050	--	<0.050	0.010	<0.010	-
Lead	mg/L	<0.000500	<0.000250	--	0.00025	<0.000250	<0.000250	--	<0.000250	0.000050	0.000907	-
Lithium	mg/L	0.423	0.417	1%	0.005	0.698	0.642	8%	0.0892	0.0010	<0.0010	-
Magnesium	mg/L	37.4	38.5	3%	0.025	8.1	7.87	3%	3.08	0.0050	0.0599	-
Manganese	mg/L	0.0924	0.0925	<MDL	0.0005	0.0245	0.026	6%	0.00849	0.00010	0.00018	-
Mercury	mg/L	<0.0000050	<0.0000050	--	0.000005	<0.0000050	<0.0000050	--	<0.0000050	0.0000050	<0.0000050	-
Molybdenum	mg/L	0.0148	0.0156	<MDL	0.00025	0.00463	0.00563	19%	0.000568	0.000050	<0.000050	-
Nickel	mg/L	<0.00500	<0.00250	--	0.0025	<0.00250	<0.00250	--	<0.00250	0.00050	<0.00050	-
Phosphorus	mg/L	<0.500	<0.250	--	0.25	<0.250	<0.250	--	<0.250	0.050	<0.050	-
Potassium	mg/L	10.9	11.2	3%	0.25	34.8	32	8%	13.6	0.050	<0.050	-
Rubidium	mg/L	0.0164	0.0174	<MDL	0.001	0.0386	0.0342	12%	0.0223	0.00020	<0.00020	-
Selenium	mg/L	0.0025	0.000658	--	0.00025	<0.000250	0.000295	--	<0.000250	0.000050	<0.000050	-
Silicon	mg/L	3.18	3.23	2%	0.25	2.88	2.91	1%	2.67	0.050	0.462	-
Silver	mg/L	<0.000100	<0.000050	--	0.00005	<0.000050	<0.000050	--	<0.000050	0.000010	0.000013	-
Sodium	mg/L	284	285	0%	0.25	274	268	2%	477	0.050	0.292	-
Strontium	mg/L	22.2	23.2	4%	0.001	16.6	18.5	11%	12.7	0.00020	0.00089	-
Sulfur	mg/L	<5.00	<2.50	--	2.5	<2.50	<2.50	--	<2.50	0.50	<0.50	-
Tellurium	mg/L	<0.00200	0.00133	--	0.001	0.00144	0.00142	<MDL	<0.00100	0.00020	<0.00020	-
Thallium	mg/L	<0.000100	<0.000050	--	0.00005	<0.000050	<0.000050	--	<0.000050	0.000010	<0.000010	-
Thorium	mg/L	<0.00100	<0.00050	--	0.0005	<0.00050	<0.00050	--	<0.00050	0.00010	<0.00010	-
Tin	mg/L	<0.00100	<0.00050	--	0.0005	<0.00050	<0.00050	--	<0.00050	0.00010	<0.00010	-
Titanium	mg/L	<0.00300	<0.00150	--	0.0015	<0.00150	<0.00150	--	<0.00150	0.00030	<0.00030	-
Tungsten	mg/L	0.0196	0.0199	<MDL	0.0005	0.0368	0.0425	14%	0.0262	0.00010	<0.00010	-
Uranium	mg/L	<0.000100	<0.000050	--	0.00005	0.000065	0.00007	<MDL	<0.000050	0.000010	<0.000010	-
Vanadium	mg/L	<0.00500	<0.00250	--	0.0025	<0.00250	<0.00250	--	<0.00250	0.00050	<0.00050	-
Zinc	mg/L	0.0239	0.0243	--	0.005	0.009	0.0136	<MDL	<0.0050	0.0010	0.0094	-
Zirconium	mg/L	<0.00200	<0.00100	--	0.0015	<0.00150	<0.00150	--	<0.00150	0.00020	<0.00020	-
Aggregate Organics												
chemical oxygen demand [COD]	mg/L	3100	3200	3%	20	633	580	9%	739	20	<20	<20
Radiological Parameters												
radium-226	Bq/L	0.66	1.1	50%	0.015	0.36	0.29	22%	0.33	0.0069	0.0069	0.0051
QA/QC												
Calculated TDS	mg/L	5157	5129	-	-	3817	3839	-	3710	-	3	-
Lab measured TDS vs Calculated TDS	%	98%	93%	-	-	86%	80%	-	86%	-	-	-
Sum Cations	meq	94	94	-	-	67	68	-	65	-	0.03	-
Sum Anions	meq	89	87	-	-	68	67	-	64	-	0.03	-
Ionic Balance	%	-3%	-4%	-	-	1%	-1%	-	-1%	-	-3%	-

**Notes:**

MDL = method detection limit

RPD = relative percent difference

Shaded denotes RPD value exceeds 20% or duplicate

-- denotes not calculated (one or both result below MD

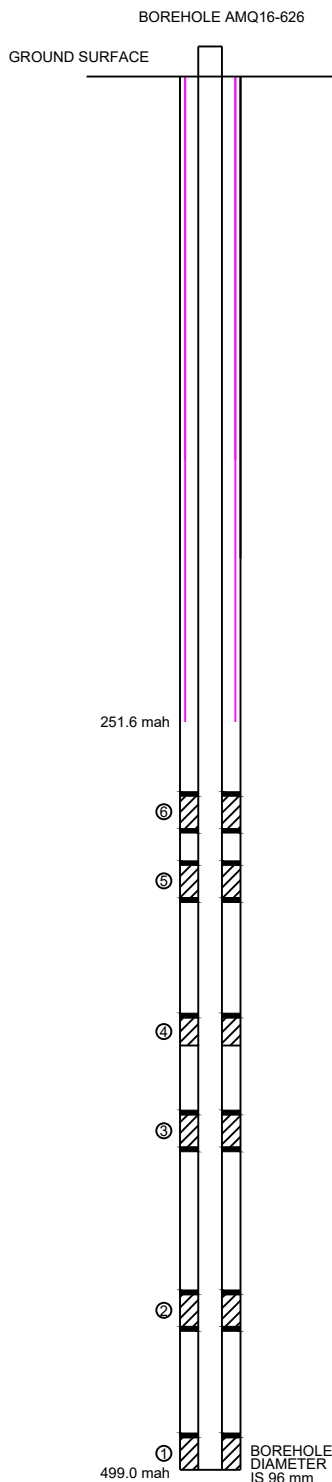
- denotes parameter was not analyzed

**ATTACHMENT A**

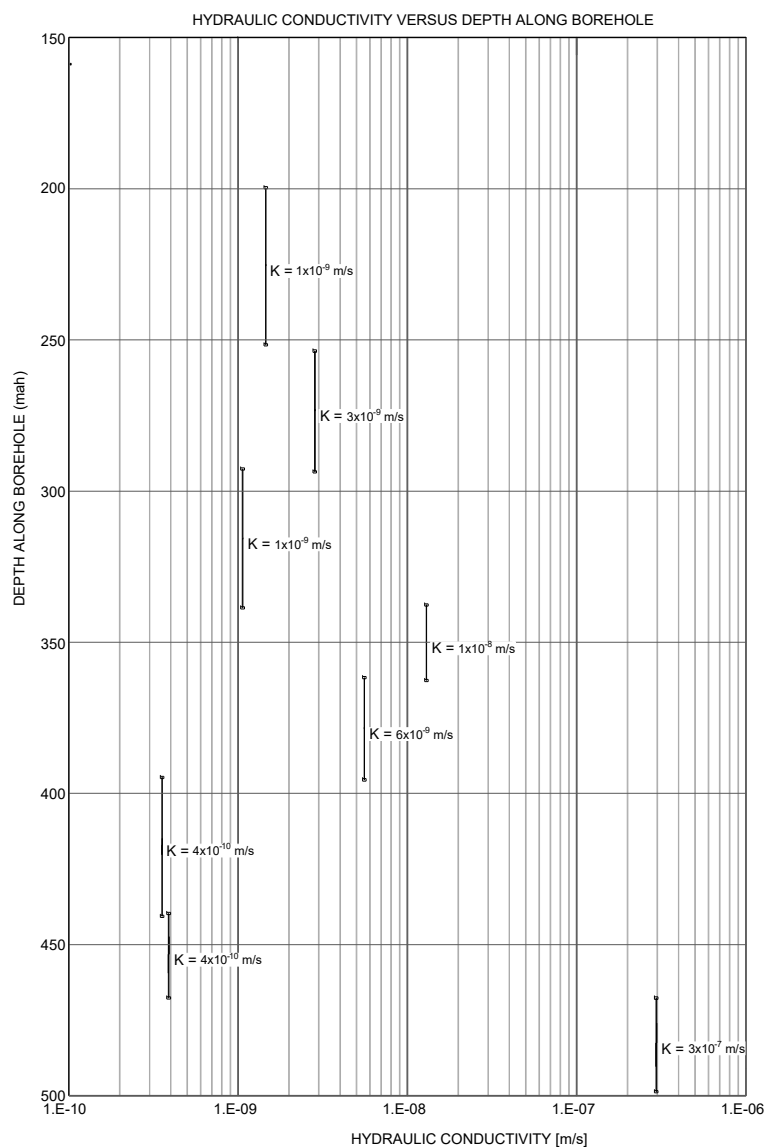
# AMQ16-626 Westbay System Installation Details



\\golder-gds\galiburnamby\CAD-GIS\client\Agnico\_Eagle\_Mines\_Ltd\WhiteTail\99\_PROJECTS\1649355\02\_PRODUCTION\4000\3000\DWG\1649355-4000-3000-03.dwg | Layout: AMQ16-626 WESTBAY SYSTEM INSTALLATION DETAILS | Modified: ppapouhesh 05/26/2016 1:35 PM | Plotted: ppapouhesh 07/06/2016



WESTBAY SYSTEM ZONE DEPTH SUMMARY						
ZONE	DEPTH ALONG HOLE			VERTICAL DEPTH		
	FROM	TO	LENGTH	FROM	TO	THICKNESS
	(mah)	(mah)	(m)	(mbgs)	(mbgs)	(m)
6	276.0	287.4	11.4	257.7	268.3	10.6
5	298.9	310.3	11.4	279	289.7	10.6
4	349.3	359.1	9.8	326.1	335.2	9.1
3	381.3	392.7	11.4	356.0	366.6	10.6
2	440.8	452.2	11.4	411.5	422.2	10.6
1	488.1	499.0	10.9	455.7	465.9	10.2







## LEGEND

1	PACKER	K	HYDRAULIC CONDUCTIVITY
2	WESTBAY MONITORING ZONE	mah	METRES ALONG BOREHOLE, RELATIVE TO GROUND SURFACE
3	STEEL CASING	mbgs	METRES BELOW GROUND SURFACE
		m/s	METRES PER SECOND

## NOTES

- ALL UNITS ARE IN METERS UNLESS OTHERWISE NOTED
- PERMAFROST ASSUMED 200 m ALONG HOLE ALIGNMENT.
- DRILL RODS TO 251.6 m ALONG HOLE.
- BOREHOLE LOCATED IN UTM NAD 83 ZONE 14, N = 7255363.5 E = 607181.68 ELEVATION = 154.46 m.
- AVERAGE BOREHOLE INCLINATION IS 69°.

NOT TO SCALE  
SCHEMATIC ONLY

	2016-07-06	ISSUED FOR FINAL	JJ	PP	DV	DC				
	2016-05-27	ISSUED FOR REVIEW	JJ	PP						
REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	R/W				
<div>PROJECT</div> <div><div>AGNICO EAGLE</div></div> <div>AGNICO EAGLE MINES LIMITED WHALE TAIL PIT PROJECT NUNAVUT, CANADA</div>										
<div>TITLE</div> <div>AMQ16-626 WESTBAY SYSTEM INSTALLATION DETAILS</div>										
<div><div>Golder Associates</div></div>										
PROJECT No.			1649355.4000.3000		FILE No.		1649355-4000-3000-03			
DESIGN			JJ		2016-07-06		SCALE		NOT TO SCALE	
CADD			PP		2016-07-06		FIGURE		A-1	
CHECK			DV		2016-07-06					
REVIEW			DC		2016-07-06					



**ATTACHMENT B**

# Westbay Instruments Mosdax Sampler Calibration Reports

# MOSDAX Calibration Report 1: EMS - 5239 Module 3019

Full Scale: 2000 (psia)

File: E:\DATA\CAL\0 2020\2000\30JAN2-1\05239

Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 9 2019

EMS - 5239 Feb 03 10:45:00 2020 Range 1 Temp 3.5° C			EMS - 5239 Feb 01 10:42:38 2020 Range 2 Temp 10.3° C			EMS - 5239 Feb 01 05:31:44 2020 Range 3 Temp 20.1° C		
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)
14.868	-0.288	-0.014	14.781	-0.145	-0.007	14.596	-0.079	-0.004
191.493	-0.104	-0.005	193.775	0.046	0.002	192.305	-0.057	-0.003
391.006	-0.061	-0.003	392.640	0.071	0.004	391.786	0.007	0.000
590.165	-0.147	-0.007	592.950	0.095	0.005	589.811	-0.016	-0.001
787.912	-0.213	-0.011	790.116	0.020	0.001	787.800	-0.042	-0.002
991.538	-0.132	-0.007	986.148	0.064	0.003	987.067	-0.098	-0.005
1185.080	-0.181	-0.009	1184.405	0.074	0.004	1184.282	0.018	0.001
1383.103	-0.175	-0.009	1389.367	-0.050	-0.002	1382.746	-0.092	-0.005
1588.738	-0.189	-0.009	1581.444	0.011	0.001	1580.834	-0.070	-0.003
1788.180	-0.117	-0.006	1781.409	0.128	0.006	1780.426	-0.024	-0.001
1986.418	0.016	0.001	1987.230	0.281	0.014	1988.412	0.164	0.008
1816.045	-0.126	-0.006	1815.603	0.135	0.007	1813.901	0.081	0.004
1612.942	-0.177	-0.009	1613.700	0.075	0.004	1617.823	-0.025	-0.001
1403.152	-0.225	-0.011	1419.203	0.049	0.002	1406.772	-0.074	-0.004
1196.859	-0.155	-0.008	1216.619	0.082	0.004	1206.443	0.019	0.001
1019.380	-0.140	-0.007	1009.360	0.153	0.008	1009.176	0.004	0.000
807.792	-0.131	-0.007	807.546	0.103	0.005	819.172	-0.011	-0.001
606.963	-0.093	-0.005	606.726	0.143	0.007	606.403	-0.010	-0.001
407.003	0.014	0.001	406.710	0.172	0.009	406.484	0.045	0.002
205.895	-0.062	-0.003	206.253	0.055	0.003	205.793	0.069	0.003
14.895	-0.216	-0.011	14.839	-0.025	-0.001	14.622	-0.124	-0.006
EMS - 5239 Feb 01 00:35:22 2020 Range 4 Temp 30.0° C			EMS - 5239 Jan 31 19:30:07 2020 Range 5 Temp 39.8° C					
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)			
14.619	-0.023	-0.001	14.637	-0.069	-0.003			
192.457	0.023	0.001	194.057	0.047	0.002			
391.864	0.057	0.003	391.756	0.009	0.000			
590.361	-0.089	-0.004	589.098	-0.054	-0.003			
791.130	-0.093	-0.005	788.721	-0.025	-0.001			
986.456	-0.082	-0.004	992.715	0.003	0.000			
1186.055	-0.119	-0.006	1184.627	0.052	0.003			
1389.731	-0.132	-0.007	1390.374	-0.117	-0.006			
1582.483	-0.131	-0.007	1583.219	0.036	0.002			
1783.121	0.009	0.000	1785.176	0.182	0.009			
1989.472	0.092	0.005	1991.019	0.195	0.010			
1813.998	0.036	0.002	1817.094	0.165	0.008			
1606.876	0.023	0.001	1618.041	0.073	0.004			
1407.509	-0.141	-0.007	1419.969	0.008	0.000			
1207.752	0.006	0.000	1217.745	0.153	0.008			
1010.127	0.071	0.004	1012.652	0.068	0.003			
807.569	0.030	0.002	807.659	0.049	0.002			
606.787	0.041	0.002	606.654	0.063	0.003			
406.409	0.081	0.004	406.303	0.077	0.004			
205.769	0.023	0.001	206.024	0.069	0.003			
14.617	-0.029	-0.001	14.653	-0.123	-0.006			

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# MOSDAX Calibration Report 2: EMS - 5239 Module 3019

Full Scale: 2000 (psia)

File E:\DATA\CAL\0-2020\2000\30JAN2-1\05239

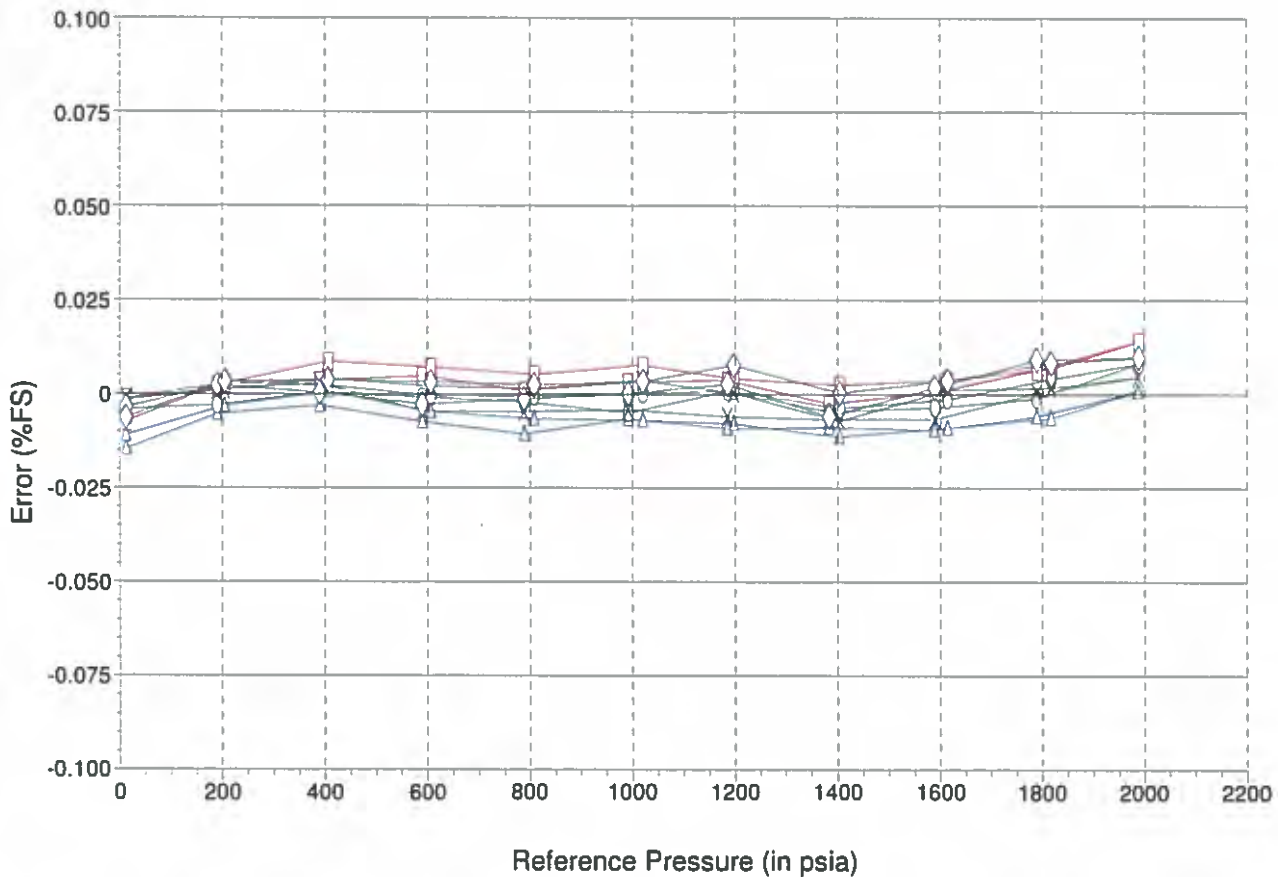
Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 9 2019

## Plot of Error vs. Reference Pressure

EMS - 5239 Module 3019



△ 3.5° C    □ 10.3° C    ○ 20.1° C    × 30.0° C    ◇ 39.8° C

Comments

Issued by



# MOSDAX Calibration Report 1: EMS - 2653 Module 1393

Full Scale: 2000 (psia)

File: E:\DATA\CAL\0-2020\2000\30JAN2-1\02653

Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 9 2019

EMS - 2653 Feb 03 10:45:00 2020 Range 1 Temp 3.5° C			EMS - 2653 Feb 01 10:42:38 2020 Range 2 Temp 10.3° C			EMS - 2653 Feb 01 05:31:44 2020 Range 3 Temp 20.1° C		
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)
14.868	-0.077	-0.004	14.781	-0.001	0.000	14.596	-0.006	0.000
191.493	-0.121	-0.006	193.775	-0.114	-0.006	192.305	-0.040	-0.002
391.006	-0.099	-0.005	392.640	-0.139	-0.007	391.786	-0.079	-0.004
590.165	-0.164	-0.008	592.950	-0.129	-0.006	589.811	-0.080	-0.004
787.912	-0.080	-0.004	790.116	-0.127	-0.006	787.800	-0.088	-0.004
991.538	-0.052	-0.003	986.148	-0.025	-0.001	987.067	-0.003	0.000
1185.080	-0.126	-0.006	1184.405	-0.078	-0.004	1184.282	-0.119	-0.006
1383.103	-0.107	-0.005	1389.367	-0.022	-0.001	1382.746	-0.094	-0.005
1588.738	-0.091	-0.005	1581.444	0.041	0.002	1580.834	-0.086	-0.004
1788.180	-0.156	-0.008	1781.409	0.082	0.004	1780.426	-0.019	-0.001
1986.418	-0.224	-0.011	1987.230	0.026	0.001	1988.412	-0.086	-0.004
1816.045	-0.126	-0.006	1815.603	0.109	0.005	1813.901	-0.010	-0.001
1612.942	-0.052	-0.003	1613.700	0.149	0.007	1617.823	0.075	0.004
1403.152	-0.048	-0.002	1419.203	0.072	0.004	1406.772	-0.009	0.000
1196.859	-0.085	-0.004	1216.619	0.049	0.002	1206.443	-0.039	-0.002
1019.380	0.055	0.003	1009.360	0.100	0.005	1009.176	0.128	0.006
807.792	-0.007	0.000	807.546	0.032	0.002	819.172	0.029	0.001
606.963	-0.078	-0.004	606.726	-0.062	-0.003	606.403	-0.020	-0.001
407.003	-0.047	-0.002	406.710	-0.024	-0.001	406.484	-0.056	-0.003
205.895	-0.081	-0.004	206.253	0.001	0.000	205.793	0.030	0.002
14.895	-0.089	-0.004	14.839	0.015	0.001	14.622	0.025	0.001
EMS - 2653 Feb 01 00:35:22 2020 Range 4 Temp 30.0° C			EMS - 2653 Jan 31 19:30:07 2020 Range 5 Temp 39.8° C					
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)			
14.619	0.058	0.003	14.637	0.002	0.000			
192.457	0.012	0.001	194.057	-0.070	-0.003			
391.864	0.005	0.000	391.756	-0.074	-0.004			
590.361	-0.001	0.000	589.098	-0.107	-0.005			
791.130	0.032	0.002	788.721	-0.031	-0.002			
986.456	0.052	0.003	992.715	0.004	0.000			
1186.055	-0.037	-0.002	1184.627	-0.126	-0.006			
1389.731	-0.027	-0.001	1390.374	-0.042	-0.002			
1582.483	-0.049	-0.002	1583.219	0.014	0.001			
1783.121	0.019	0.001	1785.176	-0.026	-0.001			
1989.472	-0.064	-0.003	1991.019	-0.076	-0.004			
1813.998	0.023	0.001	1817.094	0.074	0.004			
1606.876	0.070	0.004	1618.041	0.034	0.002			
1407.509	0.114	0.006	1419.969	0.018	0.001			
1207.752	0.000	0.000	1217.745	-0.052	-0.003			
1010.127	0.154	0.008	1012.652	0.118	0.006			
807.569	0.074	0.004	807.659	0.051	0.003			
606.787	0.048	0.002	606.654	-0.015	-0.001			
406.409	-0.041	-0.002	406.303	-0.099	-0.005			
205.769	0.035	0.002	206.024	0.001	0.000			
14.617	0.057	0.003	14.653	0.017	0.001			

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# MOSDAX Calibration Report 2: EMS - 2653 Module 1393

Full Scale: 2000 (psia)

File: E:\DATA\CAL\0-2020\2000\30JAN2-1\02653

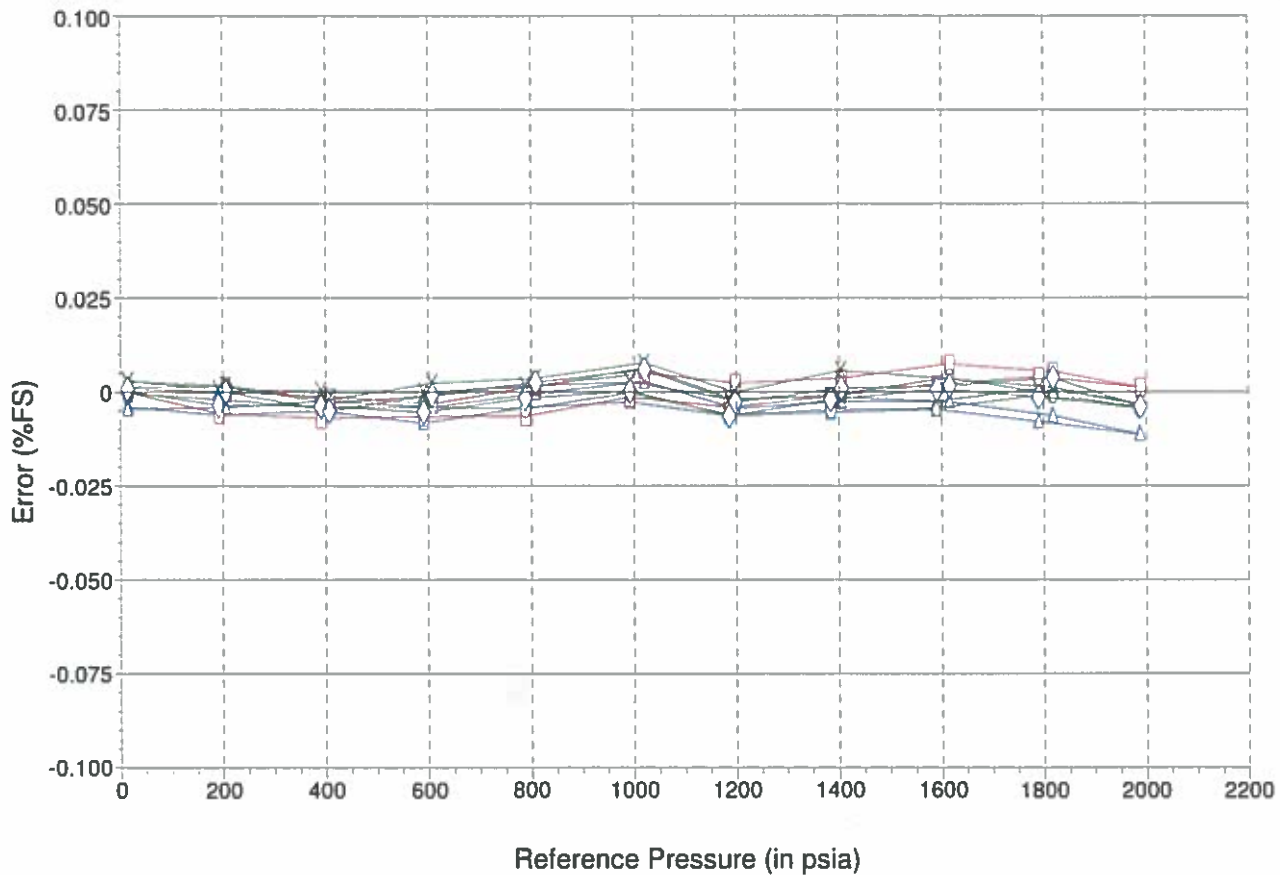
Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 9 2019

## Plot of Error vs. Reference Pressure

EMS - 2653 Module 1393



Comments

Issued by



**ATTACHMENT C**

# 2020 Laboratory Certificates of Analyses



**Environmental**

## CERTIFICATE OF ANALYSIS

**Work Order** : **VA20B8468**  
**Client** : **Agnico-Eagle Mines Limited**  
**Contact** : Adrian Kowalchuk  
**Address** : # 400 - 543 Granville Street  
Vancouver BC Canada V6C 1X8  
**Telephone** : ----  
**Project** : 20148777-1000  
**PO** : ----  
**C-O-C number** : 2020-10-13  
**Sampler** : Adrian Kowalchuk  
**Site** : ----  
**Quote number** : VA20-AEML100-001 (Q72802)  
**No. of samples received** : 2  
**No. of samples analysed** : 2

**Page** : 1 of 6  
**Laboratory** : Vancouver - Environmental  
**Account Manager** : Heather McKenzie  
**Address** : 8081 Lougheed Highway  
Burnaby BC Canada V5A 1W9  
**Telephone** : +1 604 253 4188  
**Date Samples Received** : 19-Oct-2020 12:25  
**Date Analysis Commenced** : 19-Oct-2020  
**Issue Date** : 26-Nov-2020 15:14

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Bruna Botti	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Gloria Chan	Lab Analyst	Metals, Burnaby, British Columbia
Kaitlyn Gardner	Account Manager Assistant	Internal Subcontracting, Fort Collins, Colorado
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia



## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances  
 LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
-	No Unit
µS/cm	Microsiemens per centimetre
Bq/L	Becquerels per litre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

## Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLA	Detection Limit adjusted for required dilution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DTSE	Dissolved Se concentration exceeds total. Positive bias on D-Se suspected due to signal enhancement from volatile selenium species. Contact ALS if an alternative test to address this interference is needed.



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

Client sampling date / time					AMQ16-626-3	AMQ16-626-3-D UP1	----	----	----
					13-Oct-2020 13:00	13-Oct-2020 13:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B8468-001	VA20B8468-002	-----	-----	-----
					Result	Result	----	----	----
<b>Physical Tests</b>									
alkalinity, bicarbonate (as CaCO <sub>3</sub> )	----	E290	2.0	mg/L	56.5	54.7	----	----	----
alkalinity, carbonate (as CaCO <sub>3</sub> )	----	E290	2.0	mg/L	<2.0	<2.0	----	----	----
alkalinity, hydroxide (as CaCO <sub>3</sub> )	----	E290	2.0	mg/L	<2.0	<2.0	----	----	----
alkalinity, phenolphthalein (as CaCO <sub>3</sub> )	----	E290	2.0	mg/L	<2.0	<2.0	----	----	----
alkalinity, total (as CaCO <sub>3</sub> )	----	E290	2.0	mg/L	56.5	54.7	----	----	----
conductivity	----	E100	2.0	µS/cm	6090	6180	----	----	----
hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	----	EC100A	0.60	mg/L	1850	1880	----	----	----
pH	----	E108	0.10	pH units	7.13	7.12	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	4000	4040	----	----	----
solids, total dissolved [TDS]	----	E162-L	3.0	mg/L	3770	3980	----	----	----
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	----	----	----
turbidity	----	E121	0.10	NTU	0.96	0.99	----	----	----
bicarbonate	71-52-3	E290	2.0	mg/L	68.9	66.7	----	----	----
carbonate	3812-32-6	E290	2.0	mg/L	<2.0	<2.0	----	----	----
hydroxide	14280-30-9	E290	2.0	mg/L	<2.0	<2.0	----	----	----
hardness (as CaCO <sub>3</sub> ), dissolved	----	EC100	0.60	mg/L	1890	1950	----	----	----
<b>Anions and Nutrients</b>									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0854	0.0860	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	17.8	17.7	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L	1900	1910	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	1900	1910	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	<1.00 DLDS	<1.00 DLDS	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.295	0.294	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.250 DLDS	<0.250 DLDS	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.255	<0.255	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0500 DLDS	<0.0500 DLDS	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0067	0.0064	----	----	----
silicate (as SiO <sub>2</sub> )	7631-86-9	E392	0.50	mg/L	6.31	6.33	----	----	----
sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO4	0.30	mg/L	<15.0 DLDS	<15.0 DLDS	----	----	----



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					AMQ16-626-3	AMQ16-626-3-D UP1	----	----	----
Client sampling date / time					13-Oct-2020 13:00	13-Oct-2020 13:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B8468-001	VA20B8468-002	-----	-----	-----
					Result	Result	---	---	---
<b>Total Metals</b>									
aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0150 <sup>DLA</sup>	<0.0150 <sup>DLA</sup>	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00126	0.00122	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00204	0.00200	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0742	0.0755	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000500 <sup>DLA</sup>	<0.000500 <sup>DLA</sup>	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000250 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.824	0.840	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000250 <sup>DLA</sup>	<0.0000250 <sup>DLA</sup>	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	739	750	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	0.000248	0.000236	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00241	0.00108	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	<0.050 <sup>DLA</sup>	<0.050 <sup>DLA</sup>	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	<0.000250 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.309	0.317	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	0.909	0.898	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00740	0.00759	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00343	0.00326	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.250 <sup>DLA</sup>	<0.250 <sup>DLA</sup>	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	18.3	18.4	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0245	0.0243	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000250 <sup>DLA</sup>	0.000267	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	3.18	3.35	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000050 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	----	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	315	319	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	11.6	11.7	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	<2.50 <sup>DLA</sup>	<2.50 <sup>DLA</sup>	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	0.00179	0.00128	----	----	----



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

					AMQ16-626-3	AMQ16-626-3-D UP1	----	----	----
					13-Oct-2020 13:00	13-Oct-2020 13:00	----	----	----
					VA20B8468-001	VA20B8468-002	-----	-----	-----
					Result	Result	---	---	---
Client sampling date / time									
Analyte	CAS Number	Method	LOR	Unit					
<b>Total Metals</b>									
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000050 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00150 <sup>DLA</sup>	<0.00150 <sup>DLA</sup>	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	0.0361	0.0352	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000050 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.128	0.100	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	----	----	----
<b>Dissolved Metals</b>									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0084	0.0092	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00107	0.00112	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00177	0.00174	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0713	0.0710	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000200 <sup>DLA</sup>	<0.000200 <sup>DLA</sup>	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000100 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.792	0.825	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000100 <sup>DLA</sup>	<0.0000100 <sup>DLA</sup>	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	755	779	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000225	0.000234	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	0.00024	<0.00020 <sup>DLA</sup>	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00020 <sup>DLA</sup>	<0.00020 <sup>DLA</sup>	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00040 <sup>DLA</sup>	<0.00040 <sup>DLA</sup>	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.020 <sup>DLA</sup>	<0.020 <sup>DLA</sup>	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000100 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.334	0.350	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	0.833	0.811	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00866	0.00711	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00227	0.00210	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	----	----	----



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					AMQ16-626-3	AMQ16-626-3-D UP1	----	----	----
Client sampling date / time					13-Oct-2020 13:00	13-Oct-2020 13:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B8468-001	VA20B8468-002	-----	-----	-----
					Result	Result	---	---	---
<b>Dissolved Metals</b>									
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.100 <sup>DLA</sup>	<0.100 <sup>DLA</sup>	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	15.8	17.0	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0236	0.0244	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000364 <sup>DTSE</sup>	0.000275	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.07	3.01	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000020 <sup>DLA</sup>	<0.000020 <sup>DLA</sup>	----	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	290	310	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	12.8	13.2	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<1.00 <sup>DLA</sup>	<1.00 <sup>DLA</sup>	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	0.00078	0.00066	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000020 <sup>DLA</sup>	<0.000020 <sup>DLA</sup>	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00020 <sup>DLA</sup>	<0.00020 <sup>DLA</sup>	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00020 <sup>DLA</sup>	<0.00020 <sup>DLA</sup>	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00150 <sup>DLA</sup>	<0.00060 <sup>DLA</sup>	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.0342	0.0331	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000022	<0.000020 <sup>DLA</sup>	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0020 <sup>DLA</sup>	<0.0020 <sup>DLA</sup>	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00040 <sup>DLA</sup>	<0.00040 <sup>DLA</sup>	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	----	----	----
<b>Aggregate Organics</b>									
chemical oxygen demand [COD]	----	E559	20	mg/L	1100 <sup>DLM</sup>	1120 <sup>DLM</sup>	----	----	----
<b>Radiological Parameters</b>									
radium-226	13982-63-3	RA226-MMER	0.0092	Bq/L	0.33	----	----	----	----
radium-226	13982-63-3	RA226-MMER	0.0093	Bq/L	----	0.27	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.



## QUALITY CONTROL INTERPRETIVE REPORT

**Work Order** : **VA20B8468**  
**Client** : **Agnico-Eagle Mines Limited**  
**Contact** : Adrian Kowalchuk  
**Address** : # 400 - 543 Granville Street  
                   Vancouver BC Canada V6C 1X8  
**Telephone** : ----  
**Project** : 20148777-1000  
**PO** : ----  
**C-O-C number** : 2020-10-13  
**Sampler** : Adrian Kowalchuk  
**Site** : ----  
**Quote number** : VA20-AEML100-001 (Q72802)  
**No. of samples received** : 2  
**No. of samples analysed** : 2

**Page** : 1 of 17  
**Laboratory** : Vancouver - Environmental  
**Account Manager** : Heather McKenzie  
**Address** : 8081 Lougheed Highway  
                   Burnaby, British Columbia Canada V5A 1W9  
**Telephone** : +1 604 253 4188  
**Date Samples Received** : 19-Oct-2020 12:25  
**Issue Date** : 26-Nov-2020 15:13

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

### Key

**Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.  
**CAS Number:** Chemical Abstracts Services number is a unique identifier assigned to discrete substances.  
**DQO:** Data Quality Objective.  
**LOR:** Limit of Reporting (detection limit).  
**RPD:** Relative Percent Difference.

## Summary of Outliers

### Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

### Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

### Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

### Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.





## Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
<b>Method Blank (MB) Values</b>								
Physical Tests	QC-MRG2-1050400 01	----	alkalinity, total (as CaCO <sub>3</sub> )	----	E290	1.7 mg/L <sup>B</sup>	1.5 mg/L	Blank result exceeds permitted value
Physical Tests	QC-MRG2-1050400 01	----	alkalinity, bicarbonate (as CaCO <sub>3</sub> )	----	E290	1.7 mg/L	1.5 mg/L	Blank result exceeds permitted value

## Result Qualifiers

Qualifier Description

**B** Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

## Laboratory Control Sample (LCS) Recoveries

Dissolved Metals	QC-MRG2-1062020 02	----	strontium, dissolved	7440-24-6	E421	129 % <sup>MES</sup>	80.0-120%	Recovery greater than upper control limit
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## Result Qualifiers

Qualifier Description

**MES** Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



## Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 is used for calculation purposes.

Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) AMQ16-626-3	E559	13-Oct-2020	----	----	----		05-Nov-2020	28 days	22 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) AMQ16-626-3-DUP1	E559	13-Oct-2020	----	----	----		05-Nov-2020	28 days	22 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) AMQ16-626-3	E298	13-Oct-2020	----	----	----		22-Oct-2020	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) AMQ16-626-3-DUP1	E298	13-Oct-2020	----	----	----		22-Oct-2020	28 days	8 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE AMQ16-626-3	E235.Br-L	13-Oct-2020	----	----	----		20-Oct-2020	28 days	6 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE AMQ16-626-3-DUP1	E235.Br-L	13-Oct-2020	----	----	----		20-Oct-2020	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE AMQ16-626-3	E235.Cl-L	13-Oct-2020	----	----	----		20-Oct-2020	28 days	6 days	✓



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE AMQ16-626-3-DUP1	E235.Cl-L	13-Oct-2020	----	----	----		20-Oct-2020	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE AMQ16-626-3	E235.Cl	13-Oct-2020	----	----	----		20-Oct-2020	28 days	6 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE AMQ16-626-3-DUP1	E235.Cl	13-Oct-2020	----	----	----		20-Oct-2020	28 days	6 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE AMQ16-626-3	E378-U	13-Oct-2020	----	----	----		04-Nov-2020	3 days	21 days	✖ EHTR
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE AMQ16-626-3-DUP1	E378-U	13-Oct-2020	----	----	----		04-Nov-2020	3 days	21 days	✖ EHTR
Anions and Nutrients : Fluoride in Water by IC										
HDPE AMQ16-626-3	E235.F	13-Oct-2020	----	----	----		20-Oct-2020	28 days	6 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE AMQ16-626-3-DUP1	E235.F	13-Oct-2020	----	----	----		20-Oct-2020	28 days	6 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE AMQ16-626-3	E235.NO3-L	13-Oct-2020	----	----	----		20-Oct-2020	3 days	6 days	✖ EHTR
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE AMQ16-626-3-DUP1	E235.NO3-L	13-Oct-2020	----	----	----		20-Oct-2020	3 days	6 days	✖ EHTR



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE AMQ16-626-3	E235.NO2-L	13-Oct-2020	----	----	----		20-Oct-2020	3 days	6 days	<div>✖</div> <div>EHTR</div>
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE AMQ16-626-3-DUP1	E235.NO2-L	13-Oct-2020	----	----	----		20-Oct-2020	3 days	6 days	<div>✖</div> <div>EHTR</div>
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE AMQ16-626-3	E392	13-Oct-2020	----	----	----		19-Oct-2020	28 days	6 days	<div>✔</div>
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE AMQ16-626-3-DUP1	E392	13-Oct-2020	----	----	----		19-Oct-2020	28 days	6 days	<div>✔</div>
Anions and Nutrients : Sulfate in Water by IC										
HDPE AMQ16-626-3	E235.SO4	13-Oct-2020	----	----	----		20-Oct-2020	28 days	6 days	<div>✔</div>
Anions and Nutrients : Sulfate in Water by IC										
HDPE AMQ16-626-3-DUP1	E235.SO4	13-Oct-2020	----	----	----		20-Oct-2020	28 days	6 days	<div>✔</div>
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) AMQ16-626-3	E318	13-Oct-2020	05-Nov-2020	28 days	22 days	<div>✔</div>	06-Nov-2020	5 days	1 days	<div>✔</div>
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) AMQ16-626-3-DUP1	E318	13-Oct-2020	05-Nov-2020	28 days	22 days	<div>✔</div>	06-Nov-2020	5 days	1 days	<div>✔</div>
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) AMQ16-626-3	E372-U	13-Oct-2020	22-Oct-2020	28 days	8 days	<div>✔</div>	23-Oct-2020	19 days	0 days	<div>✔</div>



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) AMQ16-626-3-DUP1	E372-U	13-Oct-2020	22-Oct-2020	28 days	8 days	✓	23-Oct-2020	19 days	0 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) AMQ16-626-3	E421.Cr-L	13-Oct-2020	21-Oct-2020	180 days	8 days	✓	24-Oct-2020	171 days	2 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) AMQ16-626-3-DUP1	E421.Cr-L	13-Oct-2020	21-Oct-2020	180 days	8 days	✓	24-Oct-2020	171 days	2 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) AMQ16-626-3	E509	13-Oct-2020	26-Oct-2020	28 days	12 days	✓	26-Oct-2020	15 days	0 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) AMQ16-626-3-DUP1	E509	13-Oct-2020	26-Oct-2020	28 days	12 days	✓	26-Oct-2020	15 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) AMQ16-626-3	E421	13-Oct-2020	21-Oct-2020	180 days	8 days	✓	24-Oct-2020	171 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) AMQ16-626-3-DUP1	E421	13-Oct-2020	21-Oct-2020	180 days	8 days	✓	24-Oct-2020	171 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE AMQ16-626-3	E290	13-Oct-2020	----	----	----		20-Oct-2020	14 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE AMQ16-626-3-DUP1	E290	13-Oct-2020	----	----	----		20-Oct-2020	14 days	7 days	✓





Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Conductivity in Water										
HDPE AMQ16-626-3	E100	13-Oct-2020	----	----	----		20-Oct-2020	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE AMQ16-626-3-DUP1	E100	13-Oct-2020	----	----	----		20-Oct-2020	28 days	7 days	✓
Physical Tests : pH by Meter										
HDPE AMQ16-626-3	E108	13-Oct-2020	----	----	----		20-Oct-2020	0.25 hrs	168 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE AMQ16-626-3-DUP1	E108	13-Oct-2020	----	----	----		20-Oct-2020	0.25 hrs	168 hrs	✖ EHTR-FM
Physical Tests : TDS by Gravimetry (Low Level)										
HDPE AMQ16-626-3	E162-L	13-Oct-2020	----	----	----		20-Oct-2020	7 days	6 days	✓
Physical Tests : TDS by Gravimetry (Low Level)										
HDPE AMQ16-626-3-DUP1	E162-L	13-Oct-2020	----	----	----		20-Oct-2020	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE AMQ16-626-3	E162	13-Oct-2020	----	----	----		03-Nov-2020	7 days	20 days	✖ EHT
Physical Tests : TDS by Gravimetry										
HDPE AMQ16-626-3-DUP1	E162	13-Oct-2020	----	----	----		03-Nov-2020	7 days	20 days	✖ EHT
Physical Tests : TSS by Gravimetry										
HDPE AMQ16-626-3	E160-H	13-Oct-2020	----	----	----		20-Oct-2020	7 days	6 days	✓



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry										
HDPE AMQ16-626-3-DUP1	E160-H	13-Oct-2020	----	----	----		20-Oct-2020	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE AMQ16-626-3	E121	13-Oct-2020	----	----	----		03-Nov-2020	3 days	20 days	✖ EHTR
Physical Tests : Turbidity by Nephelometry										
HDPE AMQ16-626-3-DUP1	E121	13-Oct-2020	----	----	----		03-Nov-2020	3 days	20 days	✖ EHTR
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) AMQ16-626-3	RA226-MMER	13-Oct-2020	----	----	----		11-Nov-2020	180 days	28 days	✓
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) AMQ16-626-3-DUP1	RA226-MMER	13-Oct-2020	----	----	----		11-Nov-2020	180 days	28 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) AMQ16-626-3	E420.Cr-L	13-Oct-2020	----	----	----		24-Oct-2020	180 days	10 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) AMQ16-626-3-DUP1	E420.Cr-L	13-Oct-2020	----	----	----		24-Oct-2020	180 days	10 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) AMQ16-626-3	E508	13-Oct-2020	----	----	----		26-Oct-2020	28 days	13 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) AMQ16-626-3-DUP1	E508	13-Oct-2020	----	----	----		26-Oct-2020	28 days	13 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) AMQ16-626-3	E420	13-Oct-2020	----	----	----		24-Oct-2020	180 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) AMQ16-626-3-DUP1	E420	13-Oct-2020	----	----	----		24-Oct-2020	180 days	10 days	✓

**Legend & Qualifier Definitions**

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).



## Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	105041	1	15	6.6	5.0	✔
Ammonia by Fluorescence	E298	106476	1	16	6.2	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	105046	1	15	6.6	5.0	✔
Chemical Oxygen Demand by Colourimetry	E559	113489	1	20	5.0	5.0	✔
Chloride in Water by IC	E235.Cl	105045	1	16	6.2	5.0	✔
Chloride in Water by IC (Low Level)	E235.Cl-L	105050	1	2	50.0	5.0	✔
Conductivity in Water	E100	105040	1	16	6.2	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	106203	1	7	14.2	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	108322	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	106202	2	18	11.1	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	112953	1	14	7.1	5.0	✔
Fluoride in Water by IC	E235.F	105044	1	15	6.6	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	105047	1	16	6.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	105048	1	16	6.2	5.0	✔
pH by Meter	E108	105039	1	17	5.8	5.0	✔
Reactive Silica by Colourimetry	E392	105072	1	19	5.2	5.0	✔
Sulfate in Water by IC	E235.SO4	105049	1	16	6.2	5.0	✔
TDS by Gravimetry	E162	112537	1	17	5.8	5.0	✔
TDS by Gravimetry (Low Level)	E162-L	105163	1	2	50.0	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	106280	1	4	25.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	113469	1	14	7.1	5.0	✔
Total Mercury in Water by CVAAS	E508	108349	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	106279	1	12	8.3	5.0	✔
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	106475	1	16	6.2	5.0	✔
TSS by Gravimetry	E160-H	105165	1	12	8.3	5.0	✔
Turbidity by Nephelometry	E121	112544	1	9	11.1	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	105041	1	15	6.6	5.0	✔
Ammonia by Fluorescence	E298	106476	1	16	6.2	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	105046	1	15	6.6	5.0	✔
Chemical Oxygen Demand by Colourimetry	E559	113489	1	20	5.0	5.0	✔
Chloride in Water by IC	E235.Cl	105045	1	16	6.2	5.0	✔
Chloride in Water by IC (Low Level)	E235.Cl-L	105050	1	2	50.0	5.0	✔
Conductivity in Water	E100	105040	1	16	6.2	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	106203	1	7	14.2	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	108322	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	106202	1	18	5.5	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Control Samples (LCS) - Continued							
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	112953	1	14	7.1	5.0	✔
Fluoride in Water by IC	E235.F	105044	1	15	6.6	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	105047	1	16	6.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	105048	1	16	6.2	5.0	✔
pH by Meter	E108	105039	1	17	5.8	5.0	✔
Reactive Silica by Colourimetry	E392	105072	1	19	5.2	5.0	✔
Sulfate in Water by IC	E235.SO4	105049	1	16	6.2	5.0	✔
TDS by Gravimetry	E162	112537	1	17	5.8	5.0	✔
TDS by Gravimetry (Low Level)	E162-L	105163	1	2	50.0	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	106280	1	4	25.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	113469	1	14	7.1	5.0	✔
Total Mercury in Water by CVAAS	E508	108349	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	106279	1	12	8.3	5.0	✔
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	106475	1	16	6.2	5.0	✔
TSS by Gravimetry	E160-H	105165	1	12	8.3	5.0	✔
Turbidity by Nephelometry	E121	112544	1	9	11.1	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	105041	1	15	6.6	5.0	✔
Ammonia by Fluorescence	E298	106476	1	16	6.2	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	105046	1	15	6.6	5.0	✔
Chemical Oxygen Demand by Colourimetry	E559	113489	1	20	5.0	5.0	✔
Chloride in Water by IC	E235.Cl	105045	1	16	6.2	5.0	✔
Chloride in Water by IC (Low Level)	E235.Cl-L	105050	1	2	50.0	5.0	✔
Conductivity in Water	E100	105040	1	16	6.2	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	106203	1	7	14.2	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	108322	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	106202	1	18	5.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	112953	1	14	7.1	5.0	✔
Fluoride in Water by IC	E235.F	105044	1	15	6.6	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	105047	1	16	6.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	105048	1	16	6.2	5.0	✔
Reactive Silica by Colourimetry	E392	105072	1	19	5.2	5.0	✔
Sulfate in Water by IC	E235.SO4	105049	1	16	6.2	5.0	✔
TDS by Gravimetry	E162	112537	1	17	5.8	5.0	✔
TDS by Gravimetry (Low Level)	E162-L	105163	1	2	50.0	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	106280	1	4	25.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	113469	1	14	7.1	5.0	✔
Total Mercury in Water by CVAAS	E508	108349	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	106279	1	12	8.3	5.0	✔
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	106475	1	16	6.2	5.0	✔
TSS by Gravimetry	E160-H	105165	1	12	8.3	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Method Blanks (MB) - Continued							
Turbidity by Nephelometry	E121	112544	1	9	11.1	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	106476	1	16	6.2	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	105046	1	15	6.6	5.0	✔
Chemical Oxygen Demand by Colourimetry	E559	113489	1	20	5.0	5.0	✔
Chloride in Water by IC	E235.Cl	105045	1	16	6.2	5.0	✔
Chloride in Water by IC (Low Level)	E235.Cl-L	105050	1	2	50.0	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	106203	1	7	14.2	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	108322	1	18	5.5	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	106202	1	18	5.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	112953	1	14	7.1	5.0	✔
Fluoride in Water by IC	E235.F	105044	1	15	6.6	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	105047	1	16	6.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	105048	1	16	6.2	5.0	✔
Reactive Silica by Colourimetry	E392	105072	1	19	5.2	5.0	✔
Sulfate in Water by IC	E235.SO4	105049	1	16	6.2	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	106280	1	4	25.0	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	113469	1	14	7.1	5.0	✔
Total Mercury in Water by CVAAS	E508	108349	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	106279	1	12	8.3	5.0	✔
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	106475	1	16	6.2	5.0	✔



## Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100  Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108  Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121  Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160-H  Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162  Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
TDS by Gravimetry (Low Level)	E162-L  Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.





Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrite in Water by IC (Low Level)	E235.NO2-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290  Vancouver - Environmental	Water	APHA 2320 B (mod)	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.
Ammonia by Fluorescence	E298  Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318  Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U  Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U  Vancouver - Environmental	Water	APHA 4500-P E (mod)	Dissolved Orthophosphate is determined colourimetrically on a water sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Reactive Silica by Colourimetry	E392  Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test.
Total Metals in Water by CRC ICPMS	E420  Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L  Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421  Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L  Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS
Total Mercury in Water by CVAAS	E508  Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509  Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry	E559  Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Dissolved Hardness (Calculated)	EC100  Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A  Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N  Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Radium-226 by Radon Emanation	RA226-MMER  Fort Collins - Environmental - 225 Commerce Drive Fort Collins Colorado United States 80524	Water	EPA 903.1	Radium-226 in sample was analyzed according to the current revision of SOP 783.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for TKN in water	EP318  Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Digestion for Total Phosphorus in water	EP372  Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421  Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO <sub>3</sub> .
Dissolved Mercury Water Filtration	EP509  Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

## QUALITY CONTROL REPORT

**Work Order** : **VA20B8468**

**Page** : 1 of 18

**Client** : Agnico-Eagle Mines Limited  
**Contact** : Adrian Kowalchuk  
**Address** : # 400 - 543 Granville Street  
                   Vancouver BC Canada V6C 1X8  
**Telephone** : ----  
**Project** : 20148777-1000  
**PO** : ----  
**C-O-C number** : 2020-10-13  
**Sampler** : Adrian Kowalchuk  
**Site** : ----  
**Quote number** : VA20-AEML100-001 (Q72802)  
**No. of samples received** : 2  
**No. of samples analysed** : 2

**Laboratory** : Vancouver - Environmental  
**Account Manager** : Heather McKenzie  
**Address** : 8081 Lougheed Highway  
                   Burnaby, British Columbia Canada V5A 1W9  
**Telephone** : +1 604 253 4188  
**Date Samples Received** : 19-Oct-2020 12:25  
**Date Analysis Commenced** : 19-Oct-2020  
**Issue Date** : 26-Nov-2020 15:13

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Bruna Botti	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Gloria Chan	Lab Analyst	Metals, Burnaby, British Columbia
Kaitlyn Gardner	Account Manager Assistant	Internal Subcontracting, Fort Collins, Colorado
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia



## General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

### Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

# = Indicates a QC result that did not meet the ALS DQO.



## Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 105039)											
VA20B8464-002	Anonymous	pH	----	E108	0.10	pH units	8.04	8.05	0.124%	4%	----
Physical Tests (QC Lot: 105040)											
VA20B8464-002	Anonymous	conductivity	----	E100	2.0	µS/cm	184	184	0.218%	10%	----
Physical Tests (QC Lot: 105041)											
VA20B8464-002	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	69.6	69.2	0.576%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	69.6	69.2	0.576%	20%	----
Physical Tests (QC Lot: 105163)											
VA20B8468-001	AMQ16-626-3	solids, total dissolved [TDS]	----	E162-L	15.0	mg/L	3770	3830	1.64%	20%	----
Physical Tests (QC Lot: 105165)											
VA20B8101-001	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	104	104	0.00%	20%	----
Physical Tests (QC Lot: 112537)											
VA20B8468-001	AMQ16-626-3	solids, total dissolved [TDS]	----	E162	20	mg/L	4000	3950	1.41%	20%	----
Physical Tests (QC Lot: 112544)											
VA20B8468-001	AMQ16-626-3	turbidity	----	E121	0.10	NTU	0.96	1.06	0.10	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 105044)											
VA20B8468-001	AMQ16-626-3	fluoride	16984-48-8	E235.F	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 105045)											
VA20B8468-001	AMQ16-626-3	chloride	16887-00-6	E235.Cl	25.0	mg/L	1900	1930	1.60%	20%	----
Anions and Nutrients (QC Lot: 105046)											
VA20B8468-001	AMQ16-626-3	bromide	24959-67-9	E235.Br-L	2.50	mg/L	17.8	18.7	0.848	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 105047)											
VA20B8468-001	AMQ16-626-3	nitrate (as N)	14797-55-8	E235.NO3-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 105048)											
VA20B8468-001	AMQ16-626-3	nitrite (as N)	14797-65-0	E235.NO2-L	0.0500	mg/L	<0.0500	<0.0500	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 105049)											
VA20B8468-001	AMQ16-626-3	sulfate (as SO4)	14808-79-8	E235.SO4	15.0	mg/L	<15.0	<15.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 105050)											
VA20B8468-001	AMQ16-626-3	chloride	16887-00-6	E235.Cl-L	5.00	mg/L	1900	1930	1.60%	20%	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Anions and Nutrients (QC Lot: 105072)</b>											
VA20B8089-001	Anonymous	silicate (as SiO <sub>2</sub> )	7631-86-9	E392	0.50	mg/L	5.46	5.47	0.233%	20%	----
<b>Anions and Nutrients (QC Lot: 106475)</b>											
VA20B8264-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0024	0.0022	0.0001	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 106476)</b>											
VA20B8264-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 112953)</b>											
VA20B8468-001	AMQ16-626-3	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 113469)</b>											
VA20B8468-001	AMQ16-626-3	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.295	0.296	0.001	Diff <2x LOR	----
<b>Total Metals (QC Lot: 106279)</b>											
VA20B8464-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	0.0031	0.00008	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00014	0.00014	0.000002	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00062	0.00065	0.00003	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.00020	0.00021	0.000002	Diff <2x LOR	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.000111	0.000108	3.19%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	2.41	2.44	1.32%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00065	0.00065	0.000005	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.040	0.041	0.0007	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.00180	0.00183	1.91%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00454	0.00446	1.70%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000114	0.000098	0.000016	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	0.547	0.543	0.004	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00044	0.00046	0.00002	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00608	0.00622	2.38%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----





Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 106279) - continued											
VA20B8464-001	Anonymous	sodium, total	17341-25-2	E420	0.050	mg/L	25.8	25.9	0.201%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.00988	0.00980	0.739%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	6.58	6.89	4.58%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000048	0.000047	0.000001	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0135	0.0144	0.0009	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 106280)											
VA20B8464-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Total Metals (QC Lot: 108349)											
VA20B8153-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 106202)											
VA20B8468-001	AMQ16-626-3	aluminum, dissolved	7429-90-5	E421	0.0050	mg/L	0.0084	0.0068	0.0015	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00150	mg/L	<0.00150	<0.00150	0	Diff <2x LOR	----
VA20B8468-001	AMQ16-626-3	antimony, dissolved	7440-36-0	E421	0.00020	mg/L	0.00107	0.00111	0.00004	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00020	mg/L	0.00177	0.00169	0.00008	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00020	mg/L	0.0713	0.0733	2.74%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.020	mg/L	0.792	0.834	5.08%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000100	mg/L	<0.0000100	<0.0000100	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.100	mg/L	755	774	2.46%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000020	mg/L	0.000225	0.000242	7.02%	20%	----
		cobalt, dissolved	7440-48-4	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0020	mg/L	0.334	0.341	2.06%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0100	mg/L	0.833	0.848	1.82%	20%	----



Sub-Matrix: <b>Water</b>					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 106202) - continued											
VA20B8468-001	AMQ16-626-3	manganese, dissolved	7439-96-5	E421	0.00020	mg/L	0.00866	0.00728	17.3%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000100	mg/L	0.00227	0.00218	4.08%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.100	mg/L	15.8	17.2	7.98%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00040	mg/L	0.0236	0.0250	6.02%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000100	mg/L	0.000364	0.000304	0.000060	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.100	mg/L	3.07	2.99	2.64%	20%	----
		silver, dissolved	7440-22-4	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.100	mg/L	290	313	7.69%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00040	mg/L	12.8	13.3	3.91%	20%	----
		sulfur, dissolved	7704-34-9	E421	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
		tellurium, dissolved	13494-80-9	E421	0.00040	mg/L	0.00078	0.00065	0.00014	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00020	mg/L	0.0342	0.0334	2.33%	20%	----
		uranium, dissolved	7440-61-1	E421	0.000020	mg/L	0.000022	<0.000020	0.000002	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 106203)											
VA20B8468-001	AMQ16-626-3	chromium, dissolved	7440-47-3	E421.Cr-L	0.00020	mg/L	0.00024	<0.00020	0.00004	Diff <2x LOR	----
Dissolved Metals (QC Lot: 108322)											
VA20B8139-006	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 113489)											
VA20B9775-001	Anonymous	chemical oxygen demand [COD]	----	E559	20	mg/L	584	595	1.93%	20%	----



## Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

### Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Physical Tests (QCLot: 105040)</b>						
conductivity	----	E100	1	µS/cm	1.1	----
<b>Physical Tests (QCLot: 105041)</b>						
alkalinity, bicarbonate (as CaCO <sub>3</sub> )	----	E290	1	mg/L	# 1.7	----
alkalinity, carbonate (as CaCO <sub>3</sub> )	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO <sub>3</sub> )	----	E290	1	mg/L	<1.0	----
alkalinity, phenolphthalein (as CaCO <sub>3</sub> )	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO <sub>3</sub> )	----	E290	1	mg/L	# 1.7	B
<b>Physical Tests (QCLot: 105163)</b>						
solids, total dissolved [TDS]	----	E162-L	3	mg/L	<3.0	----
<b>Physical Tests (QCLot: 105165)</b>						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
<b>Physical Tests (QCLot: 112537)</b>						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
<b>Physical Tests (QCLot: 112544)</b>						
turbidity	----	E121	0.1	NTU	<0.10	----
<b>Anions and Nutrients (QCLot: 105044)</b>						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
<b>Anions and Nutrients (QCLot: 105045)</b>						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
<b>Anions and Nutrients (QCLot: 105046)</b>						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
<b>Anions and Nutrients (QCLot: 105047)</b>						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
<b>Anions and Nutrients (QCLot: 105048)</b>						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
<b>Anions and Nutrients (QCLot: 105049)</b>						
sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
<b>Anions and Nutrients (QCLot: 105050)</b>						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
<b>Anions and Nutrients (QCLot: 105072)</b>						
silicate (as SiO <sub>2</sub> )	7631-86-9	E392	0.5	mg/L	<0.50	----
<b>Anions and Nutrients (QCLot: 106475)</b>						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Anions and Nutrients (QCLot: 106476)</b>						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
<b>Anions and Nutrients (QCLot: 112953)</b>						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
<b>Anions and Nutrients (QCLot: 113469)</b>						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
<b>Total Metals (QCLot: 106279)</b>						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Total Metals (QCLot: 106279) - continued</b>						
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
<b>Total Metals (QCLot: 106280)</b>						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
<b>Total Metals (QCLot: 108349)</b>						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
<b>Dissolved Metals (QCLot: 106202)</b>						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 106202) - continued						
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 106203)						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
Dissolved Metals (QCLot: 108322)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 113489)						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 105039)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 105040)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	108	90.0	110	----
Physical Tests (QCLot: 105041)									
alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	229 mg/L	89.8	75.0	125	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	97.5	85.0	115	----
Physical Tests (QCLot: 105163)									
solids, total dissolved [TDS]	----	E162-L	3	mg/L	1000 mg/L	97.5	85.0	115	----
Physical Tests (QCLot: 105165)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	95.5	85.0	115	----
Physical Tests (QCLot: 112537)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	103	85.0	115	----
Physical Tests (QCLot: 112544)									
turbidity	----	E121	0.1	NTU	200 NTU	99.0	85.0	115	----
Anions and Nutrients (QCLot: 105044)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	96.9	90.0	110	----
Anions and Nutrients (QCLot: 105045)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 105046)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 105047)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 105048)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 105049)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 105050)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 105072)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 106475)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.2	80.0	120	----





Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 106476)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.12 mg/L	99.7	85.0	115	----
Anions and Nutrients (QCLot: 112953)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	101	80.0	120	----
Anions and Nutrients (QCLot: 113469)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	103	75.0	125	----
Total Metals (QCLot: 106279)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	100	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	95.8	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	92.9	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.2	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	88.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	104	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	103	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	105	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	95.3	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.6	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	98.9	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.0	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	96.7	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	95.0	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	94.8	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	96.8	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	105	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	86.5	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	96.3	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	103	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Total Metals (QCLot: 106279) - continued</b>									
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	99.9	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	95.8	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	90.2	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	98.9	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	102	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	92.9	80.0	120	----
<b>Total Metals (QCLot: 106280)</b>									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
<b>Total Metals (QCLot: 108349)</b>									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	101	80.0	120	----
<b>Dissolved Metals (QCLot: 106202)</b>									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	104	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	91.5	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	95.1	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	91.2	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	107	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	112	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	104	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	109	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	96.3	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	99.2	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	101	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	91.6	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	112	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	91.5	80.0	120	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 106202) - continued									
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	105	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	99.6	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	# 129	80.0	120	MES
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	91.7	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	96.7	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	101	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	96.0	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.9	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.6	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	94.5	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.0	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	104	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	92.6	80.0	120	----
Dissolved Metals (QCLot: 106203)									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 108322)									
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	98.2	80.0	120	----
Aggregate Organics (QCLot: 113489)									
chemical oxygen demand [COD]	----	E559	20	mg/L	750 mg/L	99.4	85.0	115	----

Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	
Anions and Nutrients (QCLot: 105044)										
VA20B8468-002	AMQ16-626-3-DUP1	fluoride	16984-48-8	E235.F	59.7 mg/L	50 mg/L	119	75.0	125	----
Anions and Nutrients (QCLot: 105045)										
VA20B8468-002	AMQ16-626-3-DUP1	chloride	16887-00-6	E235.Cl	4880 mg/L	5000 mg/L	97.7	75.0	125	----
Anions and Nutrients (QCLot: 105046)										
VA20B8468-002	AMQ16-626-3-DUP1	bromide	24959-67-9	E235.Br-L	23.4 mg/L	25 mg/L	93.8	75.0	125	----
Anions and Nutrients (QCLot: 105047)										
VA20B8468-002	AMQ16-626-3-DUP1	nitrate (as N)	14797-55-8	E235.NO3-L	125 mg/L	125 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 105048)										
VA20B8468-002	AMQ16-626-3-DUP1	nitrite (as N)	14797-65-0	E235.NO2-L	24.2 mg/L	25 mg/L	96.7	75.0	125	----
Anions and Nutrients (QCLot: 105049)										
VA20B8468-002	AMQ16-626-3-DUP1	sulfate (as SO4)	14808-79-8	E235.SO4	5030 mg/L	5000 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 105050)										
VA20B8468-002	AMQ16-626-3-DUP1	chloride	16887-00-6	E235.Cl-L	4880 mg/L	5000 mg/L	97.7	75.0	125	----
Anions and Nutrients (QCLot: 105072)										
VA20B8089-004	Anonymous	silicate (as SiO2)	7631-86-9	E392	9.80 mg/L	10 mg/L	98.0	75.0	125	----
Anions and Nutrients (QCLot: 106475)										
VA20B8264-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0491 mg/L	0.05 mg/L	98.2	70.0	130	----
Anions and Nutrients (QCLot: 106476)										
VA20B8264-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.204 mg/L	0.2 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 112953)										
VA20B8468-002	AMQ16-626-3-DUP1	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0354 mg/L	0.03 mg/L	118	70.0	130	----
Anions and Nutrients (QCLot: 113469)										
VA20B8468-002	AMQ16-626-3-DUP1	Kjeldahl nitrogen, total [TKN]	----	E318	2.51 mg/L	2.5 mg/L	100	70.0	130	----
Total Metals (QCLot: 106279)										
VA20B8464-002	Anonymous	aluminum, total	7429-90-5	E420	0.187 mg/L	0.2 mg/L	93.4	70.0	130	----
		antimony, total	7440-36-0	E420	0.0196 mg/L	0.02 mg/L	98.3	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----



Sub-Matrix: **Water**

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 106279) - continued										
VA20B8464-002	Anonymous	beryllium, total	7440-41-7	E420	0.0395 mg/L	0.04 mg/L	98.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00980 mg/L	0.01 mg/L	98.0	70.0	130	----
		boron, total	7440-42-8	E420	0.093 mg/L	0.1 mg/L	92.9	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00406 mg/L	0.004 mg/L	101	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.00980 mg/L	0.01 mg/L	98.0	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		copper, total	7440-50-8	E420	0.0188 mg/L	0.02 mg/L	94.2	70.0	130	----
		iron, total	7439-89-6	E420	1.88 mg/L	2 mg/L	94.2	70.0	130	----
		lead, total	7439-92-1	E420	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		lithium, total	7439-93-2	E420	0.0982 mg/L	0.1 mg/L	98.2	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		nickel, total	7440-02-0	E420	0.0361 mg/L	0.04 mg/L	90.2	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.94 mg/L	10 mg/L	99.4	70.0	130	----
		potassium, total	7440-09-7	E420	3.98 mg/L	4 mg/L	99.6	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		selenium, total	7782-49-2	E420	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		silicon, total	7440-21-3	E420	9.61 mg/L	10 mg/L	96.1	70.0	130	----
		silver, total	7440-22-4	E420	0.00395 mg/L	0.004 mg/L	98.8	70.0	130	----
		sodium, total	17341-25-2	E420	2.00 mg/L	2 mg/L	100.0	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	19.9 mg/L	20 mg/L	99.3	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0377 mg/L	0.04 mg/L	94.3	70.0	130	----
		thallium, total	7440-28-0	E420	0.00390 mg/L	0.004 mg/L	97.4	70.0	130	----
		thorium, total	7440-29-1	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		tin, total	7440-31-5	E420	0.0196 mg/L	0.02 mg/L	97.9	70.0	130	----
		titanium, total	7440-32-6	E420	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, total	7440-61-1	E420	0.00407 mg/L	0.004 mg/L	102	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0989 mg/L	0.1 mg/L	98.9	70.0	130	----
		zinc, total	7440-66-6	E420	0.382 mg/L	0.4 mg/L	95.5	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0386 mg/L	0.04 mg/L	96.6	70.0	130	----
Total Metals (QCLot: 106280)										
VA20B8464-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0391 mg/L	0.04 mg/L	97.6	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 108349)										
VA20B8153-002	Anonymous	mercury, total	7439-97-6	E508	0.0000988 mg/L	0.0001 mg/L	98.8	70.0	130	----
Dissolved Metals (QCLot: 106202)										
VA20B8468-002	AMQ16-626-3-DUP1	aluminum, dissolved	7429-90-5	E421	0.378 mg/L	0.4 mg/L	94.5	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0386 mg/L	0.04 mg/L	96.5	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0352 mg/L	0.04 mg/L	87.9	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0710 mg/L	0.08 mg/L	88.7	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0169 mg/L	0.02 mg/L	84.4	70.0	130	----
		boron, dissolved	7440-42-8	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00758 mg/L	0.008 mg/L	94.7	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	8 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0344 mg/L	0.04 mg/L	86.0	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0315 mg/L	0.04 mg/L	78.7	70.0	130	----
		iron, dissolved	7439-89-6	E421	3.44 mg/L	4 mg/L	86.1	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0356 mg/L	0.04 mg/L	89.1	70.0	130	----
		lithium, dissolved	7439-93-2	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	1.67 mg/L	2 mg/L	83.3	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0335 mg/L	0.04 mg/L	83.8	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0399 mg/L	0.04 mg/L	99.8	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0656 mg/L	0.08 mg/L	82.0	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	19.0 mg/L	20 mg/L	95.2	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	8 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0360 mg/L	0.04 mg/L	90.0	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0681 mg/L	0.08 mg/L	85.1	70.0	130	----
		silicon, dissolved	7440-21-3	E421	17.1 mg/L	20 mg/L	85.4	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00715 mg/L	0.008 mg/L	89.4	70.0	130	----
		sodium, dissolved	17341-25-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.04 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	38.8 mg/L	40 mg/L	97.0	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0704 mg/L	0.08 mg/L	88.1	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00684 mg/L	0.008 mg/L	85.5	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0389 mg/L	0.04 mg/L	97.2	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0653 mg/L	0.08 mg/L	81.7	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0354 mg/L	0.04 mg/L	88.5	70.0	130	----



Sub-Matrix: <b>Water</b>					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 106202) - continued										
VA20B8468-002	AMQ16-626-3-DUP1	uranium, dissolved	7440-61-1	E421	0.00746 mg/L	0.008 mg/L	93.2	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.183 mg/L	0.2 mg/L	91.6	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.602 mg/L	0.8 mg/L	75.2	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0818 mg/L	0.08 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 106203)										
VA20B8468-002	AMQ16-626-3-DUP1	chromium, dissolved	7440-47-3	E421.Cr-L	0.0704 mg/L	0.08 mg/L	88.0	70.0	130	----
Dissolved Metals (QCLot: 108322)										
VA20B8139-007	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000977 mg/L	0.0001 mg/L	97.7	70.0	130	----
Aggregate Organics (QCLot: 113489)										
VA20B9775-002	Anonymous	chemical oxygen demand [COD]	----	E559	452 mg/L	500 mg/L	90.4	75.0	125	----



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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY      YELLOW - CLIENT COPY

NCD 2018 EVENT

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

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



**Environmental**

## CERTIFICATE OF ANALYSIS

**Work Order** : **VA20B9109**  
**Client** : **Golder Associates Ltd.**  
**Contact** : Adrian Kowalchuk  
**Address** : 1931 Robertson Road  
Ottawa ON Canada K2H 5B7  
**Telephone** : 613 592 9600  
**Project** : 20148777-1000  
**PO** : ----  
**C-O-C number** : 2020-10-19  
**Sampler** : Adrian Kowalchuk  
**Site** : AMQ16-626  
**Quote number** : VA20-AEML100-001 (Q72802)  
**No. of samples received** : 4  
**No. of samples analysed** : 4

**Page** : 1 of 7  
**Laboratory** : Vancouver - Environmental  
**Account Manager** : Heather McKenzie  
**Address** : 8081 Lougheed Highway  
Burnaby BC Canada V5A 1W9  
**Telephone** : +1 604 253 4188  
**Date Samples Received** : 26-Oct-2020 14:12  
**Date Analysis Commenced** : 27-Oct-2020  
**Issue Date** : 26-Nov-2020 15:18

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Aaron Yu	Laboratory Analyst	Metals, Burnaby, British Columbia
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Erin Gatdula	Account Manager Assistant	Internal Subcontracting, Fort Collins, Colorado
Kevin Duarte	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia





## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances  
LOR: Limit of Reporting (detection limit).

Unit	Description
-	No Unit
µS/cm	Microsiemens per centimetre
Bq/L	Becquerels per litre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

## Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DTSE	Dissolved Se concentration exceeds total. Positive bias on D-Se suspected due to signal enhancement from volatile selenium species. Contact ALS if an alternative test to address this interference is needed.



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					AMQ16-626-2	AMQ16-626-2-D up1	AMQ16-626-6	AMQ16-626-6-D up1	----
Client sampling date / time					16-Oct-2020 16:55	16-Oct-2020 16:55	18-Oct-2020 09:00	18-Oct-2020 09:00	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9109-001	VA20B9109-002	VA20B9109-003	VA20B9109-004	-----
					Result	Result	Result	Result	----
<b>Physical Tests</b>									
alkalinity, bicarbonate (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	43.2	43.8	26.2	25.2	----
alkalinity, carbonate (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----
alkalinity, hydroxide (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	----
alkalinity, total (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	43.2	43.8	26.2	25.2	----
conductivity	----	E100	2.0	µS/cm	20300	20400	9340	9460	----
hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	----	EC100A	0.60	mg/L	9440	9570	4030	4140	----
pH	----	E108	0.10	pH units	7.37	7.24	6.60	6.58	----
solids, total dissolved [TDS]	----	E162	10	mg/L	13300	14000	5280	5540	----
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	<3.0	<3.0	----
turbidity	----	E121	0.10	NTU	3.30	3.08	2.60	2.69	----
hardness (as CaCO <sub>3</sub> ), dissolved	----	EC100	0.60	mg/L	8820	8610	3800	3720	----
<b>Anions and Nutrients</b>									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.144	0.139	0.468	0.475	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	96.8	98.7	42.8	42.8	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	7800	7780	3260	3260	----
fluoride	16984-48-8	E235.F	0.020	mg/L	<2.00 <sup>DLDS</sup>	<2.00 <sup>DLDS</sup>	<1.00 <sup>DLDS</sup>	<1.00 <sup>DLDS</sup>	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.415	0.408	0.819	0.826	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.500 <sup>DLDS</sup>	<0.500 <sup>DLDS</sup>	<0.250 <sup>DLDS</sup>	<0.250 <sup>DLDS</sup>	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.510	<0.510	<0.255	<0.255	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.100 <sup>DLDS</sup>	<0.100 <sup>DLDS</sup>	<0.0500 <sup>DLDS</sup>	<0.0500 <sup>DLDS</sup>	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0024	0.0024	<0.0010	<0.0010	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0104	0.0091	<0.0020	<0.0020	----
silicate (as SiO <sub>2</sub> )	7631-86-9	E392	0.50	mg/L	6.47	6.43	6.69	6.42	----
sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO4	0.30	mg/L	<30.0 <sup>DLDS</sup>	<30.0 <sup>DLDS</sup>	<15.0 <sup>DLDS</sup>	<15.0 <sup>DLDS</sup>	----
<b>Total Metals</b>									
aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0600 <sup>DLA</sup>	<0.0600 <sup>DLA</sup>	0.0219	<0.0300 <sup>DLA</sup>	----
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00200 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	0.00061	<0.00100 <sup>DLA</sup>	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00200 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	0.00235	0.00236	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0992	0.105	0.866	0.870	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.00200 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	<0.000500 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	----



Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	AMQ16-626-2	AMQ16-626-2-D up1	AMQ16-626-6	AMQ16-626-6-D up1	----
Client sampling date / time						16-Oct-2020 16:55	16-Oct-2020 16:55	18-Oct-2020 09:00	18-Oct-2020 09:00	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9109-001	VA20B9109-002	VA20B9109-003	VA20B9109-004	-----	
					Result	Result	Result	Result	----	
Total Metals										
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	<0.000500 <sup>DLA</sup>		----
boron, total	7440-42-8	E420	0.010	mg/L	1.76	1.80	0.375	0.411		----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.000100 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	<0.0000250 <sup>DLA</sup>	<0.0000500 <sup>DLA</sup>		----
calcium, total	7440-70-2	E420	0.050	mg/L	3780	3830	1550	1600		----
cesium, total	7440-46-2	E420	0.000010	mg/L	0.00191	0.00182	0.000164	0.000163		----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00324	0.00258	0.00095	<0.00100 <sup>DLA</sup>		----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00200 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>		----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.0100 <sup>DLA</sup>	<0.0100 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	<0.00500 <sup>DLA</sup>		----
iron, total	7439-89-6	E420	0.010	mg/L	<0.200 <sup>DLA</sup>	<0.200 <sup>DLA</sup>	0.379	0.371		----
lead, total	7439-92-1	E420	0.000050	mg/L	0.00141	0.00216	0.000273	<0.000500 <sup>DLA</sup>		----
lithium, total	7439-93-2	E420	0.0010	mg/L	3.11	3.23	0.533	0.504		----
magnesium, total	7439-95-4	E420	0.0050	mg/L	1.21	1.01	37.5	37.4		----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0160	0.0148	0.0938	0.0950		----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050		----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00836	0.00780	0.0140	0.0134		----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.0100 <sup>DLA</sup>	<0.0100 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	<0.00500 <sup>DLA</sup>		----
phosphorus, total	7723-14-0	E420	0.050	mg/L	<1.00 <sup>DLA</sup>	<1.00 <sup>DLA</sup>	<0.250 <sup>DLA</sup>	<0.500 <sup>DLA</sup>		----
potassium, total	7440-09-7	E420	0.050	mg/L	135	140	11.9	11.8		----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.178	0.175	0.0176	0.0176		----
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	0.000459	<0.000500 <sup>DLA</sup>		----
silicon, total	7440-21-3	E420	0.10	mg/L	3.54	3.33	3.36	3.23		----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000200 <sup>DLA</sup>	<0.000200 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>		----
sodium, total	17341-25-2	E420	0.050	mg/L	441	449	295	282		----
strontium, total	7440-24-6	E420	0.00020	mg/L	58.9	58.6	21.1	20.6		----
sulfur, total	7704-34-9	E420	0.50	mg/L	<10.0 <sup>DLA</sup>	<10.0 <sup>DLA</sup>	<2.50 <sup>DLA</sup>	<5.00 <sup>DLA</sup>		----
tellurium, total	13494-80-9	E420	0.00020	mg/L	0.00416	0.00411	0.00135	<0.00200 <sup>DLA</sup>		----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000200 <sup>DLA</sup>	<0.000200 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>		----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00200 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>		----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00200 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>		----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00600 <sup>DLA</sup>	<0.00600 <sup>DLA</sup>	<0.00150 <sup>DLA</sup>	<0.00300 <sup>DLA</sup>		----
tungsten, total	7440-33-7	E420	0.00010	mg/L	0.0546	0.0540	0.0196	0.0197		----



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

					AMQ16-626-2	AMQ16-626-2-D up1	AMQ16-626-6	AMQ16-626-6-D up1	----
Client sampling date / time					16-Oct-2020 16:55	16-Oct-2020 16:55	18-Oct-2020 09:00	18-Oct-2020 09:00	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9109-001	VA20B9109-002	VA20B9109-003	VA20B9109-004	-----
					Result	Result	Result	Result	----
<b>Total Metals</b>									
uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000200 <sup>DLA</sup>	<0.000200 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.0100 <sup>DLA</sup>	<0.0100 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	<0.00500 <sup>DLA</sup>	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.138	0.155	0.281	0.284	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00400 <sup>DLA</sup>	<0.00400 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	----
<b>Dissolved Metals</b>									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0200 <sup>DLA</sup>	0.0163	<0.0100 <sup>DLA</sup>	0.0053	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00200 <sup>DLA</sup>	0.00119	<0.00100 <sup>DLA</sup>	0.00058	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00200 <sup>DLA</sup>	0.00194	0.00278	0.00272	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.101	0.0998	0.809	0.898	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.00200 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.000500 <sup>DLA</sup>	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.00100 <sup>DLA</sup>	<0.000500 <sup>DLA</sup>	<0.000500 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	1.63	1.61	0.350	0.325	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.000100 <sup>DLA</sup>	<0.0000500 <sup>DLA</sup>	<0.0000500 <sup>DLA</sup>	<0.0000250 <sup>DLA</sup>	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	3530	3450	1460	1430	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.00179	0.00183	0.000178	0.000164	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00200 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00200 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00400 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.200 <sup>DLA</sup>	<0.100 <sup>DLA</sup>	0.260	0.271	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.00100 <sup>DLA</sup>	<0.000500 <sup>DLA</sup>	<0.000500 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	2.87	2.70	0.423	0.417	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	0.790	0.790	37.4	38.5	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0141	0.0125	0.0924	0.0925	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00782	0.00824	0.0148	0.0156	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.0100 <sup>DLA</sup>	<0.00500 <sup>DLA</sup>	<0.00500 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<1.00 <sup>DLA</sup>	<0.500 <sup>DLA</sup>	<0.500 <sup>DLA</sup>	<0.250 <sup>DLA</sup>	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	118	116	10.9	11.2	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.144	0.145	0.0164	0.0174	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.00100 <sup>DLA</sup>	<0.000500 <sup>DLA</sup>	0.00250 <sup>DTSE</sup>	0.000658	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.32	3.20	3.18	3.23	----





## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					AMQ16-626-2	AMQ16-626-2-D up1	AMQ16-626-6	AMQ16-626-6-D up1	----
Client sampling date / time					16-Oct-2020 16:55	16-Oct-2020 16:55	18-Oct-2020 09:00	18-Oct-2020 09:00	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9109-001	VA20B9109-002	VA20B9109-003	VA20B9109-004	-----
					Result	Result	Result	Result	----
<b>Dissolved Metals</b>									
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000200 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	440	419	284	285	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	57.3	58.7	22.2	23.2	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<10.0 <sup>DLA</sup>	<5.00 <sup>DLA</sup>	<5.00 <sup>DLA</sup>	<2.50 <sup>DLA</sup>	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00400 <sup>DLA</sup>	0.00385	<0.00200 <sup>DLA</sup>	0.00133	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000200 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00200 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00200 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00600 <sup>DLA</sup>	<0.00300 <sup>DLA</sup>	<0.00300 <sup>DLA</sup>	<0.00150 <sup>DLA</sup>	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.0529	0.0540	0.0196	0.0199	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000200 <sup>DLA</sup>	0.000140	<0.000100 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.0100 <sup>DLA</sup>	<0.00500 <sup>DLA</sup>	<0.00500 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0200 <sup>DLA</sup>	<0.0100 <sup>DLA</sup>	0.0239	0.0243	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00400 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	<0.00200 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	Field	----
dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	----
<b>Aggregate Organics</b>									
chemical oxygen demand [COD]	----	E559	20	mg/L	1430 <sup>DLM</sup>	1530 <sup>DLM</sup>	3100 <sup>DLM</sup>	3200 <sup>DLM</sup>	----
<b>Radiological Parameters</b>									
radium-226	13982-63-3	RA226-MMER	0.013	Bq/L	----	----	0.66	1.1	----
radium-226	13982-63-3	RA226-MMER	0.02	Bq/L	1.1	----	----	----	----
radium-226	13982-63-3	RA226-MMER	0.026	Bq/L	----	0.88	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

## QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: <b>VA20B9109</b>	Page	: 1 of 21
Client	: <b>Golder Associates Ltd.</b>	Laboratory	: Vancouver - Environmental
Contact	: Adrian Kowalchuk	Account Manager	: Heather McKenzie
Address	: 1931 Robertson Road Ottawa ON Canada K2H 5B7	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 204 489 9600	Telephone	: +1 604 253 4188
Project	: 20148777-1000	Date Samples Received	: 26-Oct-2020 14:12
PO	: ----	Issue Date	: 26-Nov-2020 15:18
C-O-C number	: 2020-10-19		
Sampler	: Adrian Kowalchuk		
Site	: AMQ16-626		
Quote number	: VA20-AEML100-001 (Q72802)		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

### Key

**Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.

**CAS Number:** Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

**DQO:** Data Quality Objective.

**LOR:** Limit of Reporting (detection limit).

**RPD:** Relative Percent Difference.

## Summary of Outliers

### Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

### Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

### Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

### Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

RIGHT SOLUTIONS | RIGHT PARTNER



## Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 is used for calculation purposes.

Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) AMQ16-626-6	E559	18-Oct-2020	----	----	----		25-Nov-2020	28 days	38 days	<div>✖</div> <div>EHT</div>
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) AMQ16-626-6-Dup1	E559	18-Oct-2020	----	----	----		25-Nov-2020	28 days	38 days	<div>✖</div> <div>EHT</div>
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) AMQ16-626-2	E559	16-Oct-2020	----	----	----		25-Nov-2020	28 days	39 days	<div>✖</div> <div>EHT</div>
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) AMQ16-626-2-Dup1	E559	16-Oct-2020	----	----	----		25-Nov-2020	28 days	39 days	<div>✖</div> <div>EHT</div>
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) AMQ16-626-6	E298	18-Oct-2020	----	----	----		24-Nov-2020	28 days	36 days	<div>✖</div> <div>EHT</div>
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) AMQ16-626-6-Dup1	E298	18-Oct-2020	----	----	----		24-Nov-2020	28 days	36 days	<div>✖</div> <div>EHT</div>
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) AMQ16-626-2	E298	16-Oct-2020	----	----	----		24-Nov-2020	28 days	38 days	<div>✖</div> <div>EHT</div>



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) AMQ16-626-2-Dup1	E298	16-Oct-2020	----	----	----		24-Nov-2020	28 days	38 days	* EHT
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE AMQ16-626-2	E235.Br-L	16-Oct-2020	----	----	----		27-Oct-2020	28 days	10 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE AMQ16-626-2-Dup1	E235.Br-L	16-Oct-2020	----	----	----		27-Oct-2020	28 days	10 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE AMQ16-626-6	E235.Br-L	18-Oct-2020	----	----	----		27-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE AMQ16-626-6-Dup1	E235.Br-L	18-Oct-2020	----	----	----		27-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE AMQ16-626-2	E235.Cl	16-Oct-2020	----	----	----		27-Oct-2020	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE AMQ16-626-2-Dup1	E235.Cl	16-Oct-2020	----	----	----		27-Oct-2020	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE AMQ16-626-6	E235.Cl	18-Oct-2020	----	----	----		27-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE AMQ16-626-6-Dup1	E235.Cl	18-Oct-2020	----	----	----		27-Oct-2020	28 days	9 days	✓



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis				
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE AMQ16-626-6	E378-U	18-Oct-2020	----	----	----		24-Nov-2020	3 days	36 days	<div>✖</div> <div>EHTR</div>	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE AMQ16-626-6-Dup1	E378-U	18-Oct-2020	----	----	----		24-Nov-2020	3 days	36 days	<div>✖</div> <div>EHTR</div>	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE AMQ16-626-2	E378-U	16-Oct-2020	----	----	----		24-Nov-2020	3 days	38 days	<div>✖</div> <div>EHTR</div>	
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)											
HDPE AMQ16-626-2-Dup1	E378-U	16-Oct-2020	----	----	----		24-Nov-2020	3 days	38 days	<div>✖</div> <div>EHTR</div>	
Anions and Nutrients : Fluoride in Water by IC											
HDPE AMQ16-626-2	E235.F	16-Oct-2020	----	----	----		27-Oct-2020	28 days	10 days	<div>✔</div>	
Anions and Nutrients : Fluoride in Water by IC											
HDPE AMQ16-626-2-Dup1	E235.F	16-Oct-2020	----	----	----		27-Oct-2020	28 days	10 days	<div>✔</div>	
Anions and Nutrients : Fluoride in Water by IC											
HDPE AMQ16-626-6	E235.F	18-Oct-2020	----	----	----		27-Oct-2020	28 days	9 days	<div>✔</div>	
Anions and Nutrients : Fluoride in Water by IC											
HDPE AMQ16-626-6-Dup1	E235.F	18-Oct-2020	----	----	----		27-Oct-2020	28 days	9 days	<div>✔</div>	
Anions and Nutrients : Nitrate in Water by IC (Low Level)											
HDPE AMQ16-626-2	E235.NO3-L	16-Oct-2020	----	----	----		27-Oct-2020	3 days	10 days	<div>✖</div> <div>EHTR</div>	



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE AMQ16-626-2-Dup1	E235.NO3-L	16-Oct-2020	----	----	----		27-Oct-2020	3 days	10 days	<div>✖</div> <div>EHTR</div>
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE AMQ16-626-6	E235.NO3-L	18-Oct-2020	----	----	----		27-Oct-2020	3 days	9 days	<div>✖</div> <div>EHTR</div>
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE AMQ16-626-6-Dup1	E235.NO3-L	18-Oct-2020	----	----	----		27-Oct-2020	3 days	9 days	<div>✖</div> <div>EHTR</div>
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE AMQ16-626-2	E235.NO2-L	16-Oct-2020	----	----	----		27-Oct-2020	3 days	10 days	<div>✖</div> <div>EHTR</div>
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE AMQ16-626-2-Dup1	E235.NO2-L	16-Oct-2020	----	----	----		27-Oct-2020	3 days	10 days	<div>✖</div> <div>EHTR</div>
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE AMQ16-626-6	E235.NO2-L	18-Oct-2020	----	----	----		27-Oct-2020	3 days	9 days	<div>✖</div> <div>EHTR</div>
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE AMQ16-626-6-Dup1	E235.NO2-L	18-Oct-2020	----	----	----		27-Oct-2020	3 days	9 days	<div>✖</div> <div>EHTR</div>
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE AMQ16-626-2	E392	16-Oct-2020	----	----	----		27-Oct-2020	28 days	10 days	<div>✔</div>
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE AMQ16-626-2-Dup1	E392	16-Oct-2020	----	----	----		27-Oct-2020	28 days	10 days	<div>✔</div>





Matrix: **Water**

Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE AMQ16-626-6	E392	18-Oct-2020	----	----	----		27-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE AMQ16-626-6-Dup1	E392	18-Oct-2020	----	----	----		27-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE AMQ16-626-2	E235.SO4	16-Oct-2020	----	----	----		27-Oct-2020	28 days	10 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE AMQ16-626-2-Dup1	E235.SO4	16-Oct-2020	----	----	----		27-Oct-2020	28 days	10 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE AMQ16-626-6	E235.SO4	18-Oct-2020	----	----	----		27-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE AMQ16-626-6-Dup1	E235.SO4	18-Oct-2020	----	----	----		27-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) AMQ16-626-6	E318	18-Oct-2020	23-Nov-2020	28 days	36 days	✖ EHT	23-Nov-2020	-9 days	0 days	✖
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) AMQ16-626-6-Dup1	E318	18-Oct-2020	23-Nov-2020	28 days	36 days	✖ EHT	23-Nov-2020	-9 days	0 days	✖
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) AMQ16-626-2	E318	16-Oct-2020	23-Nov-2020	28 days	37 days	✖ EHT	23-Nov-2020	-10 days	0 days	✖



Matrix: **Water**

Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) AMQ16-626-2-Dup1	E318	16-Oct-2020	23-Nov-2020	28 days	37 days	* EHT	23-Nov-2020	-10 days	0 days	*
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) AMQ16-626-6	E372-U	18-Oct-2020	23-Nov-2020	28 days	36 days	* EHT	24-Nov-2020	-9 days	0 days	*
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) AMQ16-626-6-Dup1	E372-U	18-Oct-2020	23-Nov-2020	28 days	36 days	* EHT	24-Nov-2020	-9 days	0 days	*
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) AMQ16-626-2	E372-U	16-Oct-2020	23-Nov-2020	28 days	37 days	* EHT	24-Nov-2020	-10 days	0 days	*
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) AMQ16-626-2-Dup1	E372-U	16-Oct-2020	23-Nov-2020	28 days	37 days	* EHT	24-Nov-2020	-10 days	0 days	*
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) AMQ16-626-6	E421.Cr-L	18-Oct-2020	29-Oct-2020	180 days	11 days	✓	31-Oct-2020	168 days	1 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) AMQ16-626-6-Dup1	E421.Cr-L	18-Oct-2020	29-Oct-2020	180 days	11 days	✓	31-Oct-2020	168 days	1 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) AMQ16-626-2	E421.Cr-L	16-Oct-2020	29-Oct-2020	180 days	13 days	✓	31-Oct-2020	166 days	1 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) AMQ16-626-2-Dup1	E421.Cr-L	16-Oct-2020	29-Oct-2020	180 days	13 days	✓	31-Oct-2020	166 days	1 days	✓



Matrix: **Water**

Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) AMQ16-626-6	E509	18-Oct-2020	30-Oct-2020	28 days	12 days	✓	30-Oct-2020	15 days	0 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) AMQ16-626-6-Dup1	E509	18-Oct-2020	30-Oct-2020	28 days	12 days	✓	30-Oct-2020	15 days	0 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) AMQ16-626-2	E509	16-Oct-2020	30-Oct-2020	28 days	13 days	✓	30-Oct-2020	14 days	0 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) AMQ16-626-2-Dup1	E509	16-Oct-2020	30-Oct-2020	28 days	13 days	✓	30-Oct-2020	14 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) AMQ16-626-6	E421	18-Oct-2020	29-Oct-2020	180 days	11 days	✓	31-Oct-2020	168 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) AMQ16-626-6-Dup1	E421	18-Oct-2020	29-Oct-2020	180 days	11 days	✓	31-Oct-2020	168 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) AMQ16-626-2	E421	16-Oct-2020	29-Oct-2020	180 days	13 days	✓	31-Oct-2020	166 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) AMQ16-626-2-Dup1	E421	16-Oct-2020	29-Oct-2020	180 days	13 days	✓	31-Oct-2020	166 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE AMQ16-626-6	E290	18-Oct-2020	----	----	----		24-Nov-2020	14 days	36 days	✖ EHT



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Alkalinity Species by Titration										
HDPE AMQ16-626-6-Dup1	E290	18-Oct-2020	----	----	----		24-Nov-2020	14 days	36 days	<div>✖ EHT</div>
Physical Tests : Alkalinity Species by Titration										
HDPE AMQ16-626-2	E290	16-Oct-2020	----	----	----		24-Nov-2020	14 days	38 days	<div>✖ EHT</div>
Physical Tests : Alkalinity Species by Titration										
HDPE AMQ16-626-2-Dup1	E290	16-Oct-2020	----	----	----		24-Nov-2020	14 days	38 days	<div>✖ EHT</div>
Physical Tests : Conductivity in Water										
HDPE AMQ16-626-6	E100	18-Oct-2020	----	----	----		24-Nov-2020	28 days	36 days	<div>✖ EHT</div>
Physical Tests : Conductivity in Water										
HDPE AMQ16-626-6-Dup1	E100	18-Oct-2020	----	----	----		24-Nov-2020	28 days	36 days	<div>✖ EHT</div>
Physical Tests : Conductivity in Water										
HDPE AMQ16-626-2	E100	16-Oct-2020	----	----	----		24-Nov-2020	28 days	38 days	<div>✖ EHT</div>
Physical Tests : Conductivity in Water										
HDPE AMQ16-626-2-Dup1	E100	16-Oct-2020	----	----	----		24-Nov-2020	28 days	38 days	<div>✖ EHT</div>
Physical Tests : pH by Meter										
HDPE AMQ16-626-6	E108	18-Oct-2020	----	----	----		24-Nov-2020	0.25 hrs	887 hrs	<div>✖ EHTR-FM</div>
Physical Tests : pH by Meter										
HDPE AMQ16-626-6-Dup1	E108	18-Oct-2020	----	----	----		24-Nov-2020	0.25 hrs	887 hrs	<div>✖ EHTR-FM</div>



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter										
HDPE AMQ16-626-2	E108	16-Oct-2020	----	----	----		24-Nov-2020	0.25 hrs	927 hrs	* EHTR-FM
Physical Tests : pH by Meter										
HDPE AMQ16-626-2-Dup1	E108	16-Oct-2020	----	----	----		24-Nov-2020	0.25 hrs	927 hrs	* EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE AMQ16-626-6	E162	18-Oct-2020	----	----	----		23-Nov-2020	7 days	36 days	* EHTR
Physical Tests : TDS by Gravimetry										
HDPE AMQ16-626-6-Dup1	E162	18-Oct-2020	----	----	----		23-Nov-2020	7 days	36 days	* EHTR
Physical Tests : TDS by Gravimetry										
HDPE AMQ16-626-2	E162	16-Oct-2020	----	----	----		23-Nov-2020	7 days	37 days	* EHTR
Physical Tests : TDS by Gravimetry										
HDPE AMQ16-626-2-Dup1	E162	16-Oct-2020	----	----	----		23-Nov-2020	7 days	37 days	* EHTR
Physical Tests : TSS by Gravimetry										
HDPE AMQ16-626-6	E160-H	18-Oct-2020	----	----	----		23-Nov-2020	7 days	36 days	* EHTR
Physical Tests : TSS by Gravimetry										
HDPE AMQ16-626-6-Dup1	E160-H	18-Oct-2020	----	----	----		23-Nov-2020	7 days	36 days	* EHTR
Physical Tests : TSS by Gravimetry										
HDPE AMQ16-626-2	E160-H	16-Oct-2020	----	----	----		23-Nov-2020	7 days	37 days	* EHTR



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TSS by Gravimetry										
HDPE AMQ16-626-2-Dup1	E160-H	16-Oct-2020	----	----	----		23-Nov-2020	7 days	37 days	<div>✖</div> <div>EHTR</div>
Physical Tests : Turbidity by Nephelometry										
HDPE AMQ16-626-6	E121	18-Oct-2020	----	----	----		23-Nov-2020	3 days	36 days	<div>✖</div> <div>EHTR</div>
Physical Tests : Turbidity by Nephelometry										
HDPE AMQ16-626-6-Dup1	E121	18-Oct-2020	----	----	----		23-Nov-2020	3 days	36 days	<div>✖</div> <div>EHTR</div>
Physical Tests : Turbidity by Nephelometry										
HDPE AMQ16-626-2	E121	16-Oct-2020	----	----	----		23-Nov-2020	3 days	38 days	<div>✖</div> <div>EHTR</div>
Physical Tests : Turbidity by Nephelometry										
HDPE AMQ16-626-2-Dup1	E121	16-Oct-2020	----	----	----		23-Nov-2020	3 days	38 days	<div>✖</div> <div>EHTR</div>
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) AMQ16-626-6	RA226-MMER	18-Oct-2020	----	----	----		19-Nov-2020	180 days	31 days	<div>✔</div>
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) AMQ16-626-6-Dup1	RA226-MMER	18-Oct-2020	----	----	----		19-Nov-2020	180 days	31 days	<div>✔</div>
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) AMQ16-626-2	RA226-MMER	16-Oct-2020	----	----	----		19-Nov-2020	180 days	33 days	<div>✔</div>
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) AMQ16-626-2-Dup1	RA226-MMER	16-Oct-2020	----	----	----		19-Nov-2020	180 days	33 days	<div>✔</div>





Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) AMQ16-626-6	E420.Cr-L	18-Oct-2020	----	----	----		30-Oct-2020	180 days	12 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) AMQ16-626-6-Dup1	E420.Cr-L	18-Oct-2020	----	----	----		30-Oct-2020	180 days	12 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) AMQ16-626-2	E420.Cr-L	16-Oct-2020	----	----	----		30-Oct-2020	180 days	14 days	✓
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) AMQ16-626-2-Dup1	E420.Cr-L	16-Oct-2020	----	----	----		30-Oct-2020	180 days	14 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) AMQ16-626-6	E508	18-Oct-2020	----	----	----		30-Oct-2020	28 days	12 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) AMQ16-626-6-Dup1	E508	18-Oct-2020	----	----	----		30-Oct-2020	28 days	12 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) AMQ16-626-2	E508	16-Oct-2020	----	----	----		30-Oct-2020	28 days	13 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) AMQ16-626-2-Dup1	E508	16-Oct-2020	----	----	----		30-Oct-2020	28 days	13 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) AMQ16-626-6	E420	18-Oct-2020	----	----	----		30-Oct-2020	180 days	12 days	✓





Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) AMQ16-626-6-Dup1	E420	18-Oct-2020	----	----	----		30-Oct-2020	180 days	12 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) AMQ16-626-2	E420	16-Oct-2020	----	----	----		30-Oct-2020	180 days	14 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) AMQ16-626-2-Dup1	E420	16-Oct-2020	----	----	----		30-Oct-2020	180 days	14 days	✓

**Legend & Qualifier Definitions**

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended  
 EHTR: Exceeded ALS recommended hold time prior to sample receipt.  
 EHT: Exceeded ALS recommended hold time prior to analysis.  
 Rec. HT: ALS recommended hold time (see units).



## Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	120948	1	9	11.1	5.0	✔
Ammonia by Fluorescence	E298	121016	1	4	25.0	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	108623	1	5	20.0	5.0	✔
Chemical Oxygen Demand by Colourimetry	E559	121977	1	5	20.0	5.0	✔
Chloride in Water by IC	E235.Cl	108624	1	8	12.5	5.0	✔
Conductivity in Water	E100	120949	1	14	7.1	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	110377	1	18	5.5	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	110916	1	20	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	110378	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	121087	1	4	25.0	5.0	✔
Fluoride in Water by IC	E235.F	108621	1	5	20.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	108625	1	7	14.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	108626	1	6	16.6	5.0	✔
pH by Meter	E108	120947	1	8	12.5	5.0	✔
Reactive Silica by Colourimetry	E392	108979	1	16	6.2	5.0	✔
Sulfate in Water by IC	E235.SO4	108622	1	6	16.6	5.0	✔
TDS by Gravimetry	E162	120970	1	15	6.6	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	109614	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	120963	1	4	25.0	5.0	✔
Total Mercury in Water by CVAAS	E508	110985	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	109613	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	121015	1	4	25.0	5.0	✔
TSS by Gravimetry	E160-H	120968	1	20	5.0	5.0	✔
Turbidity by Nephelometry	E121	121156	1	13	7.6	5.0	✔
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	120948	1	9	11.1	5.0	✔
Ammonia by Fluorescence	E298	121016	1	4	25.0	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	108623	1	5	20.0	5.0	✔
Chemical Oxygen Demand by Colourimetry	E559	121977	1	5	20.0	5.0	✔
Chloride in Water by IC	E235.Cl	108624	1	8	12.5	5.0	✔
Conductivity in Water	E100	120949	1	14	7.1	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	110377	1	18	5.5	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	110916	1	20	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	110378	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	121087	1	4	25.0	5.0	✔
Fluoride in Water by IC	E235.F	108621	1	5	20.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	108625	1	7	14.2	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Control Samples (LCS) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	108626	1	6	16.6	5.0	✓
pH by Meter	E108	120947	1	8	12.5	5.0	✓
Reactive Silica by Colourimetry	E392	108979	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	108622	1	6	16.6	5.0	✓
TDS by Gravimetry	E162	120970	1	15	6.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	109614	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	120963	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	110985	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	109613	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	121015	1	4	25.0	5.0	✓
TSS by Gravimetry	E160-H	120968	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	121156	1	13	7.6	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	120948	1	9	11.1	5.0	✓
Ammonia by Fluorescence	E298	121016	1	4	25.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	108623	1	5	20.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	121977	1	5	20.0	5.0	✓
Chloride in Water by IC	E235.Cl	108624	1	8	12.5	5.0	✓
Conductivity in Water	E100	120949	1	14	7.1	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	110377	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	110916	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	110378	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	121087	1	4	25.0	5.0	✓
Fluoride in Water by IC	E235.F	108621	1	5	20.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	108625	1	7	14.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	108626	1	6	16.6	5.0	✓
Reactive Silica by Colourimetry	E392	108979	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	108622	1	6	16.6	5.0	✓
TDS by Gravimetry	E162	120970	1	15	6.6	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	109614	1	18	5.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	120963	1	4	25.0	5.0	✓
Total Mercury in Water by CVAAS	E508	110985	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	109613	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	121015	1	4	25.0	5.0	✓
TSS by Gravimetry	E160-H	120968	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	121156	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	121016	1	4	25.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	108623	1	5	20.0	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	121977	0	5	0.0	5.0	✗



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Matrix Spikes (MS) - Continued							
Chloride in Water by IC	E235.Cl	108624	1	8	12.5	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	110377	1	18	5.5	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	110916	1	20	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	110378	1	20	5.0	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	121087	1	4	25.0	5.0	✔
Fluoride in Water by IC	E235.F	108621	1	5	20.0	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	108625	1	7	14.2	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	108626	1	6	16.6	5.0	✔
Reactive Silica by Colourimetry	E392	108979	1	16	6.2	5.0	✔
Sulfate in Water by IC	E235.SO4	108622	1	6	16.6	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	109614	1	18	5.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	120963	1	4	25.0	5.0	✔
Total Mercury in Water by CVAAS	E508	110985	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	109613	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	121015	1	4	25.0	5.0	✔



## Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100  Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108  Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 \pm 5^\circ\text{C}$ ). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121  Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160-H  Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at $104 \pm 1^\circ\text{C}$ , with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162  Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at $180 \pm 2^\circ\text{C}$ for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Sulfate in Water by IC	E235.SO4  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290  Vancouver - Environmental	Water	APHA 2320 B (mod)	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.
Ammonia by Fluorescence	E298  Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318  Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U  Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U  Vancouver - Environmental	Water	APHA 4500-P E (mod)	Dissolved Orthophosphate is determined colourimetrically on a water sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Reactive Silica by Colourimetry	E392  Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test.
Total Metals in Water by CRC ICPMS	E420  Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L  Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421  Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L  Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Mercury in Water by CVAAS	E508  Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509  Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry	E559  Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Dissolved Hardness (Calculated)	EC100  Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A  Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N  Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Radium-226 by Radon Emanation	RA226-MMER  Fort Collins - Environmental - 225 Commerce Drive Fort Collins Colorado United States 80524	Water	EPA 903.1	Radium-226 in sample was analyzed according to the current revision of SOP 783.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318  Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Digestion for Total Phosphorus in water	EP372  Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.



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Work Order : VA20B9109  
Client : Golder Associates Ltd.  
Project : 20148777-1000



Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421  Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509  Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

## QUALITY CONTROL REPORT

**Work Order** : **VA20B9109**

**Page** : 1 of 18

**Client** : Golder Associates Ltd.  
**Contact** : Adrian Kowalchuk  
**Address** : # 400 - 543 Granville Street  
                   Vancouver BC Canada V6C 1X8  
**Telephone** : 204 489 9600  
**Project** : 20148777-1000  
**PO** : ----  
**C-O-C number** : 2020-10-19  
**Sampler** : Adrian Kowalchuk  
**Site** : AMQ16-626  
**Quote number** : VA20-AEML100-001 (Q72802)  
**No. of samples received** : 4  
**No. of samples analysed** : 4

**Laboratory** : Vancouver - Environmental  
**Account Manager** : Heather McKenzie  
**Address** : 8081 Lougheed Highway  
                   Burnaby, British Columbia Canada V5A 1W9  
**Telephone** : +1 604 253 4188  
**Date Samples Received** : 26-Oct-2020 14:12  
**Date Analysis Commenced** : 27-Oct-2020  
**Issue Date** : 26-Nov-2020 15:18

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Aaron Yu	Laboratory Analyst	Metals, Burnaby, British Columbia
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Erin Gatdula	Account Manager Assistant	Internal Subcontracting, Fort Collins, Colorado
Kevin Duarte	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia



## General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

### Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

# = Indicates a QC result that did not meet the ALS DQO.

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: <b>Water</b>					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 120947)											
VA20B9109-001	AMQ16-626-2	pH	----	E108	0.10	pH units	7.37	7.36	0.136%	4%	----
Physical Tests (QC Lot: 120948)											
VA20B9109-001	AMQ16-626-2	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	43.2	42.7	1.16%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	43.2	42.7	1.16%	20%	----
Physical Tests (QC Lot: 120949)											
VA20B9109-001	AMQ16-626-2	conductivity	----	E100	2.0	µS/cm	20300	20400	0.491%	10%	----
Physical Tests (QC Lot: 120968)											
FJ2000038-001	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	5.6	5.6	0	Diff <2x LOR	----
Physical Tests (QC Lot: 120970)											
FJ2000045-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	163	157	6	Diff <2x LOR	----
Physical Tests (QC Lot: 121156)											
VA20B9109-001	AMQ16-626-2	turbidity	----	E121	0.10	NTU	3.30	3.28	0.608%	15%	----
Anions and Nutrients (QC Lot: 108621)											
VA20B9109-002	AMQ16-626-2-Dup1	fluoride	16984-48-8	E235.F	2.00	mg/L	<2.00	<2.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 108622)											
VA20B9109-002	AMQ16-626-2-Dup1	sulfate (as SO4)	14808-79-8	E235.SO4	30.0	mg/L	<30.0	<30.0	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 108623)											
VA20B9109-002	AMQ16-626-2-Dup1	bromide	24959-67-9	E235.Br-L	5.00	mg/L	98.7	106	7.04%	20%	----
Anions and Nutrients (QC Lot: 108624)											
VA20B9109-002	AMQ16-626-2-Dup1	chloride	16887-00-6	E235.Cl	50.0	mg/L	7780	8300	6.50%	20%	----
Anions and Nutrients (QC Lot: 108625)											
VA20B9109-002	AMQ16-626-2-Dup1	nitrate (as N)	14797-55-8	E235.NO3-L	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 108626)											
VA20B9109-002	AMQ16-626-2-Dup1	nitrite (as N)	14797-65-0	E235.NO2-L	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 108979)											
VA20B8940-001	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	6.05	5.93	1.95%	20%	----
Anions and Nutrients (QC Lot: 120963)											
VA20B9109-001	AMQ16-626-2	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.415	0.404	0.011	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 121015)											



Sub-Matrix: <b>Water</b>					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Anions and Nutrients (QC Lot: 121015) - continued</b>											
VA20B9109-001	AMQ16-626-2	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0104	0.0090	0.0014	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 121016)</b>											
VA20B9109-001	AMQ16-626-2	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.144	0.144	0.0694%	20%	----
<b>Anions and Nutrients (QC Lot: 121087)</b>											
VA20B9109-001	AMQ16-626-2	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0024	0.0024	0.00005	Diff <2x LOR	----
<b>Total Metals (QC Lot: 109613)</b>											
VA20B9109-001	AMQ16-626-2	aluminum, total	7429-90-5	E420	0.0600	mg/L	<0.0600	<0.0600	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00200	mg/L	0.0992	0.105	5.36%	20%	----
		beryllium, total	7440-41-7	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.200	mg/L	1.76	1.82	0.056	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	1.00	mg/L	3780	3840	1.59%	20%	----
		cesium, total	7440-46-2	E420	0.000200	mg/L	0.00191	0.00186	0.000041	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.200	mg/L	<0.200	<0.200	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.00100	mg/L	0.00141	0.00139	0.000023	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0200	mg/L	3.11	3.40	8.93%	20%	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	1.21	1.02	16.7%	20%	----
		manganese, total	7439-96-5	E420	0.00200	mg/L	0.0160	0.0145	0.00148	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.00100	mg/L	0.00836	0.00782	0.000543	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	1.00	mg/L	135	142	4.84%	20%	----
		rubidium, total	7440-17-7	E420	0.00400	mg/L	0.178	0.178	0.210%	20%	----
		selenium, total	7782-49-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	2.00	mg/L	3.54	3.37	0.17	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	1.00	mg/L	441	441	0.0626%	20%	----
		strontium, total	7440-24-6	E420	0.00400	mg/L	58.9	59.7	1.36%	20%	----
		sulfur, total	7704-34-9	E420	10.0	mg/L	<10.0	<10.0	0	Diff <2x LOR	----
		tellurium, total	13494-80-9	E420	0.00400	mg/L	0.00416	<0.00400	0.00016	Diff <2x LOR	----



Sub-Matrix: **Water**

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 109613) - continued											
VA20B9109-001	AMQ16-626-2	thallium, total	7440-28-0	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00600	mg/L	<0.00600	<0.00600	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00200	mg/L	0.0546	0.0559	2.35%	20%	----
		uranium, total	7440-61-1	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0600	mg/L	0.138	0.142	0.0043	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00400	mg/L	<0.00400	<0.00400	0	Diff <2x LOR	----
Total Metals (QC Lot: 109614)											
VA20B9109-001	AMQ16-626-2	chromium, total	7440-47-3	E420.Cr-L	0.00200	mg/L	0.00324	0.00225	0.00099	Diff <2x LOR	----
Total Metals (QC Lot: 110985)											
VA20B9086-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 110377)											
VA20B9109-001	AMQ16-626-2	chromium, dissolved	7440-47-3	E421.Cr-L	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 110378)											
VA20B9109-001	AMQ16-626-2	aluminum, dissolved	7429-90-5	E421	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00200	mg/L	0.101	0.0975	3.68%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.200	mg/L	1.63	1.63	0.002	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	1.00	mg/L	3530	3490	1.20%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000200	mg/L	0.00179	0.00172	0.000062	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00400	mg/L	<0.00400	<0.00400	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.200	mg/L	<0.200	<0.200	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0200	mg/L	2.87	2.80	2.41%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.100	mg/L	0.790	0.796	0.0062	Diff <2x LOR	----
		manganese, dissolved	7439-96-5	E421	0.00200	mg/L	0.0141	0.0132	0.00089	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.00100	mg/L	0.00782	0.00815	0.000330	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----



Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 110378) - continued											
VA20B9109-001	AMQ16-626-2	phosphorus, dissolved	7723-14-0	E421	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	1.00	mg/L	118	120	1.35%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00400	mg/L	0.144	0.152	5.68%	20%	----
		selenium, dissolved	7782-49-2	E421	0.00100	mg/L	<0.00100	0.00106	0.000055	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	1.00	mg/L	3.32	3.18	0.142	Diff <2x LOR	----
		silver, dissolved	7440-22-4	E421	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	1.00	mg/L	440	422	4.16%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00400	mg/L	57.3	57.4	0.234%	20%	----
		sulfur, dissolved	7704-34-9	E421	10.0	mg/L	<10.0	<10.0	0	Diff <2x LOR	----
		tellurium, dissolved	13494-80-9	E421	0.00400	mg/L	<0.00400	<0.00400	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00600	mg/L	<0.00600	<0.00600	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00200	mg/L	0.0529	0.0531	0.412%	20%	----
		uranium, dissolved	7440-61-1	E421	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00400	mg/L	<0.00400	<0.00400	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 110916)											
VA20B9103-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 121977)											
VA20B9109-001	AMQ16-626-2	chemical oxygen demand [COD]	----	E559	20	mg/L	1430	1570	9.13%	20%	----

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be  $\leq$  LOR.

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 120948)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 120949)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 120968)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Physical Tests (QCLot: 120970)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 121156)						
turbidity	----	E121	0.1	NTU	<0.10	----
Anions and Nutrients (QCLot: 108621)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 108622)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 108623)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 108624)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 108625)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 108626)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 108979)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 120963)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 121015)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 121016)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 121087)						





Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Anions and Nutrients (QCLot: 121087) - continued</b>						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
<b>Total Metals (QCLot: 109613)</b>						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Total Metals (QCLot: 109613) - continued</b>						
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
<b>Total Metals (QCLot: 109614)</b>						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
<b>Total Metals (QCLot: 110985)</b>						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
<b>Dissolved Metals (QCLot: 110377)</b>						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
<b>Dissolved Metals (QCLot: 110378)</b>						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----

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 Work Order : VA20B9109  
 Client : Golder Associates Ltd.  
 Project : 20148777-1000



Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Dissolved Metals (QCLot: 110378) - continued</b>						
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
<b>Dissolved Metals (QCLot: 110916)</b>						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
<b>Aggregate Organics (QCLot: 121977)</b>						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 120947)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 120948)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	96.2	85.0	115	----
Physical Tests (QCLot: 120949)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	101	90.0	110	----
Physical Tests (QCLot: 120968)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	110	85.0	115	----
Physical Tests (QCLot: 120970)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	107	85.0	115	----
Physical Tests (QCLot: 121156)									
turbidity	----	E121	0.1	NTU	200 NTU	100.0	85.0	115	----
Anions and Nutrients (QCLot: 108621)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.3	90.0	110	----
Anions and Nutrients (QCLot: 108622)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 108623)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 108624)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 108625)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 108626)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 108979)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	99.1	85.0	115	----
Anions and Nutrients (QCLot: 120963)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 121015)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	89.8	80.0	120	----
Anions and Nutrients (QCLot: 121016)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.12 mg/L	99.9	85.0	115	----
Anions and Nutrients (QCLot: 121087)									



Sub-Matrix: Water

Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 121087) - continued									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	96.9	80.0	120	----
Total Metals (QCLot: 109613)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	99.8	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	95.9	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	95.6	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	103	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.4	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	103	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	99.6	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.8	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	100	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	101	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	96.5	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.2	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.8	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	102	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	110	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	99.0	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	93.7	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	99.3	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	95.6	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	94.3	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.1	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	98.9	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	99.8	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	98.2	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Total Metals (QCLot: 109613) - continued</b>									
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	98.5	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	97.1	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	96.6	80.0	120	----
<b>Total Metals (QCLot: 109614)</b>									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	97.1	80.0	120	----
<b>Total Metals (QCLot: 110985)</b>									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	84.5	80.0	120	----
<b>Dissolved Metals (QCLot: 110377)</b>									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	91.6	80.0	120	----
<b>Dissolved Metals (QCLot: 110378)</b>									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	91.1	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	96.3	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	92.8	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	98.8	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	94.7	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	109	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	95.8	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	94.6	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	98.7	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.5	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.8	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	87.9	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	96.5	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	95.3	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	94.3	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	95.3	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.4	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	92.5	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	108	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	94.5	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	94.1	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	98.1	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	99.9	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	97.2	80.0	120	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 110378) - continued									
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	110	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	90.4	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.6	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	95.3	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.8	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	88.7	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	99.9	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	97.3	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	102	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.0	80.0	120	----
Dissolved Metals (QCLot: 110916)									
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	87.7	80.0	120	----
Aggregate Organics (QCLot: 121977)									
chemical oxygen demand [COD]	----	E559	20	mg/L	750 mg/L	98.8	85.0	115	----



## Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level  $\geq 1 \times$  spike level.

Sub-Matrix: **Water**

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 108621)										
VA20B9109-001	AMQ16-626-2	fluoride	16984-48-8	E235.F	92.5 mg/L	100 mg/L	92.5	75.0	125	----
Anions and Nutrients (QCLot: 108622)										
VA20B9109-001	AMQ16-626-2	sulfate (as SO4)	14808-79-8	E235.SO4	9730 mg/L	10000 mg/L	97.3	75.0	125	----
Anions and Nutrients (QCLot: 108623)										
VA20B9109-001	AMQ16-626-2	bromide	24959-67-9	E235.Br-L	ND mg/L	50 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 108624)										
VA20B9109-001	AMQ16-626-2	chloride	16887-00-6	E235.Cl	9480 mg/L	10000 mg/L	94.8	75.0	125	----
Anions and Nutrients (QCLot: 108625)										
VA20B9109-001	AMQ16-626-2	nitrate (as N)	14797-55-8	E235.NO3-L	242 mg/L	250 mg/L	96.7	75.0	125	----
Anions and Nutrients (QCLot: 108626)										
VA20B9109-001	AMQ16-626-2	nitrite (as N)	14797-65-0	E235.NO2-L	48.2 mg/L	50 mg/L	96.4	75.0	125	----
Anions and Nutrients (QCLot: 108979)										
VA20B8940-002	Anonymous	silicate (as SiO2)	7631-86-9	E392	38.8 mg/L	50 mg/L	77.7	75.0	125	----
Anions and Nutrients (QCLot: 120963)										
VA20B9109-002	AMQ16-626-2-Dup1	Kjeldahl nitrogen, total [TKN]	----	E318	2.65 mg/L	2.5 mg/L	106	70.0	130	----
Anions and Nutrients (QCLot: 121015)										
VA20B9109-002	AMQ16-626-2-Dup1	phosphorus, total	7723-14-0	E372-U	0.0428 mg/L	0.05 mg/L	85.5	70.0	130	----
Anions and Nutrients (QCLot: 121016)										
VA20B9109-002	AMQ16-626-2-Dup1	ammonia, total (as N)	7664-41-7	E298	0.206 mg/L	0.2 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 121087)										
VA20B9109-002	AMQ16-626-2-Dup1	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0331 mg/L	0.03 mg/L	110	70.0	130	----
Total Metals (QCLot: 109613)										
VA20B9109-002	AMQ16-626-2-Dup1	aluminum, total	7429-90-5	E420	3.94 mg/L	4 mg/L	98.5	70.0	130	----
		antimony, total	7440-36-0	E420	0.406 mg/L	0.4 mg/L	101	70.0	130	----
		arsenic, total	7440-38-2	E420	0.394 mg/L	0.4 mg/L	98.6	70.0	130	----
		barium, total	7440-39-3	E420	0.388 mg/L	0.4 mg/L	97.0	70.0	130	----
		beryllium, total	7440-41-7	E420	0.876 mg/L	0.8 mg/L	109	70.0	130	----
		bismuth, total	7440-69-9	E420	0.185 mg/L	0.2 mg/L	92.5	70.0	130	----





Sub-Matrix: **Water**

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 109613) - continued										
VA20B9109-002	AMQ16-626-2-Dup1	boron, total	7440-42-8	E420	1.96 mg/L	2 mg/L	98.2	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0786 mg/L	0.08 mg/L	98.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	80 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.207 mg/L	0.2 mg/L	103	70.0	130	----
		cobalt, total	7440-48-4	E420	0.374 mg/L	0.4 mg/L	93.6	70.0	130	----
		copper, total	7440-50-8	E420	0.369 mg/L	0.4 mg/L	92.3	70.0	130	----
		iron, total	7439-89-6	E420	37.5 mg/L	40 mg/L	93.7	70.0	130	----
		lead, total	7439-92-1	E420	0.356 mg/L	0.4 mg/L	89.0	70.0	130	----
		lithium, total	7439-93-2	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		magnesium, total	7439-95-4	E420	18.8 mg/L	20 mg/L	93.8	70.0	130	----
		manganese, total	7439-96-5	E420	0.378 mg/L	0.4 mg/L	94.5	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.383 mg/L	0.4 mg/L	95.9	70.0	130	----
		nickel, total	7440-02-0	E420	0.744 mg/L	0.8 mg/L	93.0	70.0	130	----
		phosphorus, total	7723-14-0	E420	218 mg/L	200 mg/L	109	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	80 mg/L	ND	70.0	130	----
		rubidium, total	7440-17-7	E420	0.400 mg/L	0.4 mg/L	100.0	70.0	130	----
		selenium, total	7782-49-2	E420	0.807 mg/L	0.8 mg/L	101	70.0	130	----
		silicon, total	7440-21-3	E420	191 mg/L	200 mg/L	95.7	70.0	130	----
		silver, total	7440-22-4	E420	0.0750 mg/L	0.08 mg/L	93.7	70.0	130	----
		sodium, total	17341-25-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.4 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	451 mg/L	400 mg/L	113	70.0	130	----
		tellurium, total	13494-80-9	E420	0.764 mg/L	0.8 mg/L	95.5	70.0	130	----
		thallium, total	7440-28-0	E420	0.0747 mg/L	0.08 mg/L	93.4	70.0	130	----
		thorium, total	7440-29-1	E420	0.381 mg/L	0.4 mg/L	95.4	70.0	130	----
		tin, total	7440-31-5	E420	0.388 mg/L	0.4 mg/L	96.9	70.0	130	----
		titanium, total	7440-32-6	E420	0.812 mg/L	0.8 mg/L	102	70.0	130	----
		tungsten, total	7440-33-7	E420	0.383 mg/L	0.4 mg/L	95.6	70.0	130	----
		uranium, total	7440-61-1	E420	0.0766 mg/L	0.08 mg/L	95.7	70.0	130	----
		vanadium, total	7440-62-2	E420	1.99 mg/L	2 mg/L	99.5	70.0	130	----
		zinc, total	7440-66-6	E420	7.42 mg/L	8 mg/L	92.8	70.0	130	----
		zirconium, total	7440-67-7	E420	0.783 mg/L	0.8 mg/L	97.8	70.0	130	----
Total Metals (QCLot: 109614)										
VA20B9109-002	AMQ16-626-2-Dup1	chromium, total	7440-47-3	E420.Cr-L	0.776 mg/L	0.8 mg/L	97.0	70.0	130	----
Total Metals (QCLot: 110985)										
VA20B9086-002	Anonymous	mercury, total	7439-97-6	E508	0.0000783 mg/L	0.0001 mg/L	78.3	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 110377)										
VA20B9109-002	AMQ16-626-2-Dup1	chromium, dissolved	7440-47-3	E421.Cr-L	0.366 mg/L	0.4 mg/L	91.6	70.0	130	----
Dissolved Metals (QCLot: 110378)										
VA20B9109-002	AMQ16-626-2-Dup1	aluminum, dissolved	7429-90-5	E421	1.83 mg/L	2 mg/L	91.7	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.197 mg/L	0.2 mg/L	98.6	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.184 mg/L	0.2 mg/L	92.1	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.368 mg/L	0.4 mg/L	91.9	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0876 mg/L	0.1 mg/L	87.6	70.0	130	----
		boron, dissolved	7440-42-8	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0362 mg/L	0.04 mg/L	90.6	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0995 mg/L	0.1 mg/L	99.5	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.183 mg/L	0.2 mg/L	91.6	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.172 mg/L	0.2 mg/L	86.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	19.0 mg/L	20 mg/L	94.9	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.177 mg/L	0.2 mg/L	88.4	70.0	130	----
		lithium, dissolved	7439-93-2	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	9.29 mg/L	10 mg/L	92.9	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.183 mg/L	0.2 mg/L	91.4	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.348 mg/L	0.4 mg/L	87.1	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	101 mg/L	100 mg/L	101	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.189 mg/L	0.2 mg/L	94.6	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.395 mg/L	0.4 mg/L	98.8	70.0	130	----
		silicon, dissolved	7440-21-3	E421	93.2 mg/L	100 mg/L	93.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0373 mg/L	0.04 mg/L	93.3	70.0	130	----
		sodium, dissolved	17341-25-2	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	216 mg/L	200 mg/L	108	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.358 mg/L	0.4 mg/L	89.6	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0366 mg/L	0.04 mg/L	91.6	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.220 mg/L	0.2 mg/L	110	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.197 mg/L	0.2 mg/L	98.5	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.384 mg/L	0.4 mg/L	95.9	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.194 mg/L	0.2 mg/L	96.8	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 110378) - continued										
VA20B9109-002	AMQ16-626-2-Dup1	uranium, dissolved	7440-61-1	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	1.01 mg/L	1 mg/L	101	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.56 mg/L	4 mg/L	89.0	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.405 mg/L	0.4 mg/L	101	70.0	130	----
Dissolved Metals (QCLot: 110916)										
VA20B9103-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000896 mg/L	0.0001 mg/L	89.6	70.0	130	----



(lab use only)

COC Number: 2020-10-19

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**Canada Toll Free: 1 800 668 9878**

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY      YELLOW - CLIENT COPY

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

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

QCY 2018 E97

## CERTIFICATE OF ANALYSIS

**Work Order** : **VA20B9224**

**Amendment** : **1**

**Client** : **Golder Associates Ltd.**

**Contact** : **Adrian Kowalchuk**

**Address** : 1931 Robertson Road  
Ottawa ON Canada K2H 5B7

**Telephone** : 613 592 9600

**Project** : 20148777-1000

**PO** : ----

**C-O-C number** : 2020-10-19

**Sampler** : Adrian Kowalchuk

**Site** : AMQ16-626

**Quote number** : VA20-AEML100-001 (Q72802)

**No. of samples received** : 3

**No. of samples analysed** : 3

**Page** : 1 of 7

**Laboratory** : Vancouver - Environmental

**Account Manager** : Heather McKenzie

**Address** : 8081 Lougheed Highway  
Burnaby BC Canada V5A 1W9

**Telephone** : +1 604 253 4188

**Date Samples Received** : 27-Oct-2020 11:30

**Date Analysis Commenced** : 28-Oct-2020

**Issue Date** : 09-Dec-2020 15:48

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Bruna Botti	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kaitlyn Gardner	Account Manager Assistant	Internal Subcontracting, Fort Collins, Colorado
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Omar Beydoun	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia





## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances  
LOR: Limit of Reporting (detection limit).

Unit	Description
-	No Unit
µS/cm	Microsiemens per centimetre
Bq/L	Becquerels per litre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

## Qualifiers

Qualifier	Description
DLA	Detection Limit adjusted for required dilution.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
SFT	Sample was filtered due to turbidity interference. Result reflects soluble analyte concentration.



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					AMQ16-626-4	AMQ16-626-4-D UP1	AMQ16-626-1	----	----
Client sampling date / time					19-Oct-2020 14:30	19-Oct-2020 14:30	19-Oct-2020 17:00	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9224-001	VA20B9224-002	VA20B9224-003	-----	-----
					Result	Result	Result	----	----
<b>Physical Tests</b>									
alkalinity, bicarbonate (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	24.0	23.6	66.9	----	----
alkalinity, carbonate (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
alkalinity, hydroxide (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	<1.0	<1.0	<1.0	----	----
alkalinity, total (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	24.0	23.6	66.9	----	----
conductivity	----	E100	2.0	µS/cm	7180	7460	6950	----	----
hardness (as CaCO <sub>3</sub> ), dissolved	----	EC100	0.60	mg/L	2760	2730	2160	----	----
hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	----	EC100A	0.60	mg/L	2850	2790	2240	----	----
pH	----	E108	0.10	pH units	6.64	6.77	7.44	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	4430	4780	4310	----	----
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	5.2	----	----
turbidity	----	E121	0.10	NTU	2.11	1.96	6.32	----	----
<b>Anions and Nutrients</b>									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.121	0.121	0.0493	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	28.3	28.7	19.0	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	2330	2370	2250	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	<1.00 <sup>DLDS</sup>	<1.00 <sup>DLDS</sup>	<1.00 <sup>DLDS</sup>	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.328	0.305	0.209	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.250 <sup>DLDS</sup>	<0.250 <sup>DLDS</sup>	<0.250 <sup>DLDS</sup>	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.255	<0.255	<0.255	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0500 <sup>DLDS</sup>	<0.0500 <sup>DLDS</sup>	<0.0500 <sup>DLDS</sup>	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0095	0.0076	0.0165	----	----
silicate (as SiO <sub>2</sub> )	7631-86-9	E392	0.50	mg/L	5.87 <sup>SFT</sup>	5.77 <sup>SFT</sup>	5.30 <sup>SFT</sup>	----	----
sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO4	0.30	mg/L	<15.0 <sup>DLDS</sup>	<15.0 <sup>DLDS</sup>	<15.0 <sup>DLDS</sup>	----	----
<b>Total Metals</b>									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0172	0.0180	0.228	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	0.00154	0.00155	0.00463	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00429	0.00438	0.0171	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.181	0.181	0.147	----	----
beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000100 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	----	----





## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					AMQ16-626-4	AMQ16-626-4-D UP1	AMQ16-626-1	----	----
Client sampling date / time					19-Oct-2020 14:30	19-Oct-2020 14:30	19-Oct-2020 17:00	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9224-001	VA20B9224-002	VA20B9224-003	-----	-----
					Result	Result	Result	----	----
<b>Total Metals</b>									
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000250 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.666	0.648	1.29	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000250 <sup>DLA</sup>	<0.0000250 <sup>DLA</sup>	<0.0000250 <sup>DLA</sup>	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	1130	1100	894	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	0.000286	0.000300	0.000158	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	0.00410	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	0.00272	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.087	0.096	1.02	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	0.000262	0.000273	0.00328	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.667	0.662	0.0986	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	8.07	8.04	3.23	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.0260	0.0267	0.0173	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00497	0.00507	0.00113	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.250 <sup>DLA</sup>	<0.250 <sup>DLA</sup>	<0.250 <sup>DLA</sup>	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	35.5	34.7	13.5	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.0385	0.0384	0.0224	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000250 <sup>DLA</sup>	0.000260	<0.000250 <sup>DLA</sup>	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	3.10	3.04	3.38	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	<0.000050 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	0.000803	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	290	287	489	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	18.8	18.6	14.2	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	<2.50 <sup>DLA</sup>	<2.50 <sup>DLA</sup>	<2.50 <sup>DLA</sup>	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	0.00190	0.00193	0.00158	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000050 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00150 <sup>DLA</sup>	<0.00150 <sup>DLA</sup>	0.0122	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	0.0371	0.0373	0.0310	----	----



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

					AMQ16-626-4	AMQ16-626-4-D UP1	AMQ16-626-1	----	----
Client sampling date / time					19-Oct-2020 14:30	19-Oct-2020 14:30	19-Oct-2020 17:00	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9224-001	VA20B9224-002	VA20B9224-003	-----	-----
					Result	Result	Result	----	----
<b>Total Metals</b>									
uranium, total	7440-61-1	E420	0.000010	mg/L	0.000078	0.000078	0.000101	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.119	0.116	0.0630	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	----	----
<b>Dissolved Metals</b>									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0086	0.0079	0.0119	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00158	0.00171	0.00452	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00311	0.00306	0.0147	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.176	0.180	0.141	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000100 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	<0.000100 <sup>DLA</sup>	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000250 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.603	0.562	1.12	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000250 <sup>DLA</sup>	<0.0000250 <sup>DLA</sup>	<0.0000250 <sup>DLA</sup>	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	1090	1080	858	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000277	0.000307	0.000120	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	<0.00100 <sup>DLA</sup>	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.050 <sup>DLA</sup>	<0.050 <sup>DLA</sup>	<0.050 <sup>DLA</sup>	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000250 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	<0.000250 <sup>DLA</sup>	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.698	0.642	0.0892	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	8.10	7.87	3.08	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0245	0.0260	0.00849	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00463	0.00563	0.000568	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.250 <sup>DLA</sup>	<0.250 <sup>DLA</sup>	<0.250 <sup>DLA</sup>	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	34.8	32.0	13.6	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0386	0.0342	0.0223	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000250 <sup>DLA</sup>	0.000295	<0.000250 <sup>DLA</sup>	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	2.88	2.91	2.67	----	----



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					AMQ16-626-4	AMQ16-626-4-D UP1	AMQ16-626-1	----	----
Client sampling date / time					19-Oct-2020 14:30	19-Oct-2020 14:30	19-Oct-2020 17:00	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9224-001	VA20B9224-002	VA20B9224-003	-----	-----
					Result	Result	Result	----	----
<b>Dissolved Metals</b>									
silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000050 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	274	268	477	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	16.6	18.5	12.7	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<2.50 <sup>DLA</sup>	<2.50 <sup>DLA</sup>	<2.50 <sup>DLA</sup>	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	0.00144	0.00142	<0.00100 <sup>DLA</sup>	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000050 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	<0.000050 <sup>DLA</sup>	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	<0.00050 <sup>DLA</sup>	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00150 <sup>DLA</sup>	<0.00150 <sup>DLA</sup>	<0.00150 <sup>DLA</sup>	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.0368	0.0425	0.0262	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000065	0.000070	<0.000050 <sup>DLA</sup>	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	<0.00250 <sup>DLA</sup>	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0090	0.0136	<0.0050 <sup>DLA</sup>	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00150 <sup>DLA</sup>	<0.00150 <sup>DLA</sup>	<0.00150 <sup>DLA</sup>	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	Field	Field	----	----
dissolved metals filtration location	----	EP421	-	-	Field	Laboratory	Field	----	----
<b>Aggregate Organics</b>									
chemical oxygen demand [COD]	----	E559	20	mg/L	633	580	739	----	----
<b>Radiological Parameters</b>									
radium-226	13982-63-3	RA226-MMER	0.014	Bq/L	----	----	0.33	----	----
radium-226	13982-63-3	RA226-MMER	0.015	Bq/L	0.36	0.29	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

## QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: <b>VA20B9224</b>	Page	: 1 of 17
Amendment	: <b>1</b>		
Client	: <b>Golder Associates Ltd.</b>	Laboratory	: Vancouver - Environmental
Contact	: Adrian Kowalchuk	Account Manager	: Heather McKenzie
Address	: 1931 Robertson Road Ottawa ON Canada K2H 5B7	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 204 489 9600	Telephone	: +1 604 253 4188
Project	: 20148777-1000	Date Samples Received	: 27-Oct-2020 11:30
PO	: ----	Issue Date	: 09-Dec-2020 15:48
C-O-C number	: 2020-10-19		
Sampler	: Adrian Kowalchuk		
Site	: AMQ16-626		
Quote number	: VA20-AEML100-001 (Q72802)		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

### Key

**Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.

**CAS Number:** Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

**DQO:** Data Quality Objective.

**LOR:** Limit of Reporting (detection limit).

**RPD:** Relative Percent Difference.

## Summary of Outliers

### Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

### Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

### Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

### Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.





**Outliers : Quality Control Samples**  
*Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes*

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
<b>Laboratory Control Sample (LCS) Recoveries</b>								
Dissolved Metals	QC-MRG2-1108610 02	----	aluminum, dissolved	7429-90-5	E421	125 % <sup>MES</sup>	80.0-120%	Recovery greater than upper control limit

**Result Qualifiers**

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



## Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 is used for calculation purposes.

Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) AMQ16-626-1	E559	19-Oct-2020	----	----	----		03-Nov-2020	28 days	14 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) AMQ16-626-4	E559	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) AMQ16-626-4-DUP1	E559	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) AMQ16-626-1	E298	19-Oct-2020	----	----	----		04-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) AMQ16-626-4	E298	19-Oct-2020	----	----	----		04-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) AMQ16-626-4-DUP1	E298	19-Oct-2020	----	----	----		04-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE AMQ16-626-1	E235.Br-L	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓



Matrix: **Water**

Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE AMQ16-626-4	E235.Br-L	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE AMQ16-626-4-DUP1	E235.Br-L	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE AMQ16-626-1	E235.Cl	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE AMQ16-626-4	E235.Cl	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE AMQ16-626-4-DUP1	E235.Cl	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE AMQ16-626-1	E378-U	19-Oct-2020	----	----	----		03-Nov-2020	3 days	15 days	✖ EHTR
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE AMQ16-626-4	E378-U	19-Oct-2020	----	----	----		03-Nov-2020	3 days	15 days	✖ EHTR
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE AMQ16-626-4-DUP1	E378-U	19-Oct-2020	----	----	----		03-Nov-2020	3 days	15 days	✖ EHTR
Anions and Nutrients : Fluoride in Water by IC										
HDPE AMQ16-626-1	E235.F	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓





Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Fluoride in Water by IC										
HDPE AMQ16-626-4	E235.F	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE AMQ16-626-4-DUP1	E235.F	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE AMQ16-626-1	E235.NO3-L	19-Oct-2020	----	----	----		03-Nov-2020	3 days	15 days	✖ EHTR
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE AMQ16-626-4	E235.NO3-L	19-Oct-2020	----	----	----		03-Nov-2020	3 days	15 days	✖ EHTR
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE AMQ16-626-4-DUP1	E235.NO3-L	19-Oct-2020	----	----	----		03-Nov-2020	3 days	15 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE AMQ16-626-1	E235.NO2-L	19-Oct-2020	----	----	----		03-Nov-2020	3 days	15 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE AMQ16-626-4	E235.NO2-L	19-Oct-2020	----	----	----		03-Nov-2020	3 days	15 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE AMQ16-626-4-DUP1	E235.NO2-L	19-Oct-2020	----	----	----		03-Nov-2020	3 days	15 days	✖ EHTR
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE AMQ16-626-1	E392	19-Oct-2020	----	----	----		30-Oct-2020	28 days	10 days	✓



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE AMQ16-626-4	E392	19-Oct-2020	----	----	----		30-Oct-2020	28 days	10 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE AMQ16-626-4-DUP1	E392	19-Oct-2020	----	----	----		30-Oct-2020	28 days	10 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE AMQ16-626-1	E235.SO4	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE AMQ16-626-4	E235.SO4	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE AMQ16-626-4-DUP1	E235.SO4	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) AMQ16-626-1	E318	19-Oct-2020	03-Nov-2020	28 days	15 days	✓	04-Nov-2020	12 days	0 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) AMQ16-626-4	E318	19-Oct-2020	03-Nov-2020	28 days	15 days	✓	04-Nov-2020	12 days	0 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) AMQ16-626-4-DUP1	E318	19-Oct-2020	03-Nov-2020	28 days	15 days	✓	04-Nov-2020	12 days	0 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) AMQ16-626-1	E372-U	19-Oct-2020	03-Nov-2020	28 days	15 days	✓	04-Nov-2020	12 days	0 days	✓



Matrix: **Water**

Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) AMQ16-626-4	E372-U	19-Oct-2020	03-Nov-2020	28 days	15 days	✓	04-Nov-2020	12 days	0 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) AMQ16-626-4-DUP1	E372-U	19-Oct-2020	03-Nov-2020	28 days	15 days	✓	04-Nov-2020	12 days	0 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) AMQ16-626-1	E509	19-Oct-2020	31-Oct-2020	28 days	11 days	✓	31-Oct-2020	16 days	0 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) AMQ16-626-4	E509	19-Oct-2020	31-Oct-2020	28 days	11 days	✓	31-Oct-2020	16 days	0 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial - dissolved (lab preserved) AMQ16-626-4-DUP1	E509	19-Oct-2020	31-Oct-2020	28 days	11 days	✓	31-Oct-2020	16 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) AMQ16-626-1	E421	19-Oct-2020	30-Oct-2020	180 days	10 days	✓	30-Oct-2020	169 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) AMQ16-626-4	E421	19-Oct-2020	30-Oct-2020	180 days	10 days	✓	30-Oct-2020	169 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) AMQ16-626-4-DUP1	E421	19-Oct-2020	02-Nov-2020	180 days	14 days	✓	03-Nov-2020	165 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE AMQ16-626-1	E290	19-Oct-2020	----	----	----		03-Nov-2020	14 days	15 days	✖ EHT



Matrix: **Water**

Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Alkalinity Species by Titration										
HDPE AMQ16-626-4	E290	19-Oct-2020	----	----	----		03-Nov-2020	14 days	15 days	<div>✖ EHT</div>
Physical Tests : Alkalinity Species by Titration										
HDPE AMQ16-626-4-DUP1	E290	19-Oct-2020	----	----	----		03-Nov-2020	14 days	15 days	<div>✖ EHT</div>
Physical Tests : Conductivity in Water										
HDPE AMQ16-626-1	E100	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	<div>✔</div>
Physical Tests : Conductivity in Water										
HDPE AMQ16-626-4	E100	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	<div>✔</div>
Physical Tests : Conductivity in Water										
HDPE AMQ16-626-4-DUP1	E100	19-Oct-2020	----	----	----		03-Nov-2020	28 days	15 days	<div>✔</div>
Physical Tests : pH by Meter										
HDPE AMQ16-626-1	E108	19-Oct-2020	----	----	----		03-Nov-2020	0.25 hrs	362 hrs	<div>✖ EHTR-FM</div>
Physical Tests : pH by Meter										
HDPE AMQ16-626-4	E108	19-Oct-2020	----	----	----		03-Nov-2020	0.25 hrs	365 hrs	<div>✖ EHTR-FM</div>
Physical Tests : pH by Meter										
HDPE AMQ16-626-4-DUP1	E108	19-Oct-2020	----	----	----		03-Nov-2020	0.25 hrs	365 hrs	<div>✖ EHTR-FM</div>
Physical Tests : TDS by Gravimetry										
HDPE AMQ16-626-1	E162	19-Oct-2020	----	----	----		03-Nov-2020	7 days	14 days	<div>✖ EHTR</div>



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TDS by Gravimetry										
HDPE AMQ16-626-4	E162	19-Oct-2020	----	----	----		03-Nov-2020	7 days	14 days	<div>✖ EHTR</div>
Physical Tests : TDS by Gravimetry										
HDPE AMQ16-626-4-DUP1	E162	19-Oct-2020	----	----	----		03-Nov-2020	7 days	14 days	<div>✖ EHTR</div>
Physical Tests : TSS by Gravimetry										
HDPE AMQ16-626-1	E160-H	19-Oct-2020	----	----	----		03-Nov-2020	7 days	14 days	<div>✖ EHTR</div>
Physical Tests : TSS by Gravimetry										
HDPE AMQ16-626-4	E160-H	19-Oct-2020	----	----	----		03-Nov-2020	7 days	14 days	<div>✖ EHTR</div>
Physical Tests : TSS by Gravimetry										
HDPE AMQ16-626-4-DUP1	E160-H	19-Oct-2020	----	----	----		03-Nov-2020	7 days	14 days	<div>✖ EHTR</div>
Physical Tests : Turbidity by Nephelometry										
HDPE AMQ16-626-1	E121	19-Oct-2020	----	----	----		03-Nov-2020	3 days	14 days	<div>✖ EHTR</div>
Physical Tests : Turbidity by Nephelometry										
HDPE AMQ16-626-4	E121	19-Oct-2020	----	----	----		03-Nov-2020	3 days	14 days	<div>✖ EHTR</div>
Physical Tests : Turbidity by Nephelometry										
HDPE AMQ16-626-4-DUP1	E121	19-Oct-2020	----	----	----		03-Nov-2020	3 days	14 days	<div>✖ EHTR</div>
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) AMQ16-626-1	RA226-MMER	19-Oct-2020	----	----	----		19-Nov-2020	180 days	30 days	<div>✔</div>



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) AMQ16-626-4	RA226-MMER	19-Oct-2020	----	----	----		19-Nov-2020	180 days	30 days	✓
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) AMQ16-626-4-DUP1	RA226-MMER	19-Oct-2020	----	----	----		19-Nov-2020	180 days	30 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) AMQ16-626-1	E508	19-Oct-2020	----	----	----		31-Oct-2020	28 days	11 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) AMQ16-626-4	E508	19-Oct-2020	----	----	----		31-Oct-2020	28 days	11 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial - total (lab preserved) AMQ16-626-4-DUP1	E508	19-Oct-2020	----	----	----		31-Oct-2020	28 days	11 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) AMQ16-626-1	E420	19-Oct-2020	----	----	----		29-Oct-2020	180 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) AMQ16-626-4	E420	19-Oct-2020	----	----	----		29-Oct-2020	180 days	10 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) AMQ16-626-4-DUP1	E420	19-Oct-2020	----	----	----		29-Oct-2020	180 days	10 days	✓

**Legend & Qualifier Definitions**

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended  
 EHTR: Exceeded ALS recommended hold time prior to sample receipt.  
 EHT: Exceeded ALS recommended hold time prior to analysis.  
 Rec. HT: ALS recommended hold time (see units).



## Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	112795	1	3	33.3	5.0	✓
Ammonia by Fluorescence	E298	112736	1	5	20.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	112800	1	3	33.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	112649	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	112799	1	3	33.3	5.0	✓
Conductivity in Water	E100	112796	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	111473	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	110861	2	38	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	112797	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	112798	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	112801	1	3	33.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	112802	1	3	33.3	5.0	✓
pH by Meter	E108	112794	1	3	33.3	5.0	✓
Reactive Silica by Colourimetry	E392	110954	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	112803	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	112537	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	112737	1	3	33.3	5.0	✓
Total Mercury in Water by CVAAS	E508	111412	2	40	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	110003	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	112738	1	3	33.3	5.0	✓
TSS by Gravimetry	E160-H	112539	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	112544	1	9	11.1	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	112795	1	3	33.3	5.0	✓
Ammonia by Fluorescence	E298	112736	1	5	20.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	112800	1	3	33.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	112649	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	112799	1	3	33.3	5.0	✓
Conductivity in Water	E100	112796	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	111473	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	110861	2	38	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	112797	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	112798	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	112801	1	3	33.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	112802	1	3	33.3	5.0	✓
pH by Meter	E108	112794	1	3	33.3	5.0	✓
Reactive Silica by Colourimetry	E392	110954	1	15	6.6	5.0	✓





Matrix: **Water**

Evaluation: \* = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Control Samples (LCS) - Continued							
Sulfate in Water by IC	E235.SO4	112803	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	112537	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	112737	1	3	33.3	5.0	✓
Total Mercury in Water by CVAAS	E508	111412	2	40	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	110003	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	112738	1	3	33.3	5.0	✓
TSS by Gravimetry	E160-H	112539	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	112544	1	9	11.1	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	112795	1	3	33.3	5.0	✓
Ammonia by Fluorescence	E298	112736	1	5	20.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	112800	1	3	33.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	112649	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	112799	1	3	33.3	5.0	✓
Conductivity in Water	E100	112796	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	111473	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	110861	2	38	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	112797	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	112798	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	112801	1	3	33.3	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	112802	1	3	33.3	5.0	✓
Reactive Silica by Colourimetry	E392	110954	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	112803	1	3	33.3	5.0	✓
TDS by Gravimetry	E162	112537	1	17	5.8	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	112737	1	3	33.3	5.0	✓
Total Mercury in Water by CVAAS	E508	111412	2	40	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	110003	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	112738	1	3	33.3	5.0	✓
TSS by Gravimetry	E160-H	112539	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	112544	1	9	11.1	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	112736	1	5	20.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	112800	1	3	33.3	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	112649	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	112799	1	3	33.3	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	111473	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	110861	2	38	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	112797	1	3	33.3	5.0	✓
Fluoride in Water by IC	E235.F	112798	1	3	33.3	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	112801	1	3	33.3	5.0	✓





Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Matrix Spikes (MS) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	112802	1	3	33.3	5.0	✓
Reactive Silica by Colourimetry	E392	110954	1	15	6.6	5.0	✓
Sulfate in Water by IC	E235.SO4	112803	1	3	33.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	112737	1	3	33.3	5.0	✓
Total Mercury in Water by CVAAS	E508	111412	2	40	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	110003	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	112738	1	3	33.3	5.0	✓



## Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100  Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108  Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 \pm 5^\circ\text{C}$ ). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121  Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160-H  Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at $104 \pm 1^\circ\text{C}$ , with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162  Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at $180 \pm 2^\circ\text{C}$ for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Sulfate in Water by IC	E235.S04  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290  Vancouver - Environmental	Water	APHA 2320 B (mod)	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.
Ammonia by Fluorescence	E298  Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318  Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U  Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U  Vancouver - Environmental	Water	APHA 4500-P E (mod)	Dissolved Orthophosphate is determined colourimetrically on a water sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Reactive Silica by Colourimetry	E392  Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test.
Total Metals in Water by CRC ICPMS	E420  Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421  Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508  Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509  Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chemical Oxygen Demand by Colourimetry	E559  Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Dissolved Hardness (Calculated)	EC100  Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A  Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N  Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Radium-226 by Radon Emanation	RA226-MMER  Fort Collins - Environmental - 225 Commerce Drive Fort Collins Colorado United States 80524	Water	EPA 903.1	Radium-226 in sample was analyzed according to the current revision of SOP 783.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318  Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Digestion for Total Phosphorus in water	EP372  Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421  Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO <sub>3</sub> .
Dissolved Mercury Water Filtration	EP509  Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

## QUALITY CONTROL REPORT

Work Order : **VA20B9224**

Page : 1 of 22

Amendment : **1**

Client : Golder Associates Ltd.  
 Contact : Adrian Kowalchuk  
 Address : # 400 - 543 Granville Street  
 Vancouver BC Canada V6C 1X8  
 Telephone : 204 489 9600  
 Project : 20148777-1000  
 PO : ----  
 C-O-C number : 2020-10-19  
 Sampler : Adrian Kowalchuk  
 Site : AMQ16-626  
 Quote number : VA20-AEML100-001 (Q72802)  
 No. of samples received : 3  
 No. of samples analysed : 3

Laboratory : Vancouver - Environmental  
 Account Manager : Heather McKenzie  
 Address : 8081 Lougheed Highway  
 Burnaby, British Columbia Canada V5A 1W9  
 Telephone : +1 604 253 4188  
 Date Samples Received : 27-Oct-2020 11:30  
 Date Analysis Commenced : 28-Oct-2020  
 Issue Date : 09-Dec-2020 15:48

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Bruna Botti	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kaitlyn Gardner	Account Manager Assistant	Internal Subcontracting, Fort Collins, Colorado
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Omar Beydoun	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia



## General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

### Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

# = Indicates a QC result that did not meet the ALS DQO.

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: <b>Water</b>					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 112537)											
VA20B8468-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	4000	3950	1.41%	20%	----
Physical Tests (QC Lot: 112539)											
VA20B9658-001	Anonymous	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 112544)											
VA20B8468-001	Anonymous	turbidity	----	E121	0.10	NTU	0.96	1.06	0.10	Diff <2x LOR	----
Physical Tests (QC Lot: 112794)											
VA20B9224-003	AMQ16-626-1	pH	----	E108	0.10	pH units	7.44	7.42	0.269%	4%	----
Physical Tests (QC Lot: 112795)											
VA20B9224-003	AMQ16-626-1	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	66.9	65.8	1.66%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	66.9	65.8	1.66%	20%	----
Physical Tests (QC Lot: 112796)											
VA20B9224-003	AMQ16-626-1	conductivity	----	E100	2.0	µS/cm	6950	6950	0.00%	10%	----
Anions and Nutrients (QC Lot: 110954)											
VA20B9224-001	AMQ16-626-4	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	5.87	6.01	2.36%	20%	----
Anions and Nutrients (QC Lot: 112736)											
VA20B9224-001	AMQ16-626-4	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.121	0.123	1.53%	20%	----
Anions and Nutrients (QC Lot: 112737)											
VA20B9224-001	AMQ16-626-4	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.328	0.330	0.003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 112738)											
VA20B9224-001	AMQ16-626-4	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0095	0.0079	0.0016	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 112797)											
VA20B9224-001	AMQ16-626-4	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 112798)											
VA20B9224-001	AMQ16-626-4	fluoride	16984-48-8	E235.F	1.00	mg/L	<1.00	<1.00	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 112799)											
VA20B9224-001	AMQ16-626-4	chloride	16887-00-6	E235.Cl	25.0	mg/L	2330	2320	0.318%	20%	----
Anions and Nutrients (QC Lot: 112800)											
VA20B9224-001	AMQ16-626-4	bromide	24959-67-9	E235.Br-L	2.50	mg/L	28.3	28.3	0.0334%	20%	----
Anions and Nutrients (QC Lot: 112801)											



Sub-Matrix: <b>Water</b>					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Anions and Nutrients (QC Lot: 112801) - continued</b>											
VA20B9224-001	AMQ16-626-4	nitrate (as N)	14797-55-8	E235.NO3-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 112802)</b>											
VA20B9224-001	AMQ16-626-4	nitrite (as N)	14797-65-0	E235.NO2-L	0.0500	mg/L	<0.0500	<0.0500	0	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 112803)</b>											
VA20B9224-001	AMQ16-626-4	sulfate (as SO4)	14808-79-8	E235.SO4	15.0	mg/L	<15.0	<15.0	0	Diff <2x LOR	----
<b>Total Metals (QC Lot: 110003)</b>											
VA20B9142-022	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	17341-25-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----





Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 110003) - continued											
VA20B9142-022	Anonymous	tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 111412)											
VA20B9160-001	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Total Metals (QC Lot: 111413)											
VA20B9224-003	AMQ16-626-1	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 110861)											
VA20B9250-004	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0031	0.0025	0.0006	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00028	0.00027	0.000009	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00123	0.00129	4.28%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.122	0.119	1.94%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.576	0.603	4.62%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	94.4	97.8	3.54%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000013	0.000012	0.0000008	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	0.00052	<0.00050	0.00002	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00086	0.00085	0.00001	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00269	0.00270	0.204%	20%	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.151	0.152	0.287%	20%	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0066	0.0068	0.0002	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	35.0	35.3	0.810%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0928	0.0923	0.469%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000842	0.000828	1.65%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00739	0.00741	0.193%	20%	----



Sub-Matrix: **Water**

**Laboratory Duplicate (DUP) Report**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 110861) - continued											
VA20B9250-004	Anonymous	phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	81.1	84.4	3.93%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0372	0.0379	1.83%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000149	0.000167	0.000018	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	9.12	9.07	0.651%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	110	110	0.242%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.596	0.616	3.19%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	9.10	8.76	3.82%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000253	0.000256	1.07%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Dissolved Metals (QC Lot: 111473)									
VA20B9224-001	AMQ16-626-4	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 112111)											
YL2000163-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0063	0.0058	0.0005	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00021	0.00019	0.00003	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.194	0.193	0.588%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.674	0.730	7.95%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000331	0.0000259	0.0000072	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	90.0	92.0	2.20%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000065	0.000062	0.000003	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00013	0.00012	0.00001	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00040	0.00043	0.00002	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----



Sub-Matrix: **Water**

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 112111) - continued											
YL2000163-001	Anonymous	lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0178	0.0184	3.51%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	25.6	25.2	1.28%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0343	0.0342	0.302%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00201	0.00204	1.49%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00505	0.00511	1.32%	20%	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	17.7	17.6	0.407%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0192	0.0188	1.79%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	0.000072	0.000022	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	0.968	0.951	1.80%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	69.1	68.0	1.59%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.41	1.40	1.01%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	17.4	17.3	0.847%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000043	0.000040	0.000002	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000542	0.000543	0.146%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0017	0.0016	0.0001	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 112649)											
VA20B9224-001	AMQ16-626-4	chemical oxygen demand [COD]	----	E559	20	mg/L	633	627	1.02%	20%	----

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be  $\leq$  LOR.

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 112537)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 112539)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Physical Tests (QCLot: 112544)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 112795)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 112796)						
conductivity	----	E100	1	µS/cm	<1.0	----
Anions and Nutrients (QCLot: 110954)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 112736)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 112737)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 112738)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 112797)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 112798)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 112799)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 112800)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 112801)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 112802)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 112803)						



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Anions and Nutrients (QCLot: 112803) - continued</b>						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
<b>Total Metals (QCLot: 110003)</b>						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Total Metals (QCLot: 110003) - continued</b>						
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
<b>Total Metals (QCLot: 111412)</b>						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
<b>Total Metals (QCLot: 111413)</b>						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
<b>Dissolved Metals (QCLot: 110861)</b>						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Dissolved Metals (QCLot: 110861) - continued</b>						
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
<b>Dissolved Metals (QCLot: 111473)</b>						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
<b>Dissolved Metals (QCLot: 112111)</b>						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----



Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Dissolved Metals (QCLot: 112111) - continued</b>						
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
<b>Aggregate Organics (QCLot: 112649)</b>						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----



A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

### Laboratory Control Sample (LCS) Report

Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 112537)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	103	85.0	115	----
Physical Tests (QCLot: 112539)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	91.7	85.0	115	----
Physical Tests (QCLot: 112544)									
turbidity	----	E121	0.1	NTU	200 NTU	99.0	85.0	115	----
Physical Tests (QCLot: 112794)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 112795)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	96.8	85.0	115	----
Physical Tests (QCLot: 112796)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	102	90.0	110	----
Anions and Nutrients (QCLot: 110954)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 112736)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.12 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 112737)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 112738)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	94.8	80.0	120	----
Anions and Nutrients (QCLot: 112797)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	90.5	80.0	120	----
Anions and Nutrients (QCLot: 112798)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.3	90.0	110	----
Anions and Nutrients (QCLot: 112799)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 112800)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 112801)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 112802)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 112803)									



Sub-Matrix: Water

Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 112803) - continued									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Total Metals (QCLot: 110003)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	97.0	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.0	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	104	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	106	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	103	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.9	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	101	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	106	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	106	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	108	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	104	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	104	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	99.1	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	100	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	93.6	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	98.8	80.0	120	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 110003) - continued									
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	104	80.0	120	----
vanadium, total	7440-62-2	E420	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	105	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
Total Metals (QCLot: 111412)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	95.4	80.0	120	----
Total Metals (QCLot: 111413)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	96.1	80.0	120	----
Dissolved Metals (QCLot: 110861)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	# 125	80.0	120	MES
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	85.5	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	83.3	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	105	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	103	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	104	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	99.0	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	99.7	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.2	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	97.3	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	95.4	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	112	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	103	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	108	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	98.6	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	94.0	80.0	120	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 110861) - continued									
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	87.4	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	96.2	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	89.2	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.5	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	98.5	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	98.1	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	103	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	96.9	80.0	120	----
Dissolved Metals (QCLot: 111473)									
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 112111)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	107	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	105	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	104	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	101	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	103	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	99.2	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----



Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 112111) - continued									
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	93.7	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	106	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	106	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	112	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	102	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	106	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	105	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	94.1	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	98.5	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	104	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.4	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	99.5	80.0	120	----
Aggregate Organics (QCLot: 112649)									
chemical oxygen demand [COD]	----	E559	20	mg/L	750 mg/L	100	85.0	115	----

Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level  $\geq 1 \times$  spike level.

Matrix Spike (MS) Report					
Spike		Recovery (%)	Recovery Limits (%)		
Concentration	Target	MS	Low	High	Qualifier
10.7 mg/L	10 mg/L	107	75.0	125	----
0.217 mg/L	0.2 mg/L	108	75.0	125	----
2.52 mg/L	2.5 mg/L	101	70.0	130	----
0.0452 mg/L	0.05 mg/L	90.4	70.0	130	----
0.0266 mg/L	0.03 mg/L	88.8	70.0	130	----
45.5 mg/L	50 mg/L	91.1	75.0	125	----
4950 mg/L	5000 mg/L	99.0	75.0	125	----
ND mg/L	25 mg/L	ND	75.0	125	----
123 mg/L	125 mg/L	98.6	75.0	125	----
24.2 mg/L	25 mg/L	97.0	75.0	125	----
4950 mg/L	5000 mg/L	99.0	75.0	125	----
0.192 mg/L	0.2 mg/L	96.0	70.0	130	----
0.0225 mg/L	0.02 mg/L	112	70.0	130	----
0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
0.0441 mg/L	0.04 mg/L	110	70.0	130	----
0.0113 mg/L	0.01 mg/L	113	70.0	130	----

Sub-Matrix: **Water**

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 110003) - continued										
VA20B9142-023	Anonymous	boron, total	7440-42-8	E420	0.113 mg/L	0.1 mg/L	113	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00404 mg/L	0.004 mg/L	101	70.0	130	----
		calcium, total	7440-70-2	E420	4.41 mg/L	4 mg/L	110	70.0	130	----
		cesium, total	7440-46-2	E420	0.0119 mg/L	0.01 mg/L	119	70.0	130	----
		chromium, total	7440-47-3	E420	0.0388 mg/L	0.04 mg/L	96.9	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0197 mg/L	0.02 mg/L	98.6	70.0	130	----
		copper, total	7440-50-8	E420	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		iron, total	7439-89-6	E420	1.96 mg/L	2 mg/L	97.9	70.0	130	----
		lead, total	7439-92-1	E420	0.0215 mg/L	0.02 mg/L	107	70.0	130	----
		lithium, total	7439-93-2	E420	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		magnesium, total	7439-95-4	E420	0.950 mg/L	1 mg/L	95.0	70.0	130	----
		manganese, total	7439-96-5	E420	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0216 mg/L	0.02 mg/L	108	70.0	130	----
		nickel, total	7440-02-0	E420	0.0396 mg/L	0.04 mg/L	98.9	70.0	130	----
		phosphorus, total	7723-14-0	E420	9.81 mg/L	10 mg/L	98.1	70.0	130	----
		potassium, total	7440-09-7	E420	3.91 mg/L	4 mg/L	97.8	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		selenium, total	7782-49-2	E420	0.0423 mg/L	0.04 mg/L	106	70.0	130	----
		silicon, total	7440-21-3	E420	9.64 mg/L	10 mg/L	96.4	70.0	130	----
		silver, total	7440-22-4	E420	0.00455 mg/L	0.004 mg/L	114	70.0	130	----
		sodium, total	17341-25-2	E420	2.00 mg/L	2 mg/L	99.9	70.0	130	----
		strontium, total	7440-24-6	E420	0.0230 mg/L	0.02 mg/L	115	70.0	130	----
		sulfur, total	7704-34-9	E420	19.0 mg/L	20 mg/L	95.1	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0455 mg/L	0.04 mg/L	114	70.0	130	----
		thallium, total	7440-28-0	E420	0.00427 mg/L	0.004 mg/L	107	70.0	130	----
		thorium, total	7440-29-1	E420	0.0234 mg/L	0.02 mg/L	117	70.0	130	----
		tin, total	7440-31-5	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		titanium, total	7440-32-6	E420	0.0376 mg/L	0.04 mg/L	94.1	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0212 mg/L	0.02 mg/L	106	70.0	130	----
		uranium, total	7440-61-1	E420	0.00464 mg/L	0.004 mg/L	116	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0993 mg/L	0.1 mg/L	99.3	70.0	130	----
		zinc, total	7440-66-6	E420	0.412 mg/L	0.4 mg/L	103	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0445 mg/L	0.04 mg/L	111	70.0	130	----
Total Metals (QCLot: 111412)										
VA20B9186-001	Anonymous	mercury, total	7439-97-6	E508	0.000952 mg/L	0.001 mg/L	95.2	70.0	130	----
Total Metals (QCLot: 111413)										





Sub-Matrix: **Water**

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 111413) - continued										
VA20B9250-004	Anonymous	mercury, total	7439-97-6	E508	0.0000970 mg/L	0.0001 mg/L	97.0	70.0	130	----
Dissolved Metals (QCLot: 110861)										
VA20B9263-003	Anonymous	aluminum, dissolved	7429-90-5	E421	0.196 mg/L	0.2 mg/L	98.0	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00945 mg/L	0.01 mg/L	94.5	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.099 mg/L	0.1 mg/L	98.8	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00410 mg/L	0.004 mg/L	103	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0103 mg/L	0.01 mg/L	103	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.92 mg/L	2 mg/L	96.1	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0188 mg/L	0.02 mg/L	93.8	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0407 mg/L	0.04 mg/L	102	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.5 mg/L	10 mg/L	105	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.22 mg/L	4 mg/L	106	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0427 mg/L	0.04 mg/L	107	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.08 mg/L	10 mg/L	90.8	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00383 mg/L	0.004 mg/L	95.8	70.0	130	----
		sodium, dissolved	17341-25-2	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	21.0 mg/L	20 mg/L	105	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00387 mg/L	0.004 mg/L	96.8	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0196 mg/L	0.02 mg/L	98.3	70.0	130	----
				titanium, dissolved	7440-32-6	E421	0.0410 mg/L	0.04 mg/L	103	70.0





Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 110861) - continued										
VA20B9263-003	Anonymous	tungsten, dissolved	7440-33-7	E421	0.0193 mg/L	0.02 mg/L	96.3	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00392 mg/L	0.004 mg/L	98.1	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.402 mg/L	0.4 mg/L	100	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0398 mg/L	0.04 mg/L	99.5	70.0	130	----
Dissolved Metals (QCLot: 111473)										
VA20B9224-002	AMQ16-626-4-DUP1	mercury, dissolved	7439-97-6	E509	0.0000906 mg/L	0.0001 mg/L	90.6	70.0	130	----
Dissolved Metals (QCLot: 112111)										
VA20B9297-005	Anonymous	aluminum, dissolved	7429-90-5	E421	0.197 mg/L	0.2 mg/L	98.7	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00822 mg/L	0.01 mg/L	82.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.086 mg/L	0.1 mg/L	86.4	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00403 mg/L	0.004 mg/L	101	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0103 mg/L	0.01 mg/L	103	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0398 mg/L	0.04 mg/L	99.4	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.93 mg/L	2 mg/L	96.7	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0978 mg/L	0.1 mg/L	97.8	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0198 mg/L	0.02 mg/L	99.2	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0376 mg/L	0.04 mg/L	94.1	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.8 mg/L	10 mg/L	108	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.81 mg/L	4 mg/L	95.2	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0179 mg/L	0.02 mg/L	89.7	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0421 mg/L	0.04 mg/L	105	70.0	130	----
		silicon, dissolved	7440-21-3	E421	8.59 mg/L	10 mg/L	85.9	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00318 mg/L	0.004 mg/L	79.6	70.0	130	----
		sodium, dissolved	17341-25-2	E421	1.82 mg/L	2 mg/L	90.8	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 112111) - continued										
VA20B9297-005	Anonymous	sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0426 mg/L	0.04 mg/L	106	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00385 mg/L	0.004 mg/L	96.2	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0197 mg/L	0.02 mg/L	98.7	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0376 mg/L	0.04 mg/L	94.0	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00393 mg/L	0.004 mg/L	98.3	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0988 mg/L	0.1 mg/L	98.8	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.386 mg/L	0.4 mg/L	96.6	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0394 mg/L	0.04 mg/L	98.5	70.0	130	----
Aggregate Organics (QCLot: 112649)										
VA20B9224-002	AMQ16-626-4-DUP1	chemical oxygen demand [COD]	----	E559	ND mg/L	500 mg/L	ND	75.0	125	----



(lab use only)

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**Canada Toll Free: 1 800 668 9878**

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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

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

WHITE - LABORATORY COPY

YELLOW - CLIENT COPY

NOV 2018 E-EDITION

## CERTIFICATE OF ANALYSIS

**Work Order** : **VA20B9403**  
**Client** : **Golder Associates Ltd.**  
**Contact** : Adrian Kowalchuk  
**Address** : 1931 Robertson Road  
                   Ottawa ON Canada K2H 5B7  
**Telephone** : 613 592 9600  
**Project** : 20148777-1000  
**PO** : ----  
**C-O-C number** : 2020-10-21  
**Sampler** : Adrian Kowalchuk  
**Site** : ----  
**Quote number** : VA20-AEML100-001 (Q72802)  
**No. of samples received** : 2  
**No. of samples analysed** : 2

**Page** : 1 of 6  
**Laboratory** : Vancouver - Environmental  
**Account Manager** : Heather McKenzie  
**Address** : 8081 Lougheed Highway  
                   Burnaby BC Canada V5A 1W9  
**Telephone** : +1 604 253 4188  
**Date Samples Received** : 28-Oct-2020 09:10  
**Date Analysis Commenced** : 29-Oct-2020  
**Issue Date** : 26-Nov-2020 18:35

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Bruna Botti	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Erin Gatdula	Account Manager Assistant	Internal Subcontracting, Fort Collins, Colorado
Jashan Kaur	Lab Assistant	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Monica Ko	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia



## General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances  
LOR: Limit of Reporting (detection limit).

Unit	Description
-	No Unit
µS/cm	Microsiemens per centimetre
Bq/L	Becquerels per litre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

## Sample Comments

Sample	Client Id	Comment
VA20B9403-001	Field Blank	Sample 1: Water sample for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

## Qualifiers

Qualifier	Description
RRV	Reported result verified by repeat analysis.



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

Client sampling date / time					Field Blank	Trip Blank	----	----	----
					20-Oct-2020 09:00	20-Oct-2020 15:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9403-001	VA20B9403-002	-----	-----	-----
					Result	Result	----	----	----
<b>Physical Tests</b>									
alkalinity, bicarbonate (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	1.2	<1.0	----	----	----
alkalinity, carbonate (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, hydroxide (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	<1.0	<1.0	----	----	----
alkalinity, total (as CaCO <sub>3</sub> )	----	E290	1.0	mg/L	1.2	<1.0	----	----	----
conductivity	----	E100	2.0	µS/cm	3.4	<2.0	----	----	----
hardness (as CaCO <sub>3</sub> ), from total Ca/Mg	----	EC100A	0.60	mg/L	0.79	<0.60	----	----	----
pH	----	E108	0.10	pH units	6.01	5.30	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	<10	----	----	----
solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	----	----	----
turbidity	----	E121	0.10	NTU	0.24 <sup>RRV</sup>	<0.10	----	----	----
hardness (as CaCO <sub>3</sub> ), dissolved	----	EC100	0.60	mg/L	0.67	----	----	----	----
<b>Anions and Nutrients</b>									
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0227 <sup>RRV</sup>	<0.0050	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L	<0.050	<0.050	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.087 <sup>RRV</sup>	<0.050	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L	<0.0051	<0.0051	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0079 <sup>RRV</sup>	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0287 <sup>RRV</sup>	<0.0020	----	----	----
silicate (as SiO <sub>2</sub> )	7631-86-9	E392	0.50	mg/L	0.61 <sup>RRV</sup>	<0.50	----	----	----
sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO4	0.30	mg/L	0.37 <sup>RRV</sup>	<0.30	----	----	----
<b>Total Metals</b>									
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0070 <sup>RRV</sup>	<0.0030	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00014 <sup>RRV</sup>	<0.00010	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.00028 <sup>RRV</sup>	<0.00010	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	----	----	----



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					Field Blank	Trip Blank	----	----	----
Client sampling date / time					20-Oct-2020 09:00	20-Oct-2020 15:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9403-001	VA20B9403-002	-----	-----	-----
					Result	Result	---	---	---
<b>Total Metals</b>									
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.027 <sup>RRV</sup>	<0.010	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000206 <sup>RRV</sup>	<0.0000050	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	0.195 <sup>RRV</sup>	<0.050	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	<0.00010	<0.00010	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00117 <sup>RRV</sup>	<0.00050	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	0.000975 <sup>RRV</sup>	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	0.0731 <sup>RRV</sup>	<0.0050	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.00021 <sup>RRV</sup>	<0.00010	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	0.00063 <sup>RRV</sup>	<0.00050	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	<0.050	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	0.51 <sup>RRV</sup>	<0.10	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L	0.000039 <sup>RRV</sup>	<0.000010	----	----	----
sodium, total	17341-25-2	E420	0.050	mg/L	0.298 <sup>RRV</sup>	<0.050	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L	0.00099 <sup>RRV</sup>	<0.00020	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L	<0.50	<0.50	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	----	----	----



## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					Field Blank	Trip Blank	----	----	----
Client sampling date / time					20-Oct-2020 09:00	20-Oct-2020 15:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9403-001	VA20B9403-002	-----	-----	-----
					Result	Result	---	---	---
<b>Total Metals</b>									
uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L	0.0112 <sup>RRV</sup>	<0.0030	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	----	----	----
<b>Dissolved Metals</b>									
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0038 <sup>RRV</sup>	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00015 <sup>RRV</sup>	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00035 <sup>RRV</sup>	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L	0.028 <sup>RRV</sup>	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000070 <sup>RRV</sup>	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L	0.168 <sup>RRV</sup>	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	----	----	----	----
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00143 <sup>RRV</sup>	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000907 <sup>RRV</sup>	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	0.0599 <sup>RRV</sup>	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00018 <sup>RRV</sup>	----	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L	<0.050	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	<0.00020	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L	0.462 <sup>RRV</sup>	----	----	----	----





## Analytical Results

Sub-Matrix: Groundwater

Client sample ID

(Matrix: Water)

					Field Blank	Trip Blank	----	----	----
Client sampling date / time					20-Oct-2020 09:00	20-Oct-2020 15:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA20B9403-001	VA20B9403-002	-----	-----	-----
					Result	Result	---	---	---
<b>Dissolved Metals</b>									
silver, dissolved	7440-22-4	E421	0.000010	mg/L	0.000013 <sup>RRV</sup>	----	----	----	----
sodium, dissolved	17341-25-2	E421	0.050	mg/L	0.292 <sup>RRV</sup>	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.00089 <sup>RRV</sup>	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0094 <sup>RRV</sup>	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	----	----	----	----
dissolved mercury filtration location	----	EP509	-	-	Field	----	----	----	----
dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----
<b>Aggregate Organics</b>									
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	<20	----	----	----
<b>Radiological Parameters</b>									
radium-226	13982-63-3	RA226-MMER	0.0031	Bq/L	----	0.0051	----	----	----
radium-226	13982-63-3	RA226-MMER	0.0069	Bq/L	0.0069	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

## QUALITY CONTROL INTERPRETIVE REPORT

**Work Order** : **VA20B9403**  
**Client** : **Golder Associates Ltd.**  
**Contact** : **Adrian Kowalchuk**  
**Address** : **1931 Robertson Road**  
**Ottawa ON Canada K2H 5B7**  
**Telephone** : **204 489 9600**  
**Project** : **20148777-1000**  
**PO** : **----**  
**C-O-C number** : **2020-10-21**  
**Sampler** : **Adrian Kowalchuk**  
**Site** : **----**  
**Quote number** : **VA20-AEML100-001 (Q72802)**  
**No. of samples received** : **2**  
**No. of samples analysed** : **2**

**Page** : **1 of 15**  
**Laboratory** : **Vancouver - Environmental**  
**Account Manager** : **Heather McKenzie**  
**Address** : **8081 Lougheed Highway**  
**Burnaby, British Columbia Canada V5A 1W9**  
**Telephone** : **+1 604 253 4188**  
**Date Samples Received** : **28-Oct-2020 09:10**  
**Issue Date** : **26-Nov-2020 18:35**

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

### Key

**Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.  
**CAS Number:** Chemical Abstracts Services number is a unique identifier assigned to discrete substances.  
**DQO:** Data Quality Objective.  
**LOR:** Limit of Reporting (detection limit).  
**RPD:** Relative Percent Difference.

## Summary of Outliers

### Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

### Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

### Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

### Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

RIGHT SOLUTIONS | RIGHT PARTNER



## Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 is used for calculation purposes.

Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) Field Blank	E559	20-Oct-2020	----	----	----		30-Oct-2020	28 days	9 days	✓
Aggregate Organics : Chemical Oxygen Demand by Colourimetry										
Amber glass total (sulfuric acid) Trip Blank	E559	20-Oct-2020	----	----	----		30-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Field Blank	E298	20-Oct-2020	----	----	----		03-Nov-2020	28 days	13 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) Trip Blank	E298	20-Oct-2020	----	----	----		03-Nov-2020	28 days	13 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE Field Blank	E235.Br-L	20-Oct-2020	----	----	----		29-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE Trip Blank	E235.Br-L	20-Oct-2020	----	----	----		29-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE Field Blank	E235.Cl	20-Oct-2020	----	----	----		29-Oct-2020	28 days	9 days	✓



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Chloride in Water by IC										
HDPE Trip Blank	E235.Cl	20-Oct-2020	----	----	----		29-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE Field Blank	E378-U	20-Oct-2020	----	----	----		30-Oct-2020	3 days	9 days	✖ EHTR
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)										
HDPE Trip Blank	E378-U	20-Oct-2020	----	----	----		30-Oct-2020	3 days	9 days	✖ EHTR
Anions and Nutrients : Fluoride in Water by IC										
HDPE Field Blank	E235.F	20-Oct-2020	----	----	----		29-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE Trip Blank	E235.F	20-Oct-2020	----	----	----		29-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Field Blank	E235.NO3-L	20-Oct-2020	----	----	----		29-Oct-2020	3 days	9 days	✖ EHTR
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO3-L	20-Oct-2020	----	----	----		29-Oct-2020	3 days	9 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Field Blank	E235.NO2-L	20-Oct-2020	----	----	----		29-Oct-2020	3 days	9 days	✖ EHTR
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE Trip Blank	E235.NO2-L	20-Oct-2020	----	----	----		29-Oct-2020	3 days	9 days	✖ EHTR



Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Field Blank	E392	20-Oct-2020	----	----	----		30-Oct-2020	28 days	10 days	✓
Anions and Nutrients : Reactive Silica by Colourimetry										
HDPE Trip Blank	E392	20-Oct-2020	----	----	----		30-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Field Blank	E235.SO4	20-Oct-2020	----	----	----		29-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE Trip Blank	E235.SO4	20-Oct-2020	----	----	----		29-Oct-2020	28 days	9 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Field Blank	E318	20-Oct-2020	02-Nov-2020	28 days	13 days	✓	03-Nov-2020	14 days	0 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) Trip Blank	E318	20-Oct-2020	02-Nov-2020	28 days	13 days	✓	03-Nov-2020	14 days	0 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) Field Blank	E372-U	20-Oct-2020	02-Nov-2020	28 days	13 days	✓	03-Nov-2020	14 days	0 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (Ultra Trace)										
Amber glass total (sulfuric acid) Trip Blank	E372-U	20-Oct-2020	02-Nov-2020	28 days	13 days	✓	03-Nov-2020	14 days	0 days	✓
Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)										
HDPE - dissolved (lab preserved) Field Blank	E421.Cr-L	20-Oct-2020	30-Oct-2020	180 days	10 days	✓	31-Oct-2020	169 days	0 days	✓



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
HDPE - dissolved (lab preserved) Field Blank	E509	20-Oct-2020	03-Nov-2020	28 days	13 days	✓	03-Nov-2020	14 days	0 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) Field Blank	E421	20-Oct-2020	30-Oct-2020	180 days	10 days	✓	31-Oct-2020	169 days	0 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Field Blank	E290	20-Oct-2020	----	----	----		29-Oct-2020	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE Trip Blank	E290	20-Oct-2020	----	----	----		29-Oct-2020	14 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE Field Blank	E100	20-Oct-2020	----	----	----		29-Oct-2020	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE Trip Blank	E100	20-Oct-2020	----	----	----		29-Oct-2020	28 days	9 days	✓
Physical Tests : pH by Meter										
HDPE Trip Blank	E108	20-Oct-2020	----	----	----		29-Oct-2020	0.25 hrs	222 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE Field Blank	E108	20-Oct-2020	----	----	----		29-Oct-2020	0.25 hrs	228 hrs	✖ EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE Field Blank	E162	20-Oct-2020	----	----	----		29-Oct-2020	7 days	9 days	✖ EHTR



Matrix: **Water** Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : TDS by Gravimetry										
HDPE Trip Blank	E162	20-Oct-2020	----	----	----		29-Oct-2020	7 days	9 days	<div>✖</div> <div>EHTR</div>
Physical Tests : TSS by Gravimetry										
HDPE Field Blank	E160-H	20-Oct-2020	----	----	----		29-Oct-2020	7 days	9 days	<div>✖</div> <div>EHTR</div>
Physical Tests : TSS by Gravimetry										
HDPE Trip Blank	E160-H	20-Oct-2020	----	----	----		29-Oct-2020	7 days	9 days	<div>✖</div> <div>EHTR</div>
Physical Tests : Turbidity by Nephelometry										
HDPE Field Blank	E121	20-Oct-2020	----	----	----		29-Oct-2020	3 days	9 days	<div>✖</div> <div>EHTR</div>
Physical Tests : Turbidity by Nephelometry										
HDPE Trip Blank	E121	20-Oct-2020	----	----	----		29-Oct-2020	3 days	9 days	<div>✖</div> <div>EHTR</div>
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) Trip Blank	RA226-MMER	20-Oct-2020	----	----	----		19-Nov-2020	180 days	29 days	<div>✔</div>
Radiological Parameters : Radium-226 by Radon Emanation										
HDPE (nitric acid) Field Blank	RA226-MMER	20-Oct-2020	----	----	----		19-Nov-2020	180 days	30 days	<div>✔</div>
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) Field Blank	E420.Cr-L	20-Oct-2020	----	----	----		03-Nov-2020	180 days	13 days	<div>✔</div>
Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)										
HDPE - total (lab preserved) Trip Blank	E420.Cr-L	20-Oct-2020	----	----	----		03-Nov-2020	180 days	13 days	<div>✔</div>





Matrix: **Water** Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
Container / Client Sample ID(s)			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Field Blank	E508	20-Oct-2020	----	----	----		02-Nov-2020	28 days	13 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) Trip Blank	E508	20-Oct-2020	----	----	----		02-Nov-2020	28 days	13 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Field Blank	E420	20-Oct-2020	----	----	----		03-Nov-2020	180 days	13 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) Trip Blank	E420	20-Oct-2020	----	----	----		03-Nov-2020	180 days	13 days	✓

**Legend & Qualifier Definitions**

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

Rec. HT: ALS recommended hold time (see units).



## Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water** Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	110501	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	112051	1	18	5.5	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	110495	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	110767	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	110494	1	18	5.5	5.0	✓
Conductivity in Water	E100	110500	1	10	10.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	111161	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	112346	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	111162	2	18	11.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	110491	1	12	8.3	5.0	✓
Fluoride in Water by IC	E235.F	110492	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	110497	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	110496	1	19	5.2	5.0	✓
pH by Meter	E108	110499	1	10	10.0	5.0	✓
Reactive Silica by Colourimetry	E392	110954	2	18	11.1	5.0	✓
Sulfate in Water by IC	E235.SO4	110493	1	18	5.5	5.0	✓
TDS by Gravimetry	E162	110521	1	10	10.0	5.0	✓
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	111404	1	8	12.5	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	112020	2	21	9.5	5.0	✓
Total Mercury in Water by CVAAS	E508	112275	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	111403	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	112021	1	13	7.6	5.0	✓
TSS by Gravimetry	E160-H	110520	1	10	10.0	5.0	✓
Turbidity by Nephelometry	E121	110457	1	15	6.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	110501	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	112051	1	18	5.5	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	110495	1	17	5.8	5.0	✓
Chemical Oxygen Demand by Colourimetry	E559	110767	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	110494	1	18	5.5	5.0	✓
Conductivity in Water	E100	110500	1	10	10.0	5.0	✓
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	111161	1	18	5.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	112346	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	111162	1	18	5.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	110491	1	12	8.3	5.0	✓
Fluoride in Water by IC	E235.F	110492	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	110497	1	18	5.5	5.0	✓



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Control Samples (LCS) - Continued							
Nitrite in Water by IC (Low Level)	E235.NO2-L	110496	1	19	5.2	5.0	✔
pH by Meter	E108	110499	1	10	10.0	5.0	✔
Reactive Silica by Colourimetry	E392	110954	2	18	11.1	5.0	✔
Sulfate in Water by IC	E235.SO4	110493	1	18	5.5	5.0	✔
TDS by Gravimetry	E162	110521	1	10	10.0	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	111404	1	8	12.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	112020	2	21	9.5	5.0	✔
Total Mercury in Water by CVAAS	E508	112275	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	111403	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	112021	1	13	7.6	5.0	✔
TSS by Gravimetry	E160-H	110520	1	10	10.0	5.0	✔
Turbidity by Nephelometry	E121	110457	1	15	6.6	5.0	✔
Method Blanks (MB)							
Alkalinity Species by Titration	E290	110501	1	10	10.0	5.0	✔
Ammonia by Fluorescence	E298	112051	1	18	5.5	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	110495	1	17	5.8	5.0	✔
Chemical Oxygen Demand by Colourimetry	E559	110767	1	16	6.2	5.0	✔
Chloride in Water by IC	E235.Cl	110494	1	18	5.5	5.0	✔
Conductivity in Water	E100	110500	1	10	10.0	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	111161	1	18	5.5	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	112346	1	20	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	111162	1	18	5.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	110491	1	12	8.3	5.0	✔
Fluoride in Water by IC	E235.F	110492	1	18	5.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	110497	1	18	5.5	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	110496	1	19	5.2	5.0	✔
Reactive Silica by Colourimetry	E392	110954	2	18	11.1	5.0	✔
Sulfate in Water by IC	E235.SO4	110493	1	18	5.5	5.0	✔
TDS by Gravimetry	E162	110521	1	10	10.0	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	111404	1	8	12.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	112020	2	21	9.5	5.0	✔
Total Mercury in Water by CVAAS	E508	112275	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	111403	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	112021	1	13	7.6	5.0	✔
TSS by Gravimetry	E160-H	110520	1	10	10.0	5.0	✔
Turbidity by Nephelometry	E121	110457	1	15	6.6	5.0	✔
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	112051	1	18	5.5	5.0	✔
Bromide in Water by IC (Low Level)	E235.Br-L	110495	1	17	5.8	5.0	✔
Chemical Oxygen Demand by Colourimetry	E559	110767	1	16	6.2	5.0	✔



Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Matrix Spikes (MS) - Continued							
Chloride in Water by IC	E235.Cl	110494	1	18	5.5	5.0	✔
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L	111161	1	18	5.5	5.0	✔
Dissolved Mercury in Water by CVAAS	E509	112346	1	20	5.0	5.0	✔
Dissolved Metals in Water by CRC ICPMS	E421	111162	1	18	5.5	5.0	✔
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U	110491	1	12	8.3	5.0	✔
Fluoride in Water by IC	E235.F	110492	1	18	5.5	5.0	✔
Nitrate in Water by IC (Low Level)	E235.NO3-L	110497	1	18	5.5	5.0	✔
Nitrite in Water by IC (Low Level)	E235.NO2-L	110496	1	19	5.2	5.0	✔
Reactive Silica by Colourimetry	E392	110954	2	18	11.1	5.0	✔
Sulfate in Water by IC	E235.SO4	110493	1	18	5.5	5.0	✔
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L	111404	1	8	12.5	5.0	✔
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	112020	2	21	9.5	5.0	✔
Total Mercury in Water by CVAAS	E508	112275	1	20	5.0	5.0	✔
Total Metals in Water by CRC ICPMS	E420	111403	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U	112021	1	13	7.6	5.0	✔



## Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100  Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108  Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally $20 \pm 5^\circ\text{C}$ ). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121  Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160-H  Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at $104 \pm 1^\circ\text{C}$ , with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162  Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at $180 \pm 2^\circ\text{C}$ for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC	E235.Cl  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Sulfate in Water by IC	E235.SO4  Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290  Vancouver - Environmental	Water	APHA 2320 B (mod)	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.
Ammonia by Fluorescence	E298  Vancouver - Environmental	Water	J. Environ. Monit., 2005, 7, 37-42 (mod)	Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318  Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.
Total Phosphorus by Colourimetry (Ultra Trace)	E372-U  Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level)	E378-U  Vancouver - Environmental	Water	APHA 4500-P E (mod)	Dissolved Orthophosphate is determined colourimetrically on a water sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Reactive Silica by Colourimetry	E392  Vancouver - Environmental	Water	APHA 4500-SiO2 E (mod)	Silicate (molybdate-reactive silica) is determined by the molybdosilicate-heteropoly blue colourimetric method using a discrete analyzer. Method Limitation: Arsenic (5+) above 100 mg/L is a negative interference on this test.
Total Metals in Water by CRC ICPMS	E420  Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Chromium in Water by CRC ICPMS (Low Level)	E420.Cr-L  Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.
Dissolved Metals in Water by CRC ICPMS	E421  Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Chromium in Water by CRC ICPMS (Low Level)	E421.Cr-L  Vancouver - Environmental	Water	APHA 3030 B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS



Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Mercury in Water by CVAAS	E508  Vancouver - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509  Vancouver - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Chemical Oxygen Demand by Colourimetry	E559  Vancouver - Environmental	Water	APHA 5220 D (mod)	Samples are analyzed using the closed reflux colourimetric method.
Dissolved Hardness (Calculated)	EC100  Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A  Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO <sub>3</sub> ), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N  Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Radium-226 by Radon Emanation	RA226-MMER  Fort Collins - Environmental - 225 Commerce Drive Fort Collins Colorado United States 80524	Water	EPA 903.1	Radium-226 in sample was analyzed according to the current revision of SOP 783.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318  Vancouver - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested using block digestion with Copper Sulfate Digestion Reagent.
Digestion for Total Phosphorus in water	EP372  Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

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Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421  Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Mercury Water Filtration	EP509  Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.



## QUALITY CONTROL REPORT

**Work Order** : **VA20B9403**

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**Project** : 20148777-1000  
**PO** : ----  
**C-O-C number** : 2020-10-21  
**Sampler** : Adrian Kowalchuk  
**Site** : ----  
**Quote number** : VA20-AEML100-001 (Q72802)  
**No. of samples received** : 2  
**No. of samples analysed** : 2

**Laboratory** : Vancouver - Environmental  
**Account Manager** : Heather McKenzie  
**Address** : 8081 Lougheed Highway  
                   Burnaby, British Columbia Canada V5A 1W9  
**Telephone** : +1 604 253 4188  
**Date Samples Received** : 28-Oct-2020 09:10  
**Date Analysis Commenced** : 29-Oct-2020  
**Issue Date** : 26-Nov-2020 18:35

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

### Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Bruna Botti	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Caitlin Macey	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
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Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

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Work Order : VA20B9403  
Client : Golder Associates Ltd.  
Project : 20148777-1000



## General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

### Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

# = Indicates a QC result that did not meet the ALS DQO.

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 110457)											
VA20B9403-001	Field Blank	turbidity	----	E121	0.10	NTU	0.24	0.25	0.005	Diff <2x LOR	----
Physical Tests (QC Lot: 110499)											
KS2002346-001	Anonymous	pH	----	E108	0.10	pH units	8.17	8.26	1.10%	4%	----
Physical Tests (QC Lot: 110500)											
KS2002346-001	Anonymous	conductivity	----	E100	2.0	µS/cm	468	467	0.214%	10%	----
Physical Tests (QC Lot: 110501)											
KS2002346-001	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	231	230	0.738%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	231	230	0.738%	20%	----
Physical Tests (QC Lot: 110520)											
VA20B9403-001	Field Blank	solids, total suspended [TSS]	----	E160-H	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 110521)											
VA20B9403-001	Field Blank	solids, total dissolved [TDS]	----	E162	10	mg/L	<10	<10	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 110491)											
KS2002336-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0206	0.0207	0.434%	20%	----
Anions and Nutrients (QC Lot: 110492)											
KS2002336-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.112	0.109	0.003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 110493)											
KS2002336-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	29.8	30.0	0.540%	20%	----
Anions and Nutrients (QC Lot: 110494)											
KS2002336-001	Anonymous	chloride	16887-00-6	E235.Cl	2.50	mg/L	<2.50	<2.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 110495)											
KS2002336-001	Anonymous	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 110496)											
KS2002336-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 110497)											
KS2002336-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.155	0.156	0.0012	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 110954)											
VA20B9224-001	Anonymous	silicate (as SiO2)	7631-86-9	E392	0.50	mg/L	5.87	6.01	2.36%	20%	----
Anions and Nutrients (QC Lot: 112020)											



Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Anions and Nutrients (QC Lot: 112020) - continued</b>											
VA20B9292-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	0.067	0.104	0.036	Diff <2x LOR	----
<b>Anions and Nutrients (QC Lot: 112021)</b>											
VA20B9148-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0376	0.0358	5.02%	20%	----
<b>Anions and Nutrients (QC Lot: 112051)</b>											
VA20B9148-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	0.580	0.576	0.747%	20%	----
<b>Anions and Nutrients (QC Lot: 112826)</b>											
VA20B9385-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	500	mg/L	14700 µg/L	12.8	13.7%	20%	----
<b>Anions and Nutrients (QC Lot: 112827)</b>											
VA20B9403-001	Field Blank	silicate (as SiO <sub>2</sub> )	7631-86-9	E392	0.50	mg/L	0.61	0.62	0.01	Diff <2x LOR	----
<b>Total Metals (QC Lot: 111403)</b>											
KS2002350-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0057	<0.0030	0.0027	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00182	0.00187	2.34%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.00305	0.00297	2.60%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.046	0.044	0.002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	0.0000054	0.0000004	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	32.3	32.0	1.05%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00304	0.00298	0.00006	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000623	0.000630	1.09%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0089	0.0086	0.0002	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	206	194	5.54%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00034	0.00021	0.00013	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00912	0.00923	1.22%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00158	0.00152	0.00006	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	0.097	0.106	0.009	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	12.8	12.9	0.596%	20%	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00420	0.00430	2.46%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00334	0.00330	1.29%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	16.6	16.1	3.11%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----



Sub-Matrix: **Water**

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 111403) - continued											
KS2002350-001	Anonymous	sodium, total	17341-25-2	E420	0.050	mg/L	51.9	49.9	3.91%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0739	0.0762	3.03%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	17.9	17.4	2.85%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00471	0.00470	0.0947%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00454	0.00442	0.00012	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0093	0.0087	0.0006	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	0.00067	0.00071	0.00004	Diff <2x LOR	----
Total Metals (QC Lot: 111404)											
KS2002350-001	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L	0.00589	0.00581	1.30%	20%	----
Total Metals (QC Lot: 112275)											
KS2002368-001	Anonymous	mercury, total	7439-97-6	E508	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 111161)											
VA20B9403-001	Field Blank	chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 111162)											
VA20B9403-001	Field Blank	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0038	0.0044	0.0005	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00015	0.00013	0.00002	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00035	0.00034	0.00002	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.028	0.029	0.0005	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000070	0.0000062	0.0000008	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	0.168	0.168	0.0009	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00143	0.00149	0.00006	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000907	0.000907	0.00242%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	0.0599	0.0608	1.45%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00018	0.00016	0.00002	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	0.462	0.460	0.0010	Diff <2x LOR	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	0.000013	0.000012	0.0000009	Diff <2x LOR	----
		sodium, dissolved	17341-25-2	E421	0.050	mg/L	0.292	0.304	0.011	Diff <2x LOR	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.00089	0.00089	0.000003	Diff <2x LOR	----



Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Dissolved Metals (QC Lot: 111162) - continued</b>											
VA20B9403-001	Field Blank	zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0094	0.0102	0.0008	Diff <2x LOR	----
VA20B9403-001	Field Blank	antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	0.00052	0.00002	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	0.054	0.004	Diff <2x LOR	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
<b>Dissolved Metals (QC Lot: 112346)</b>											
VA20B9143-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
<b>Aggregate Organics (QC Lot: 110767)</b>											
VA20B9385-001	Anonymous	chemical oxygen demand [COD]	----	E559	20000	mg/L	145000 µg/L	135	11	Diff <2x LOR	----

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be  $\leq$  LOR.

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 110457)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 110500)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 110501)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 110520)						
solids, total suspended [TSS]	----	E160-H	3	mg/L	<3.0	----
Physical Tests (QCLot: 110521)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 110491)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 110492)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 110493)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 110494)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 110495)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 110496)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 110497)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 110954)						
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 112020)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 112021)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 112051)						





Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Anions and Nutrients (QCLot: 112051) - continued</b>						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
<b>Anions and Nutrients (QCLot: 112826)</b>						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
<b>Anions and Nutrients (QCLot: 112827)</b>						
silicate (as SiO <sub>2</sub> )	7631-86-9	E392	0.5	mg/L	<0.50	----
<b>Total Metals (QCLot: 111403)</b>						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	17341-25-2	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----





Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Total Metals (QCLot: 111403) - continued</b>						
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
<b>Total Metals (QCLot: 111404)</b>						
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	<0.00010	----
<b>Total Metals (QCLot: 112275)</b>						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
<b>Dissolved Metals (QCLot: 111161)</b>						
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	<0.00010	----
<b>Dissolved Metals (QCLot: 111162)</b>						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----

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 Work Order : VA20B9403  
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Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Dissolved Metals (QCLot: 111162) - continued</b>						
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
<b>Dissolved Metals (QCLot: 112346)</b>						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
<b>Aggregate Organics (QCLot: 110767)</b>						
chemical oxygen demand [COD]	----	E559	20	mg/L	<20	----

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 110457)									
turbidity	----	E121	0.1	NTU	200 NTU	100	85.0	115	----
Physical Tests (QCLot: 110499)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 110500)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	101	90.0	110	----
Physical Tests (QCLot: 110501)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.8	85.0	115	----
Physical Tests (QCLot: 110520)									
solids, total suspended [TSS]	----	E160-H	3	mg/L	150 mg/L	99.2	85.0	115	----
Physical Tests (QCLot: 110521)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	108	85.0	115	----
Anions and Nutrients (QCLot: 110491)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 110492)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 110493)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 110494)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 110495)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	92.6	85.0	115	----
Anions and Nutrients (QCLot: 110496)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 110497)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 110954)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 112020)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 112021)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	92.5	80.0	120	----
Anions and Nutrients (QCLot: 112051)									



Sub-Matrix: Water

Sub-Matrix: Water					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 112051) - continued									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.12 mg/L	102	85.0	115	----
Anions and Nutrients (QCLot: 112826)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 112827)									
silicate (as SiO2)	7631-86-9	E392	0.5	mg/L	10 mg/L	98.4	85.0	115	----
Total Metals (QCLot: 111403)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	96.3	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	95.2	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	90.9	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	91.3	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	96.6	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	104	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	99.7	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	96.2	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	97.3	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	91.5	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	96.0	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	98.7	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.4	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.5	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	103	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	99.3	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	96.6	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	100	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	99.9	80.0	120	----
sodium, total	17341-25-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	95.4	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	93.7	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	103	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Total Metals (QCLot: 111403) - continued</b>									
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	94.6	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.7	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	93.8	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	98.1	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	98.7	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	97.8	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	99.0	80.0	120	----
<b>Total Metals (QCLot: 111404)</b>									
chromium, total	7440-47-3	E420.Cr-L	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
<b>Total Metals (QCLot: 112275)</b>									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
<b>Dissolved Metals (QCLot: 111161)</b>									
chromium, dissolved	7440-47-3	E421.Cr-L	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
<b>Dissolved Metals (QCLot: 111162)</b>									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	98.6	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	92.3	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.5	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.6	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	95.2	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.6	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	93.6	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	99.8	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.8	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	104	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	98.4	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	100	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	91.2	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.2	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	104	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	100	80.0	120	----



Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Dissolved Metals (QCLot: 111162) - continued</b>									
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	98.9	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	96.6	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	97.4	80.0	120	----
sodium, dissolved	17341-25-2	E421	0.05	mg/L	50 mg/L	98.3	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	96.3	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	108	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	96.8	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.6	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.6	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	99.6	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	110	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.5	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	92.7	80.0	120	----
<b>Dissolved Metals (QCLot: 112346)</b>									
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
<b>Aggregate Organics (QCLot: 110767)</b>									
chemical oxygen demand [COD]	----	E559	20	mg/L	750 mg/L	97.9	85.0	115	----



## Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level  $\geq 1 \times$  spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>Anions and Nutrients (QCLot: 110491)</b>										
KS2002336-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0382 mg/L	0.03 mg/L	127	70.0	130	----
<b>Anions and Nutrients (QCLot: 110492)</b>										
KS2002336-002	Anonymous	fluoride	16984-48-8	E235.F	5.01 mg/L	5 mg/L	100	75.0	125	----
<b>Anions and Nutrients (QCLot: 110493)</b>										
KS2002336-002	Anonymous	sulfate (as SO <sub>4</sub> )	14808-79-8	E235.SO <sub>4</sub>	508 mg/L	500 mg/L	102	75.0	125	----
<b>Anions and Nutrients (QCLot: 110494)</b>										
KS2002336-002	Anonymous	chloride	16887-00-6	E235.Cl	504 mg/L	500 mg/L	101	75.0	125	----
<b>Anions and Nutrients (QCLot: 110495)</b>										
KS2002336-002	Anonymous	bromide	24959-67-9	E235.Br-L	2.24 mg/L	2.5 mg/L	89.4	75.0	125	----
<b>Anions and Nutrients (QCLot: 110496)</b>										
KS2002336-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO <sub>2</sub> -L	2.48 mg/L	2.5 mg/L	99.3	75.0	125	----
<b>Anions and Nutrients (QCLot: 110497)</b>										
KS2002336-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO <sub>3</sub> -L	12.6 mg/L	12.5 mg/L	101	75.0	125	----
<b>Anions and Nutrients (QCLot: 110954)</b>										
VA20B9224-002	Anonymous	silicate (as SiO <sub>2</sub> )	7631-86-9	E392	10.7 mg/L	10 mg/L	107	75.0	125	----
<b>Anions and Nutrients (QCLot: 112020)</b>										
VA20B9292-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.48 mg/L	2.5 mg/L	99.2	70.0	130	----
<b>Anions and Nutrients (QCLot: 112021)</b>										
VA20B9293-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.472 mg/L	0.5 mg/L	94.3	70.0	130	----
<b>Anions and Nutrients (QCLot: 112051)</b>										
VA20B9277-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	190 mg/L	200 mg/L	95.2	75.0	125	----
<b>Anions and Nutrients (QCLot: 112826)</b>										
VA20B9385-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	25.1 mg/L	2.5 mg/L	100	70.0	130	----
<b>Anions and Nutrients (QCLot: 112827)</b>										
WR2001133-001	Anonymous	silicate (as SiO <sub>2</sub> )	7631-86-9	E392	12.3 mg/L	10 mg/L	123	75.0	125	----
<b>Total Metals (QCLot: 111403)</b>										
VA20B9276-002	Anonymous	aluminum, total	7429-90-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		antimony, total	7440-36-0	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----





Sub-Matrix: **Water**

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 111403) - continued										
VA20B9276-002	Anonymous	arsenic, total	7440-38-2	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0104 mg/L	0.01 mg/L	104	70.0	130	----
		boron, total	7440-42-8	E420	0.098 mg/L	0.1 mg/L	97.5	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00401 mg/L	0.004 mg/L	100	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0107 mg/L	0.01 mg/L	107	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		copper, total	7440-50-8	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		iron, total	7439-89-6	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, total	7439-92-1	E420	0.0200 mg/L	0.02 mg/L	100.0	70.0	130	----
		lithium, total	7439-93-2	E420	0.0991 mg/L	0.1 mg/L	99.1	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		nickel, total	7440-02-0	E420	0.0413 mg/L	0.04 mg/L	103	70.0	130	----
		phosphorus, total	7723-14-0	E420	10.1 mg/L	10 mg/L	101	70.0	130	----
		potassium, total	7440-09-7	E420	4.03 mg/L	4 mg/L	101	70.0	130	----
		rubidium, total	7440-17-7	E420	0.0215 mg/L	0.02 mg/L	107	70.0	130	----
		selenium, total	7782-49-2	E420	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		silicon, total	7440-21-3	E420	8.75 mg/L	10 mg/L	87.5	70.0	130	----
		silver, total	7440-22-4	E420	0.00411 mg/L	0.004 mg/L	103	70.0	130	----
		sodium, total	17341-25-2	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		thallium, total	7440-28-0	E420	0.00403 mg/L	0.004 mg/L	101	70.0	130	----
		thorium, total	7440-29-1	E420	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		tin, total	7440-31-5	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		titanium, total	7440-32-6	E420	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		tungsten, total	7440-33-7	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		uranium, total	7440-61-1	E420	0.00414 mg/L	0.004 mg/L	104	70.0	130	----
		vanadium, total	7440-62-2	E420	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		zinc, total	7440-66-6	E420	0.416 mg/L	0.4 mg/L	104	70.0	130	----
		zirconium, total	7440-67-7	E420	0.0407 mg/L	0.04 mg/L	102	70.0	130	----





Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 111404)										
VA20B9276-002	Anonymous	chromium, total	7440-47-3	E420.Cr-L	0.0415 mg/L	0.04 mg/L	104	70.0	130	----
Total Metals (QCLot: 112275)										
KS2002368-002	Anonymous	mercury, total	7439-97-6	E508	0.000998 mg/L	0.001 mg/L	99.8	70.0	130	----
Dissolved Metals (QCLot: 111161)										
VA20B9431-001	Anonymous	chromium, dissolved	7440-47-3	E421.Cr-L	0.0391 mg/L	0.04 mg/L	97.7	70.0	130	----
Dissolved Metals (QCLot: 111162)										
VA20B9431-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.198 mg/L	0.2 mg/L	99.2	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0415 mg/L	0.04 mg/L	104	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0100 mg/L	0.01 mg/L	100	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.097 mg/L	0.1 mg/L	97.1	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00398 mg/L	0.004 mg/L	99.5	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.0106 mg/L	0.01 mg/L	106	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0200 mg/L	0.02 mg/L	100.0	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		iron, dissolved	7439-89-6	E421	2.02 mg/L	2 mg/L	101	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.106 mg/L	0.1 mg/L	106	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0186 mg/L	0.02 mg/L	93.0	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	10.5 mg/L	10 mg/L	105	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.96 mg/L	4 mg/L	99.1	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.0198 mg/L	0.02 mg/L	99.1	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.10 mg/L	10 mg/L	91.0	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00399 mg/L	0.004 mg/L	99.7	70.0	130	----
		sodium, dissolved	17341-25-2	E421	2.06 mg/L	2 mg/L	103	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	21.6 mg/L	20 mg/L	108	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.0399 mg/L	0.04 mg/L	99.7	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00387 mg/L	0.004 mg/L	96.8	70.0	130	----



Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 111162) - continued										
VA20B9431-001	Anonymous	thorium, dissolved	7440-29-1	E421	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0198 mg/L	0.02 mg/L	98.9	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0397 mg/L	0.04 mg/L	99.3	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.0197 mg/L	0.02 mg/L	98.5	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00419 mg/L	0.004 mg/L	105	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0994 mg/L	0.1 mg/L	99.4	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.417 mg/L	0.4 mg/L	104	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.0392 mg/L	0.04 mg/L	98.1	70.0	130	----
Dissolved Metals (QCLot: 112346)										
VA20B9143-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.000106 mg/L	0.0001 mg/L	106	70.0	130	----
Aggregate Organics (QCLot: 110767)										
VA20B9403-001	Field Blank	chemical oxygen demand [COD]	----	E559	489 mg/L	500 mg/L	97.8	75.0	125	----



(lab use only)

COC Number: 2020-10-21

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REFER TO BACK PAGE FOR AIS LOCATIONS AND SAMPLING INFORMATION

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

NOV 2018 EPO

**ATTACHMENT B**

# 2020 Thermal Monitoring Report



WHALE TAIL PIT PROJECT

## **Thermal Monitoring Report 2020**

In Accordance with  
Project Certificate No. 008, T&C 14

Prepared by:  
Agnico Eagle Mines Limited – Meadowbank Division

February 2021

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Appendix A: Whale Tail Thermal Data

## **1 INTRODUCTION**

---

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is developing the Whale Tail Pit Project (Project), a satellite deposit located on the Amaruq property, to continue mine operations and milling at Meadowbank Mine.

This document presents the Thermal Monitoring Report include the following mine facilities and natural locations as described in the Thermal Monitoring Plan:

- Waste rock storage facility (WRSF)
- Water management facilities including Whale Tail Dike, Mammoth Dike, North-East Dike, WRSF Dike, and the Whale Tail Attenuation Pond
- Whale Tail Pit

The Thermal Monitoring Report provides the instrumentation data and their interpretation. Refer to the Thermal Monitoring Plan for a general descriptions of the different facilities, the anticipated impact of operation of the facilities on the permafrost and the general guidelines that are used to define instrumentation needs for each facility.

## **2 AVAILABLE DATA**

---

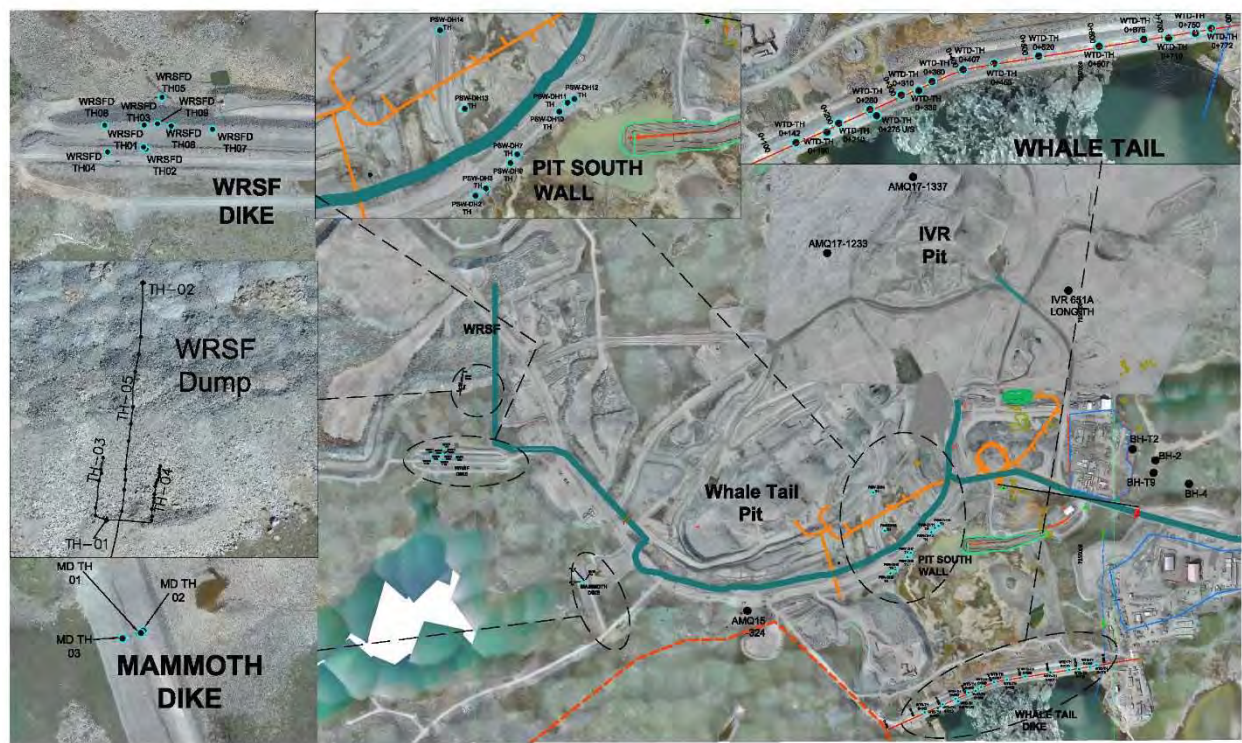
There are currently 45 active thermistors at the Whale Tail Site project area.

The location and installation summary of the 45 active thermistors within the Project site are presented in the table in Appendix A. Figure 1 shows locations of active and inactive thermistors. Data are collected from the thermistors by data loggers or using manual readout units.

Results of active thermistors are presented in Appendix A.



Figure 1. Location of Thermistors



### **3 THERMAL MONITORING RESULT**

---

This section presents a summary expected thermal effect as well as interpretation of the instrumentation data gathered for the reporting period.

#### **3.1 WASTE ROCK STORAGE FACILITY**

##### **3.1.1 Expected Thermal Effects on Permafrost**

Construction of the WRSF on the permafrost is expected to result in aggradation of permafrost into the pile. The permafrost under the pile would remain, but temperatures in the upper permafrost zone are expected to increase gradually until a thermal equilibrium is established with the active zone and zero-amplitude zone moving upward and being located within the waste rock pile. Convective cooling conditions often occur in waste piles and would potentially offset some of the temperature increase in the permafrost.

The waste rock pile itself is expected to freeze back with time and have an active layer formed on the upper portion (Okane 2019b). Climate change in the long-term is expected to extend the depth of the active layer in the pile, but the thick waste rock pile will constitute a protection to the underlying permafrost. If heat generation occurs associated with the oxidation of sulphide-bearing minerals within the pile, the process of freeze-back would be delayed and, depending on the location of the heat generation source, the upper portion of the permafrost foundation could be impacted.

##### **3.1.2 Thermal Monitoring Results**

For the thermistor installed in the foundation of the WT WRSF, the instrumentation data is showing thermal behaviour along the expected trend (no permafrost degradation)

The instruments installed at mid-elevation in the PAG of the first bench are now covered in waste rock. 65 % of beads on the horizontal instruments are still operational and due to the redundancy of the installation it is still possible to have a complete horizontal profile for most of the length. The data show that the PAG material is all in permafrost.

#### **3.2 WATER MANAGEMENT FACILITIES**

##### **3.2.1 Expected Thermal Effects on Permafrost**

The Whale Tail Dike is constructed within the lake where talik is anticipated to exist, therefore there will be no direct negative impact on the permafrost zone underneath the talik. The construction of the Whale Tail Dike is expected to have a cooling effect on the lake ground underneath the dike due to exposure to lower dike temperature than lake water. Minimal effects to the permafrost at the abutment areas are expected.

Following lake dewatering and beginning of operations, areas downstream of the Whale Tail Dike are expected to freeze back progressively, and the upstream area of the dike is expected to remain unfrozen.

After the dike is breached in the final stages of closure, the Whale Tail Lake will be restored, causing frozen zones located downstream of the dike to thaw and progressively restoring the original lake talik.

The other dewatering dike areas are expected to have similar thermal impacts on the permafrost associated with construction, operation and closure of the dikes.

The WRSF Dike will periodically contain a pond formed from water flowing out of the waste rock facility. Depending on pond depth and operational conditions there would be impact with possible thawing of a shallow upper permafrost zone underlying the pond. However, due to the operational pond level that is normally maintained low to reduce the hydraulic gradient, this issue is unlikely.

The talik zone under the Attenuation Pond would remain, but depth of the talik could be reduced as the Attenuation Pond will likely be shallower than the existing lake at that location. The surrounding areas to the pond would freeze back progressively after dewatering but would restore to talik condition after breaching of the dewatering dikes and flooding of the area.

### **3.2.2 Thermal Monitoring Results**

#### **Mammoth Dike**

The instrumentation data are showing thermal behaviour along the expected trend at Mammoth Dike with an active layer contained in the rockfill shell and the foundation and key trench are in permafrost condition.

#### **WRSF Dike**

A degradation of the thermal condition in the keytrench of WRSF Dike was observed in the summer of 2019 leading to seepage. In 2020 the instruments show that the foundation and keytrench remained frozen all year long (permafrost aggradation of 2 m) which indicate that the mitigation measure implemented in 2020 were successful.

#### **Whale Tail Dike**

The trend of permafrost degradation at the abutment continued in 2020 and was observed at the Western abutment (0+142) and at the Eastern abutment up to Sta 0+750. A rapid warmup in the wall and foundation also was noted at 0+675 but is not related to local seepage through the wall. This permafrost degradation at the abutment has not resulted in a seepage increase for the moment.

The thermistors show that limited freezeback is happening in deep bedrock in some areas (0+260, 0+407, 0+520).

#### **IVR Dike D-1 area (not yet constructed)**

The thermistors installed in the projected footprint of IVR Dike D-1 (to be constructed in 2021) show that the active layer in this area is about 2 m thick, located within the overburden, while the bedrock is in permafrost.

## **3.3 OPEN PIT**

### **3.3.1 Expected Effects on Permafrost**

Whale Tail pit will be excavated through an upper closed talik zone and underlying permafrost. During operations of the pit the talik zone is expected to freeze back progressively and the lower permafrost zone surrounding the pit walls will, in general, experience reduction in temperature

other than at a shallow active zone adjacent to the pit walls subjected to seasonal thawing during summer.

Upon closure and subsequent flooding of the WT pit, permafrost areas underneath the pit lake are expected to gradually thaw. Thermal assessments have indicated this process would take hundreds of years (Golder 2018a). The pit lake would eventually reduce the permafrost depth in the pit surrounding ground, but this process could take significantly longer time (in the order of 10,000 years) to complete.

IVR Pit is excavated through permafrost and as a result the mining activity are not expected to impact the thermal regime of that area.

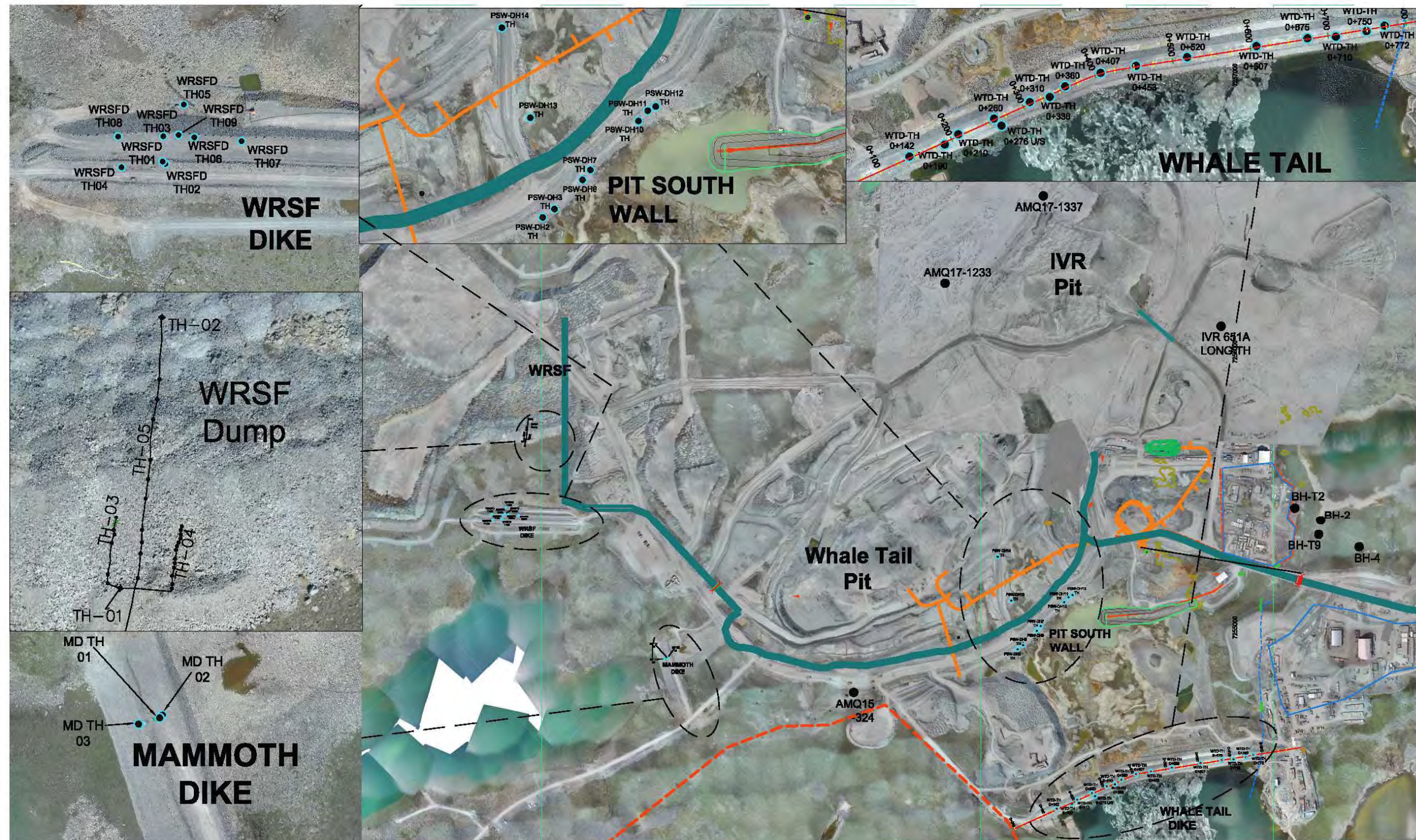
### **3.3.2 Thermal Monitoring Results**

Thermistors have been installed in 2020 in the talik zone near the south wall of the WT Pit. As there is less than a year of data available there is not enough data to draw conclusion for the moment.

The previous thermistors installed in the IVR area are no longer functioning due to mining activity in the sector but were showing permafrost until they stopped working. A deep thermistor has been installed in 2020 in that area (IVR long TH) and shows permafrost conditions down to 500 m below ground surface, to El. 9600 m (mining datum).

## **APPENDIX A – THERMAL MONITORING DATA**





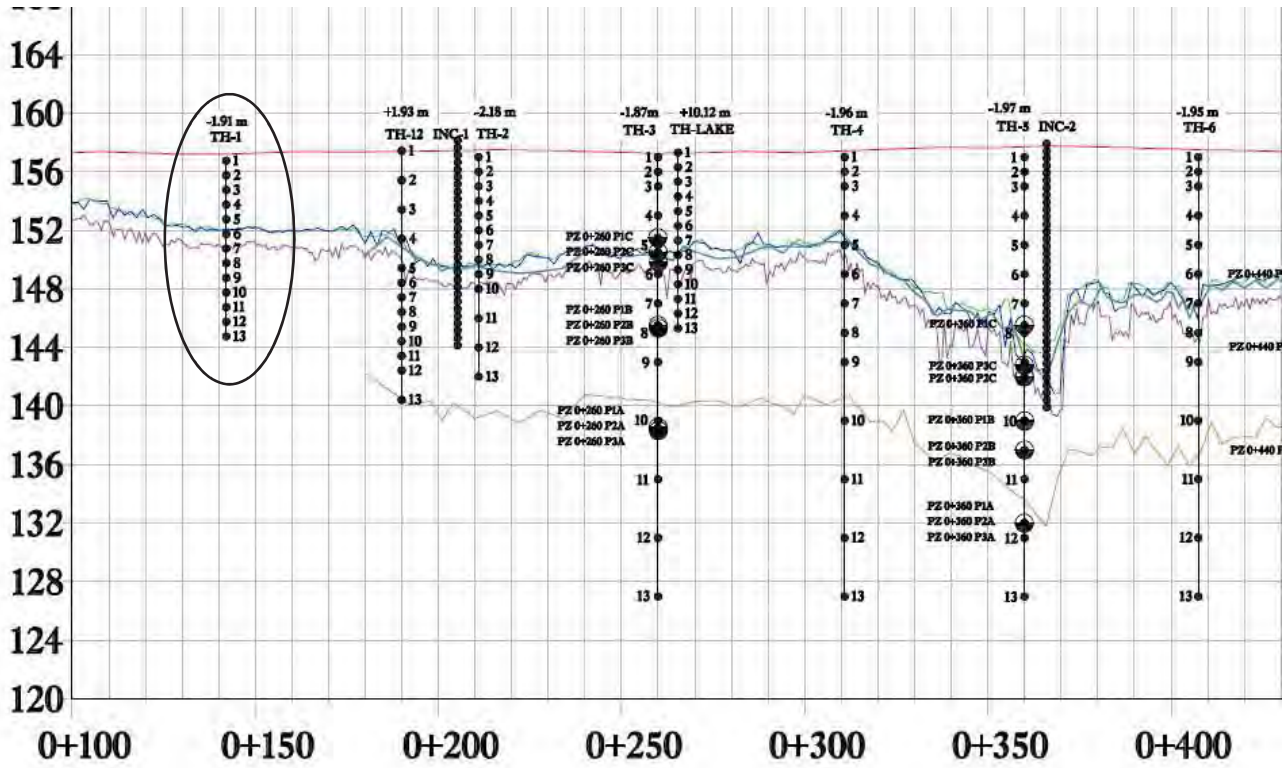
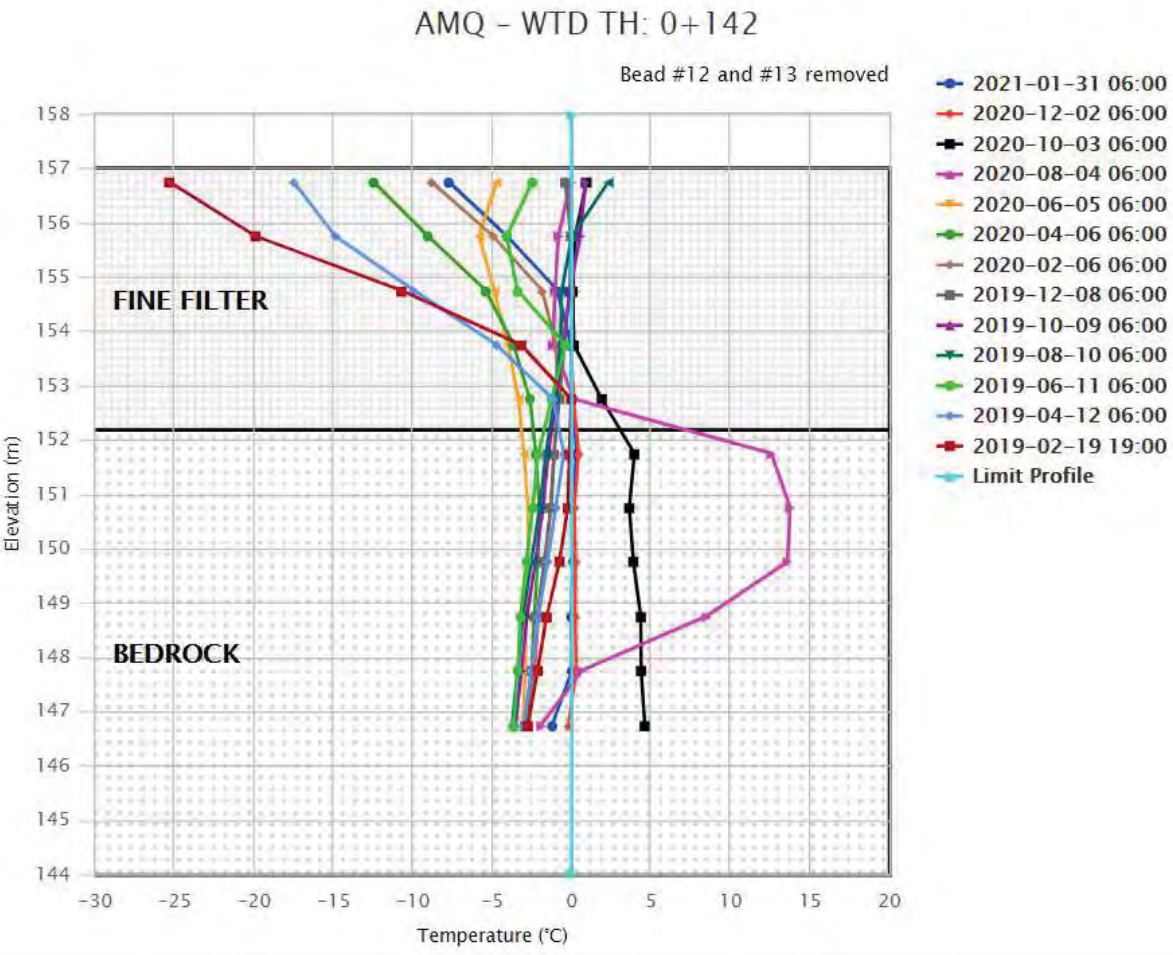
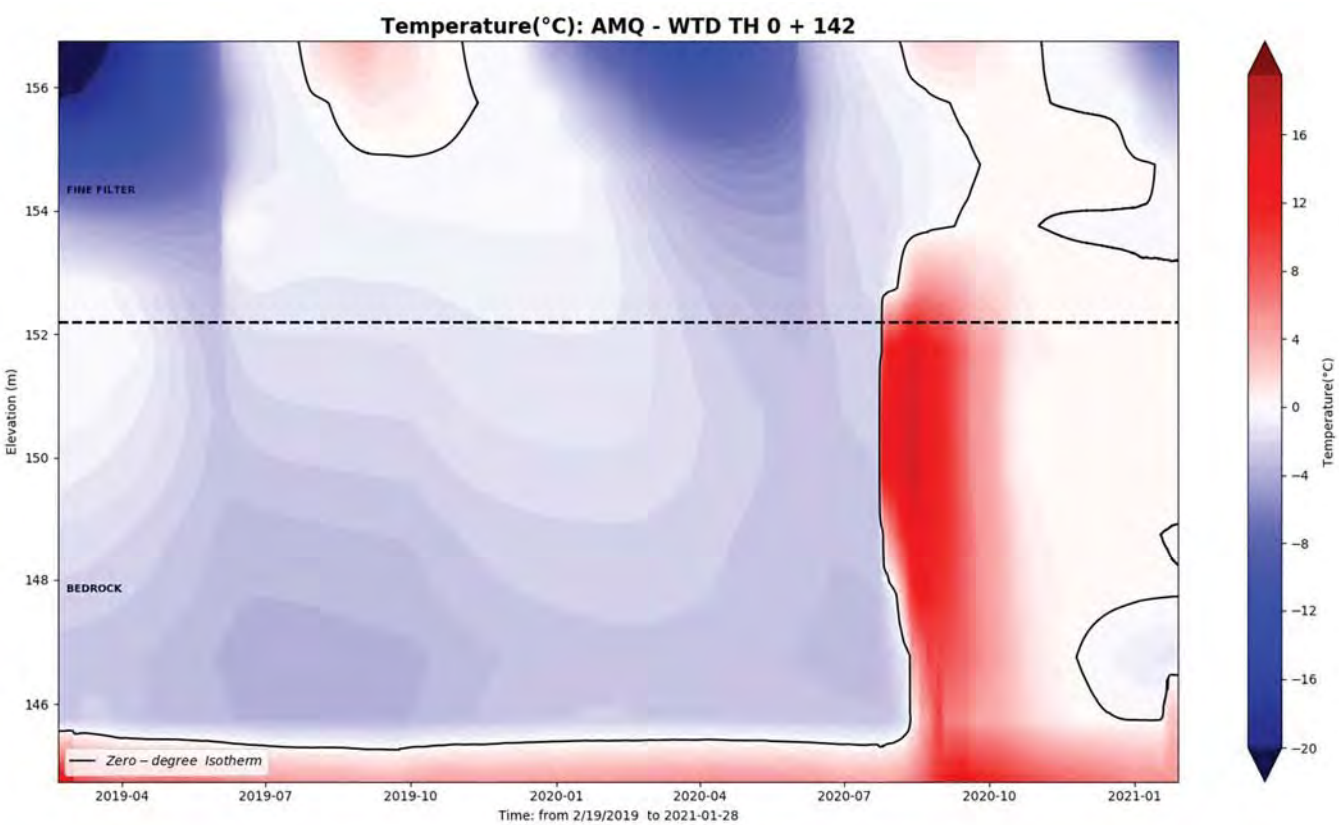


<i>Name</i>	<i>Area</i>	<i>Easting (X)</i>	<i>Northing (Y)</i>	<i>Elevation (Z)</i>	<i>Azimuth</i>	<i>Dip</i>	<i>Installed</i>	<i>Active (Y) or (N)</i>
AMQ15-324	WTP	606496.80	7254995.20	161.79	323.41	-55.46	2015	N
AMQ17-1233	IVR	606778.00	7256254.00	162.00	252.71	-59.06	2017	N
WTD 0+142	WTD	607119.94	7254637.98	156.75		-90	2018	Y
WTD 0+190 U/S	WTD	607165.34	7254653.83	157.42		-90	2018	Y
WTD 0+210	WTD	607182.85	7254666.19	157		-90	2018	Y
WTD 0+260	WTD	607227.51	7254686.28	157		-90	2018	Y
WTD 0+276 U/S	WTD	607237.2	7254677.3	157		-90	2018	Y
WTD 0+310	WTD	607237.98	7254707.09	157		-90	2018	Y
WTD 0+336 U/S	WTD	607298.44	7254713.45	157		-90	2018	Y
WTD 0+360	WTD	607318.81	7254727.15	157		-90	2018	Y
WTD 0+407	WTD	607363.08	7254744.86	157		-90	2018	Y
WTD 0+453	WTD	607408.60	7254753.72	157		-90	2018	Y
WTD 0+520	WTD	607473.78	7254764.22	157		-90	2018	Y
WTD 0+607	WTD	607561.24	7254778.35	157		-90	2018	Y
WTD 0+675	WTD	607262.31	7254788.86	157		-90	2018	Y
WTD 0+710 U/S	WTD	607662.32	7254790.63	157		-90	2018	Y
WTD 0+750	WTD	607701.81	7254797.04	157		-90	2018	Y
WTD 0+772 U/S	WTD	607724.15	7254804.63	157		-90	2018	Y
WRSF TH01	WRSF	615797.25	7238129.77	161.546		-90	2019	Y
WRSF TH02	WRSF	615861.49	7238133.24	162.053		-90	2019	Y
WRSF TH03	WRSF	615814.31 to 615799.6	7238118.6 to 7238117	162.744 to 162.042		0	2019	Y (13/16 beads)
WRSF TH04	WRSF	615813.38 to 615797.7	7238134.1to 7238132.8	162.138 to 161.619		0	2019	Y (8/16 beads)
WRSF TH05	WRSF	615860.9 to 615800.3	71238133.3 to 7238126	162.202		0	2019	Y (10/16 beads)
MD-TH01	MD	Slope	Slope	-		Slope	2019	Y
MD-TH02	MD	605926.19	7255102.52	154.9		-90	2019	Y
MD-TH03	MD	605926.74	7255102.6	154.9		-90	2019	Y
WRSF TH01	WRSF Dike	Slope	Slope	-		Slope	2019	Y
WRSF TH02	WRSF Dike	605416.44	7255526.7	159.07		-90	2019	Y
WRSF TH03	WRSF Dike	605414.98	7255545.01	155.29		-90	2019	Y
WRSF TH04	WRSF Dike	605387.14	7255524.47	158.15		-90	2019	Y
WRSF TH05	WRSF Dike	605428.59	7255566.21	153.63		-90	2019	Y
WRSF TH06	WRSF Dike	605435.56	7255544.29	155.35		-90	2019	Y
WRSF TH07	WRSF Dike	605466.94	7255541.78	155.13		-90	2019	Y
WRSF TH08	WRSF Dike	605384.991	7255544.818	159.886		-90	2019	Y
WRSF TH09	WRSF Dike	605425.1	7255546.038	160.037		-90	2019	Y
PSW DH2 TH	Pit South Wall	606998.837	7255127.783	149.02		-90	2020	Y

<i>PSW DH3 TH</i>	Pit South Wall	<b>607016.336</b>	<b>7255140.383</b>	<b>148.041</b>		-90	2020	Y
<i>PSW DH6 TH</i>	Pit South Wall	<b>607058.391</b>	<b>7255184.293</b>	<b>148.181</b>		-90	2020	Y
<i>PSW DH7 TH</i>	Pit South Wall	<b>607070.111</b>	<b>7255198.772</b>	<b>148.734</b>		-90	2020	Y
<i>PSW DH10 TH</i>	Pit South Wall	<b>607142.218</b>	<b>7255272.101</b>	<b>150.109</b>		-90	2020	Y
<i>PSW DH11 TH</i>	Pit South Wall	<b>607155.955</b>	<b>7255287.46</b>	<b>151.241</b>		-50	2020	Y
<i>PSW DH12 TH</i>	Pit South Wall	<b>607168.065</b>	<b>7255293.87</b>	<b>151.934</b>		-50	2020	Y
<i>PSW DH13 TH</i>	Pit South Wall	<b>14837.598</b>	<b>6846.924</b>	<b>145.398</b>		-90	2020	Y
<i>PSW DH14 Th</i>	Pit South Wall	<b>14889.046</b>	<b>6978.711</b>	<b>130.761</b>		-90	2020	Y
<i>V651A</i>	IVR	<b>607624.208</b>	<b>7256122.348</b>	<b>10163.28</b>		-69	2019	Y
<i>BH-T2</i>	IVR	<b>607850.8</b>	<b>7255563.9</b>	<b>164.303</b>		-90	2019	N
<i>BH-2</i>	IVR	<b>607930.1</b>	<b>7255525.4</b>	<b>162.159</b>		-90	2019	N
<i>BH-T9</i>	IVR	<b>607923.8</b>	<b>72555480.4</b>	<b>162.084</b>		-90	2019	N
<i>BH-4</i>	IVR	<b>608048</b>	<b>7255442</b>	<b>163.982</b>		-90	2019	N

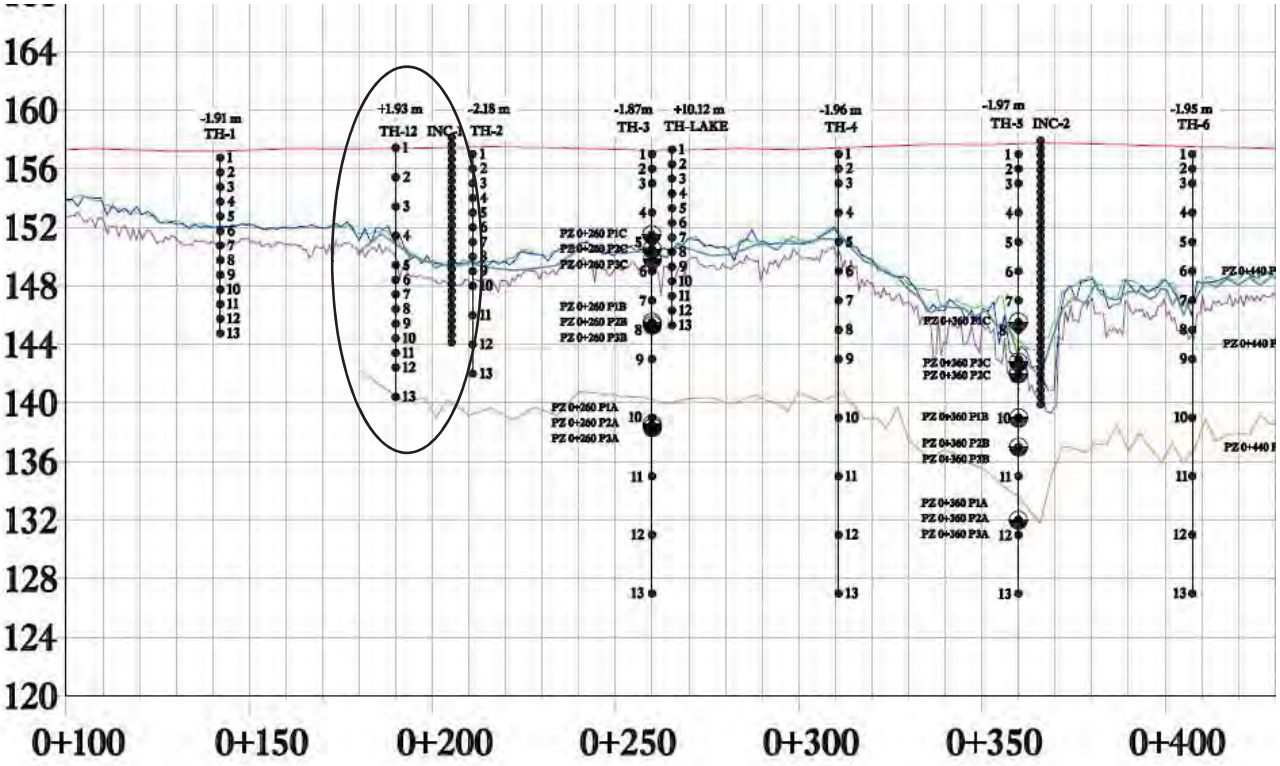
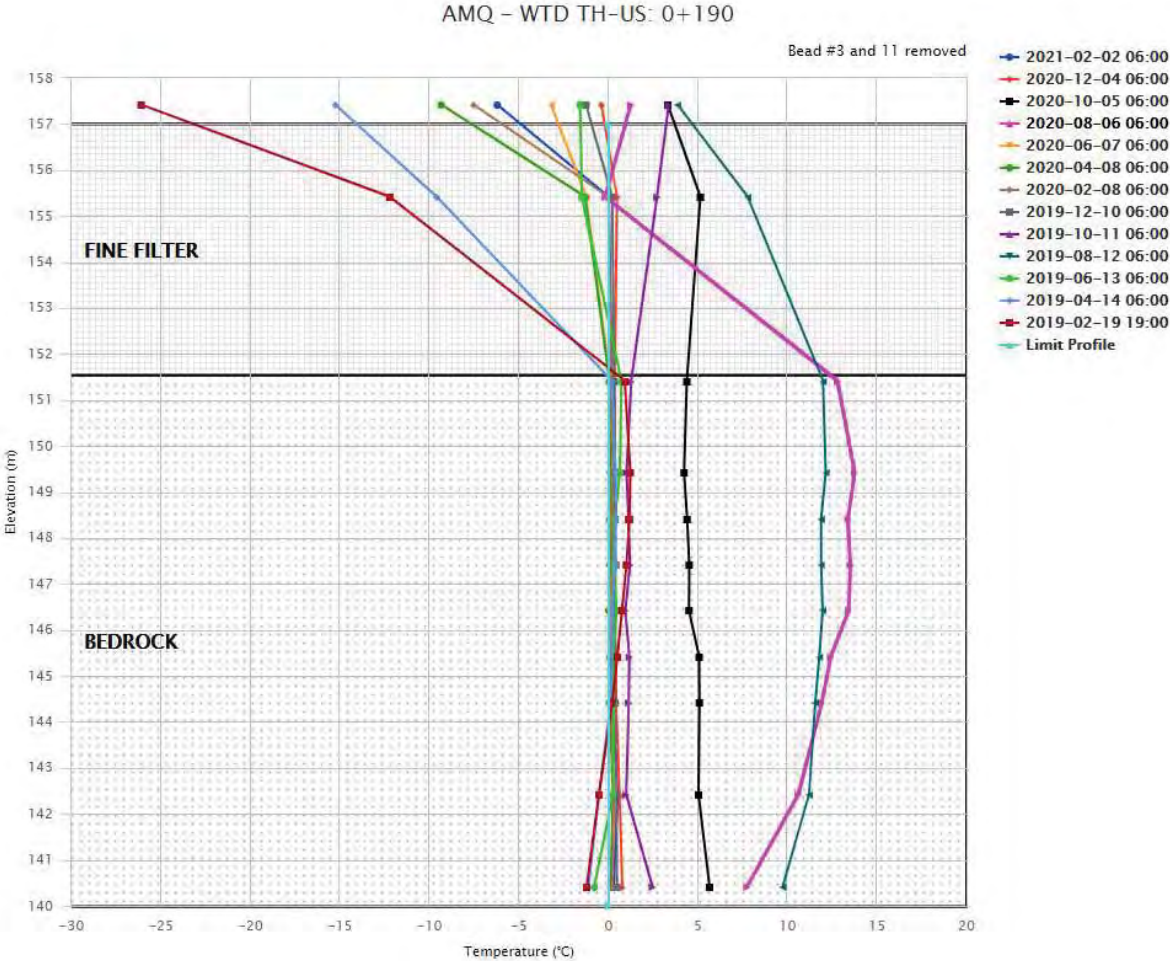
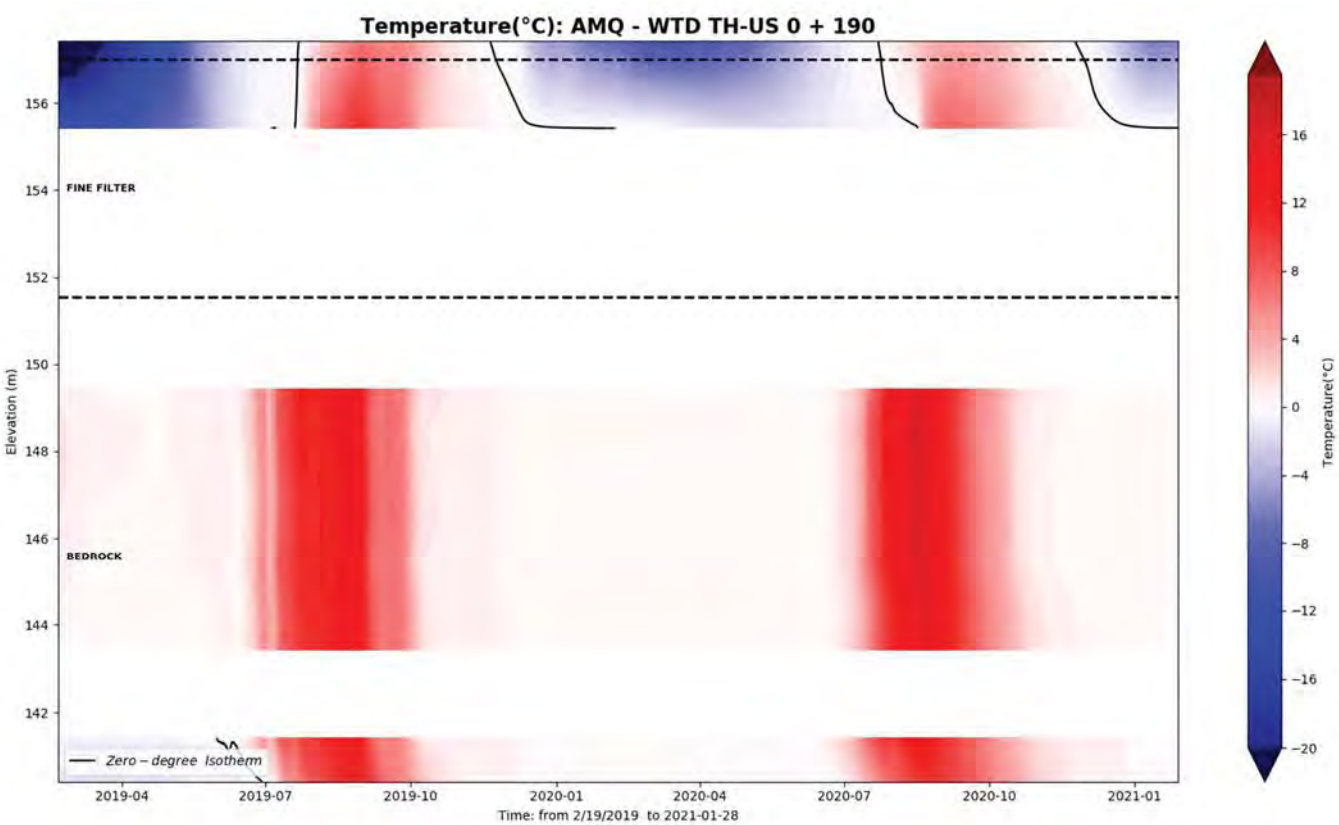


WTD-TH 0+142



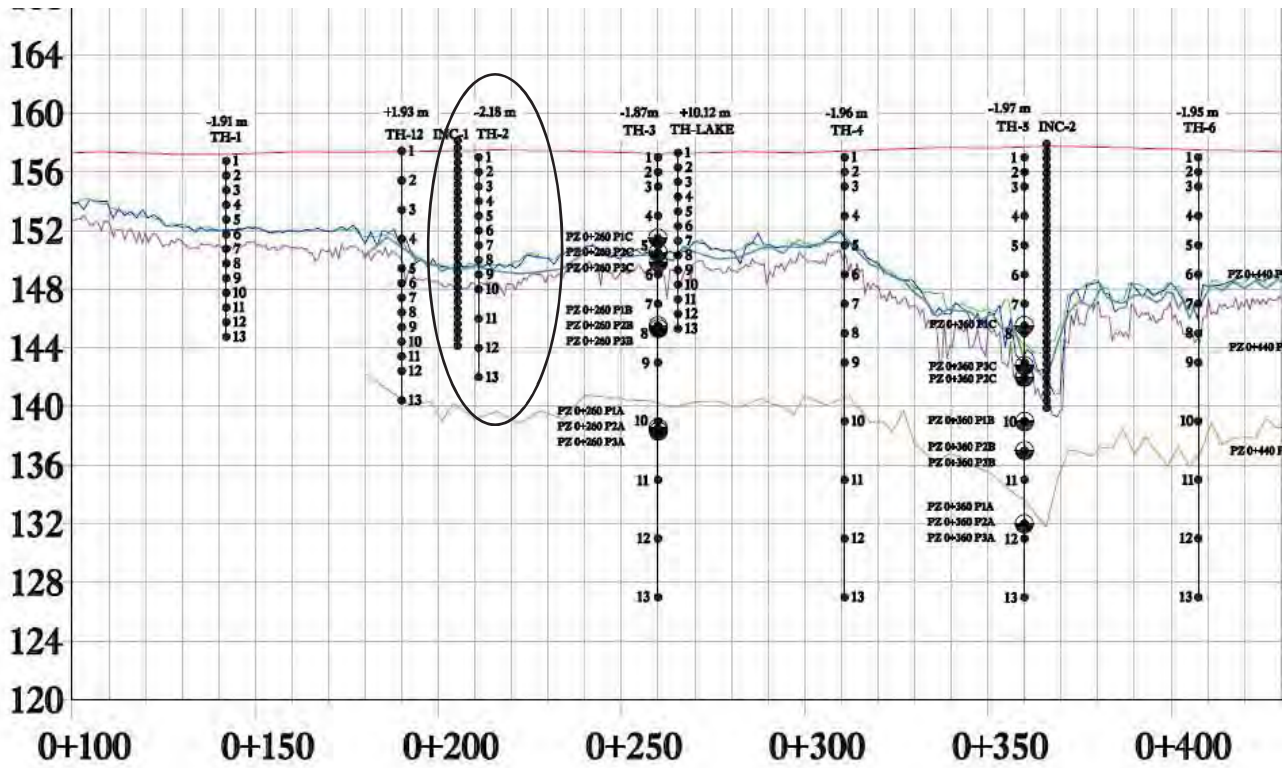
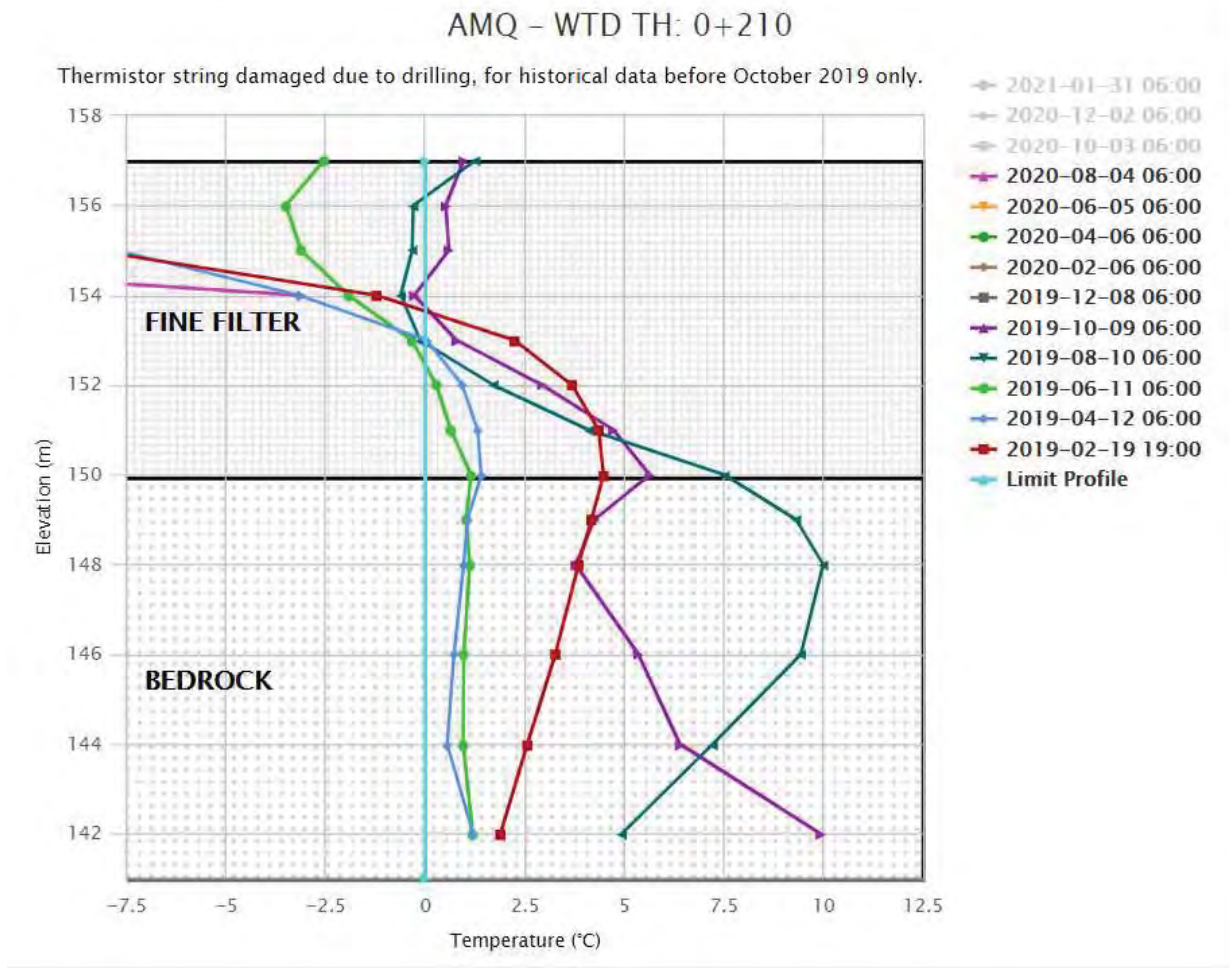
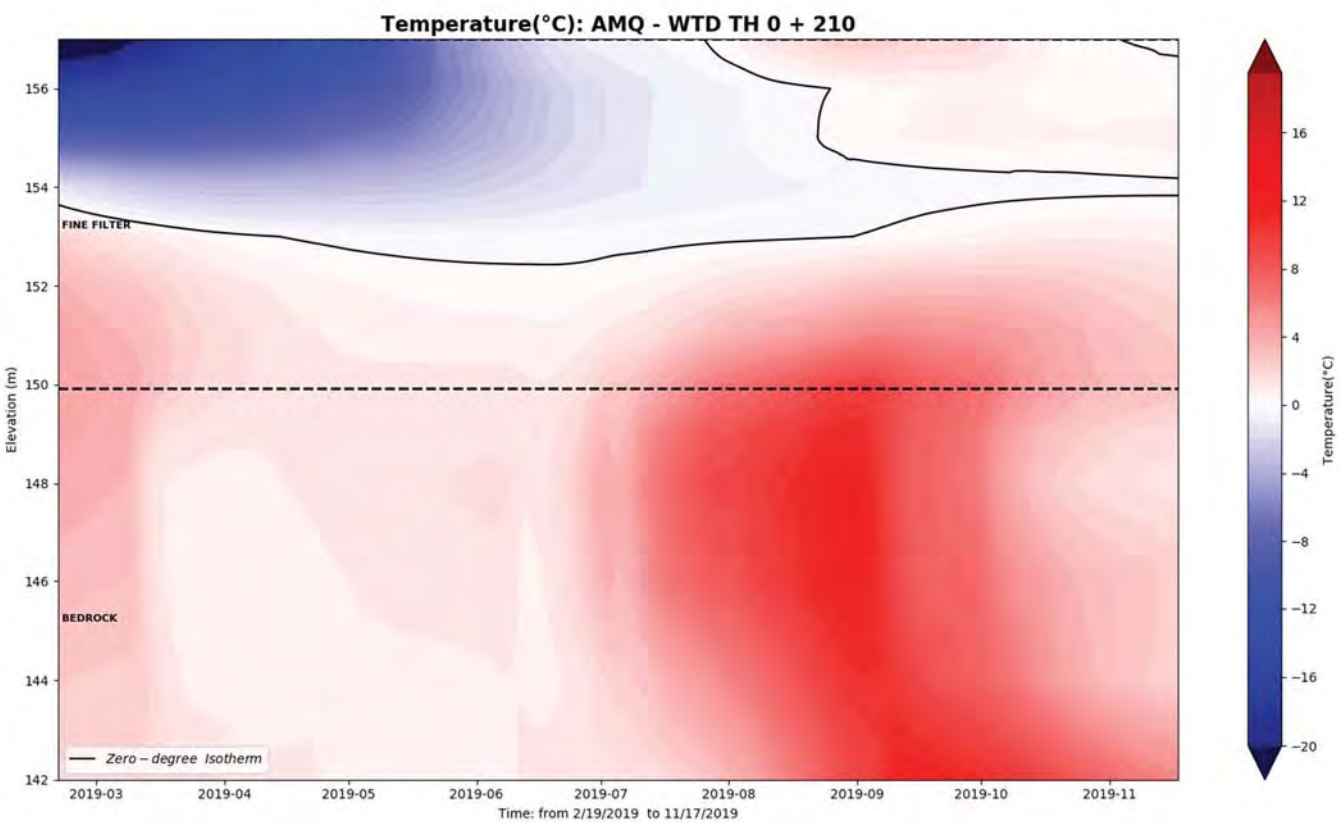


WTD-TH 0+190 U/S



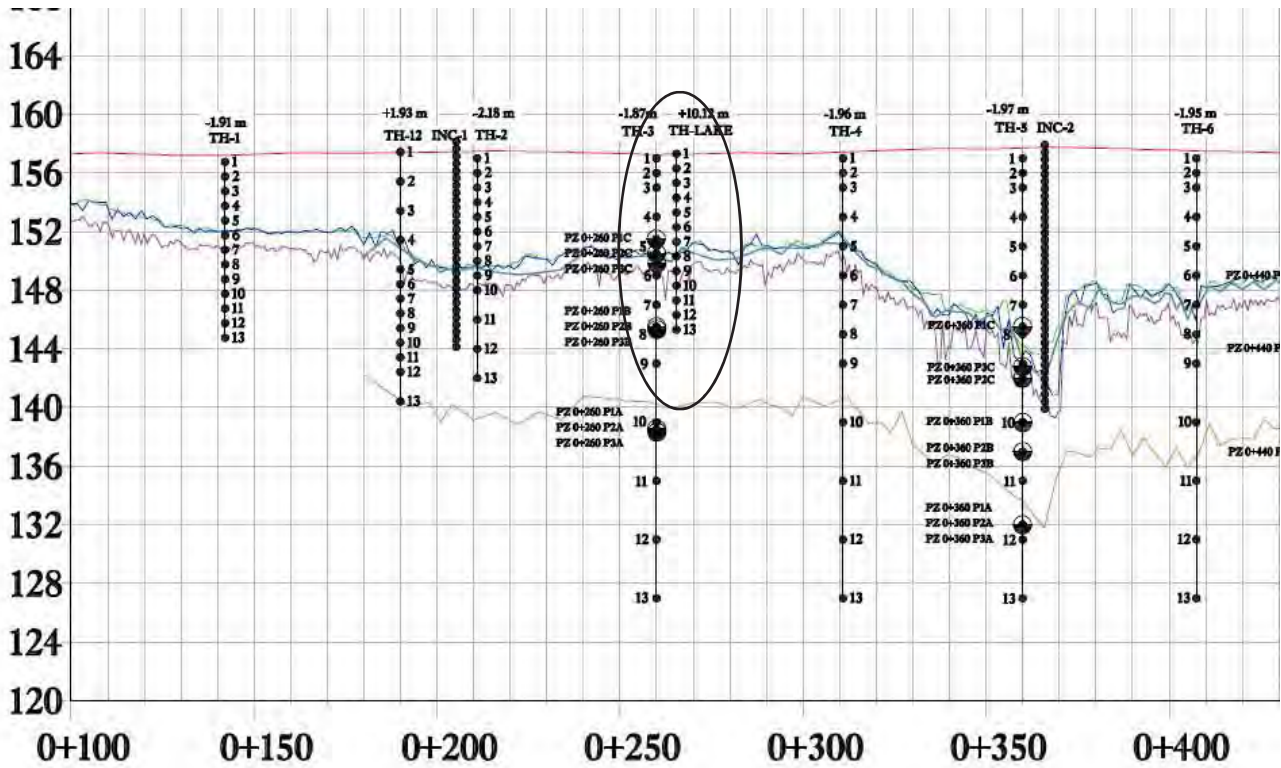
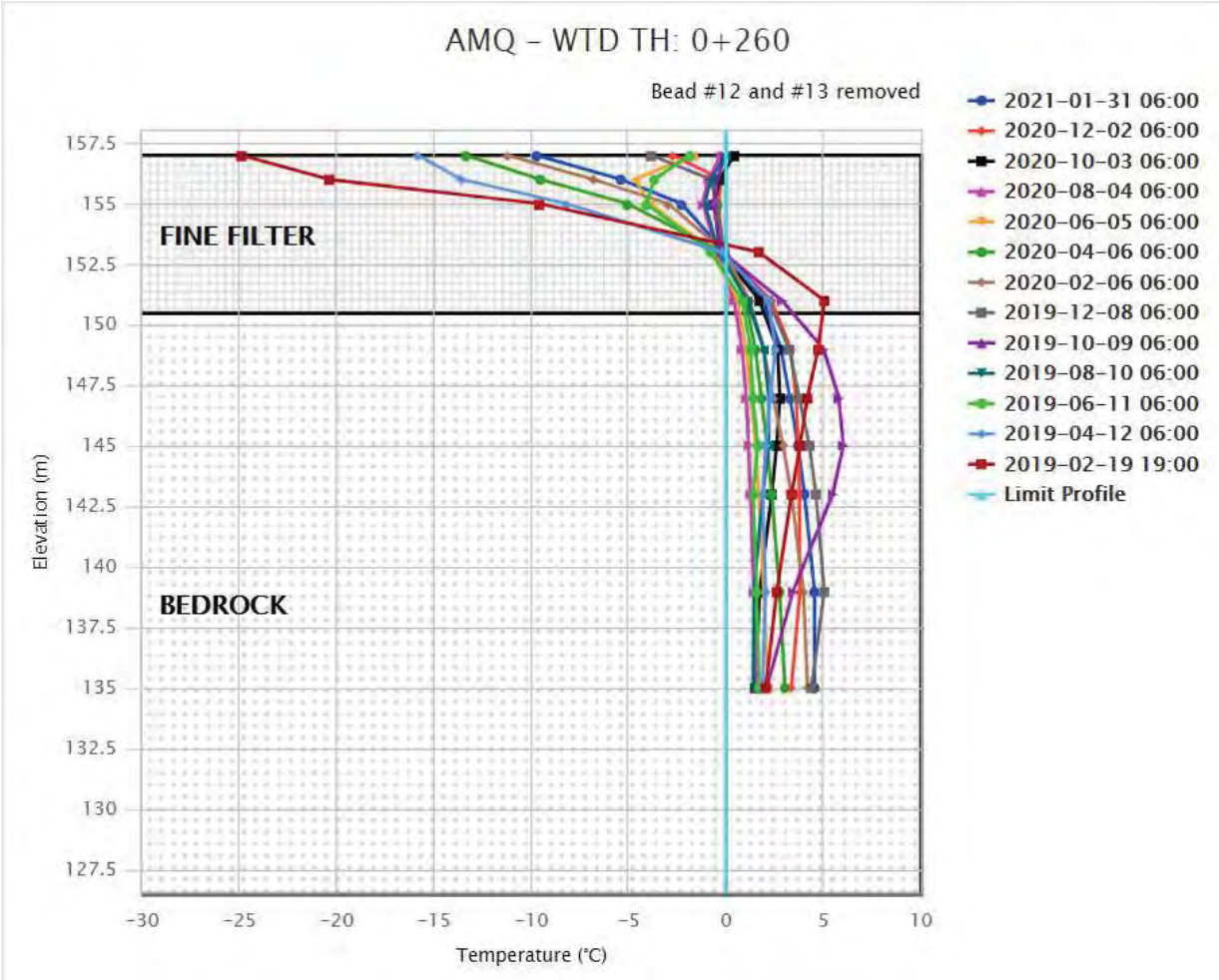
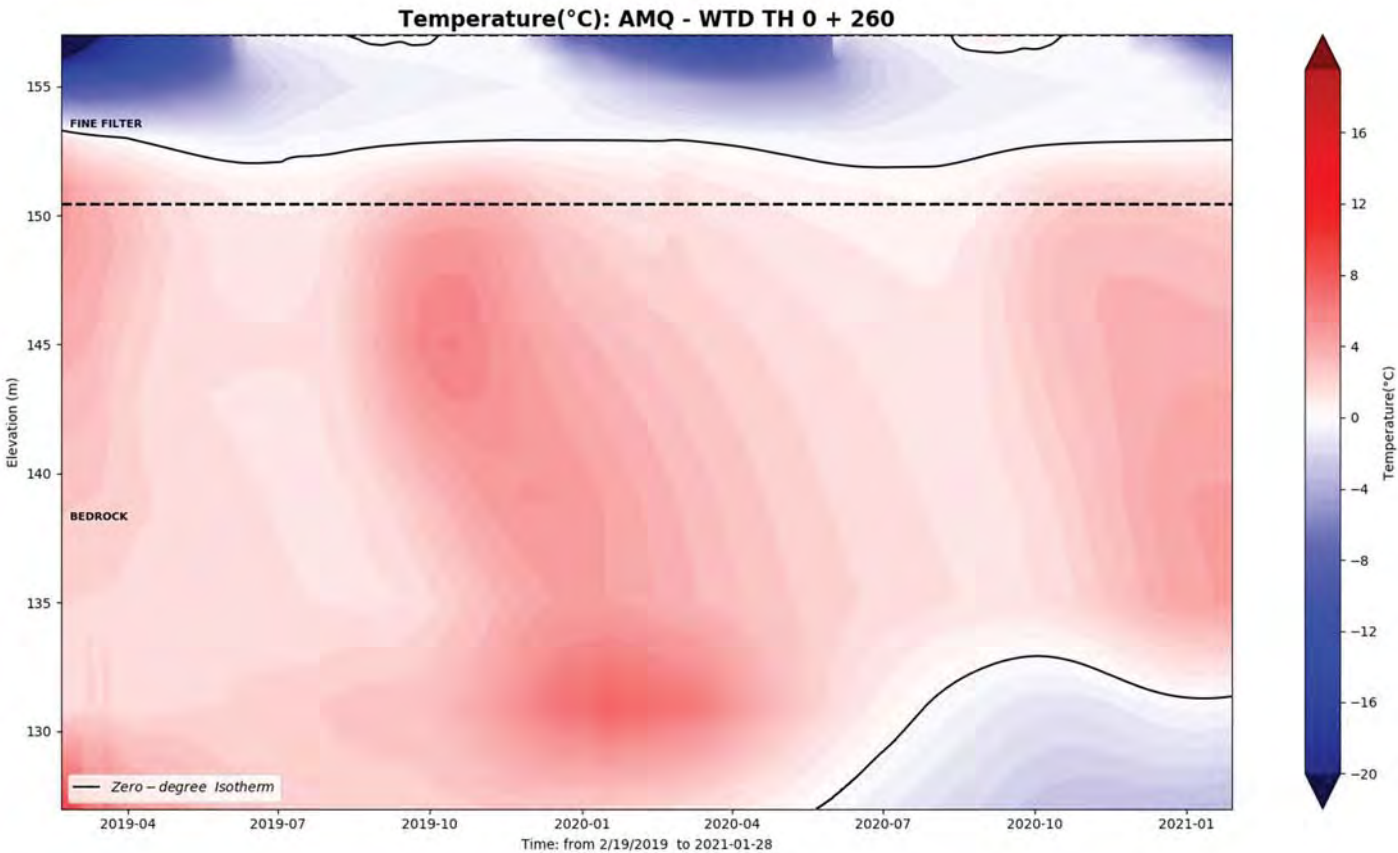


WTD-TH 0+210



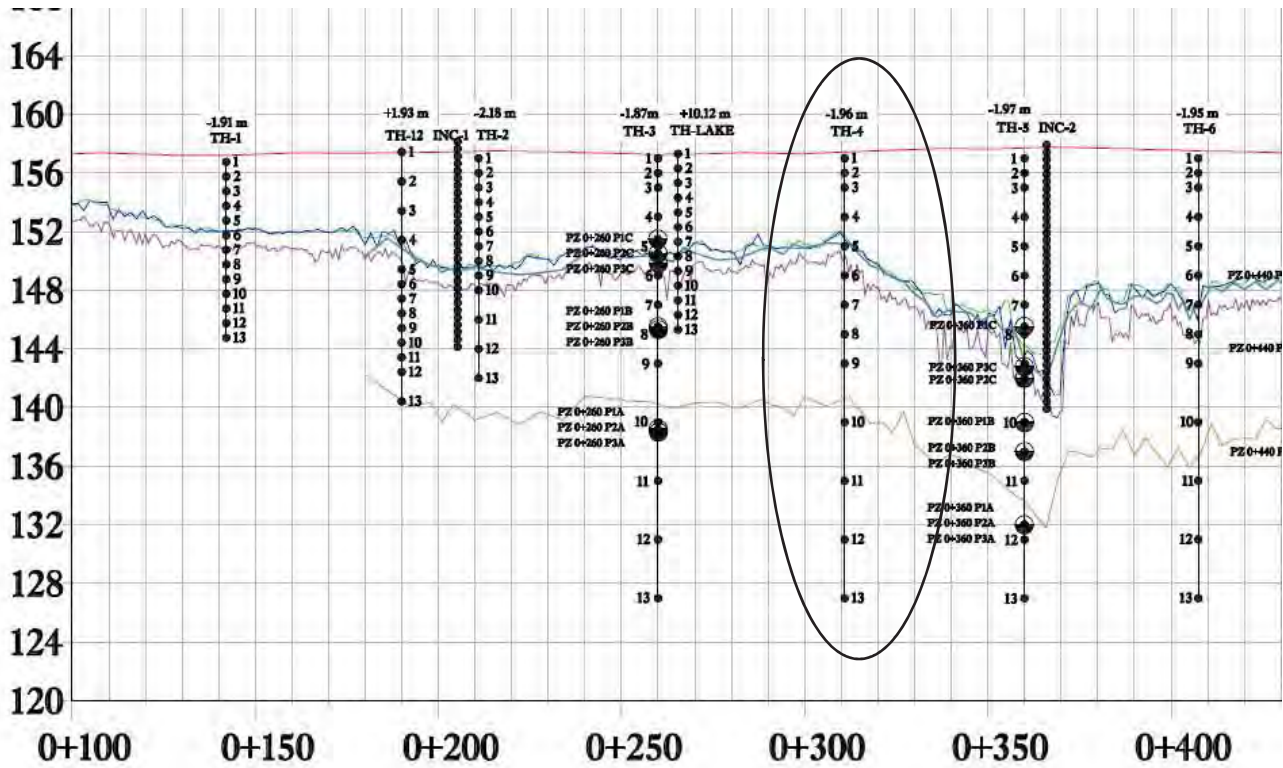
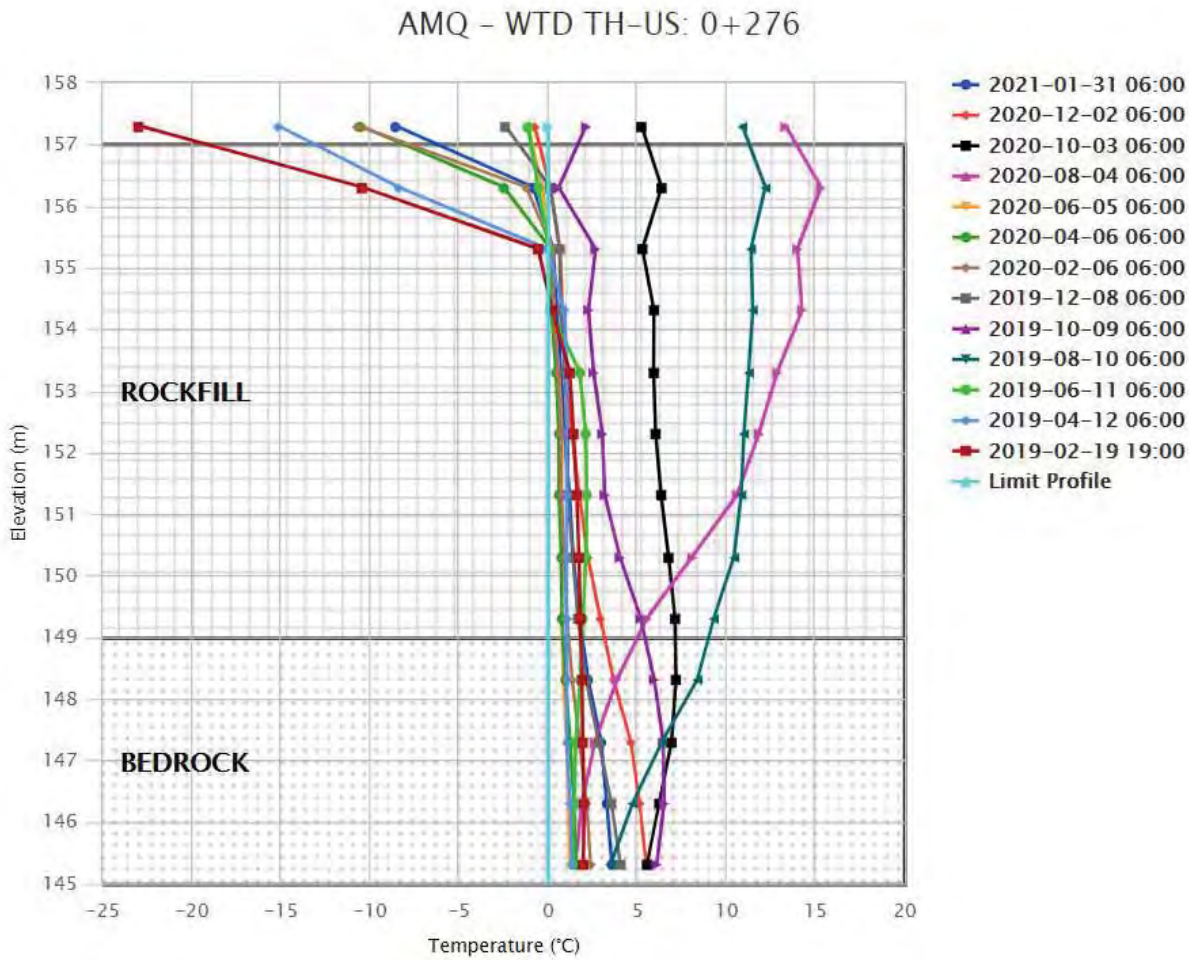
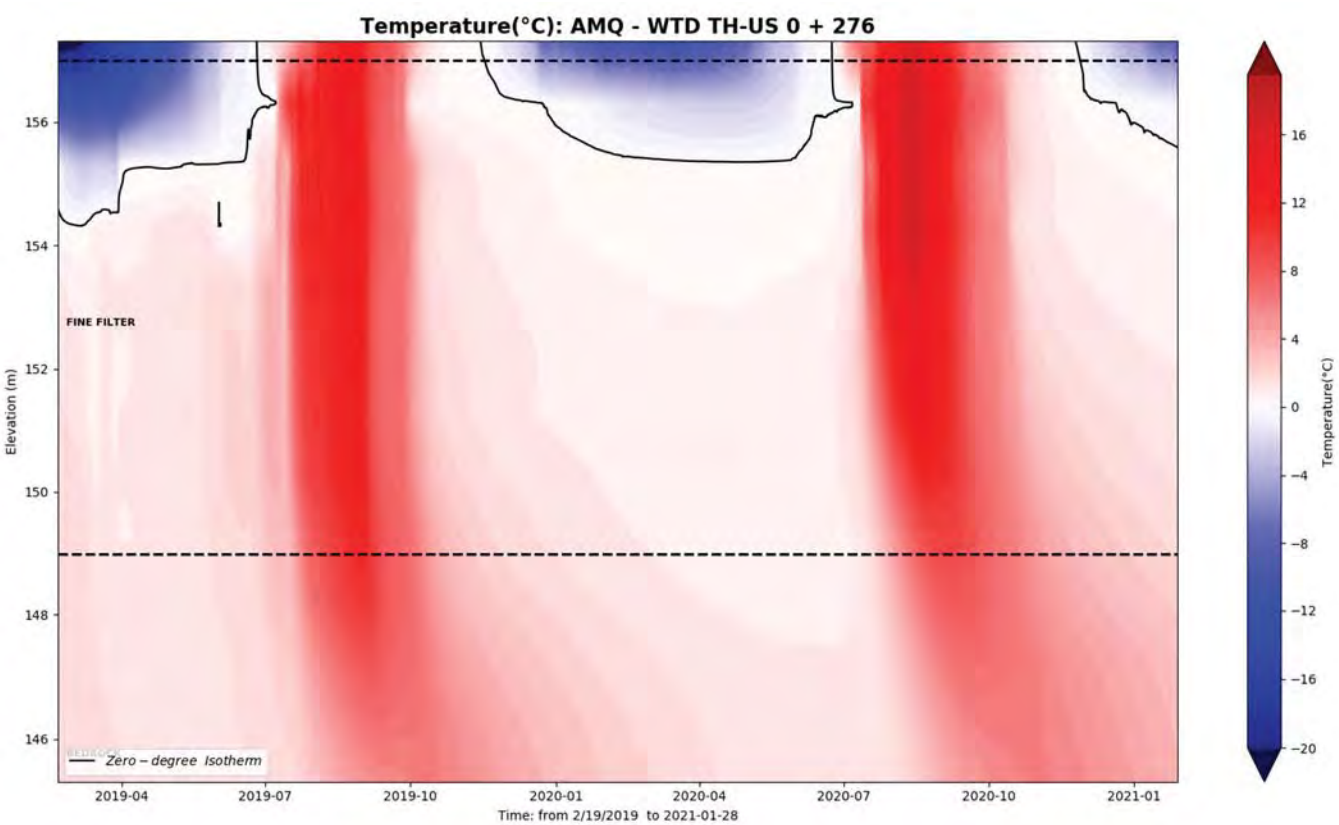
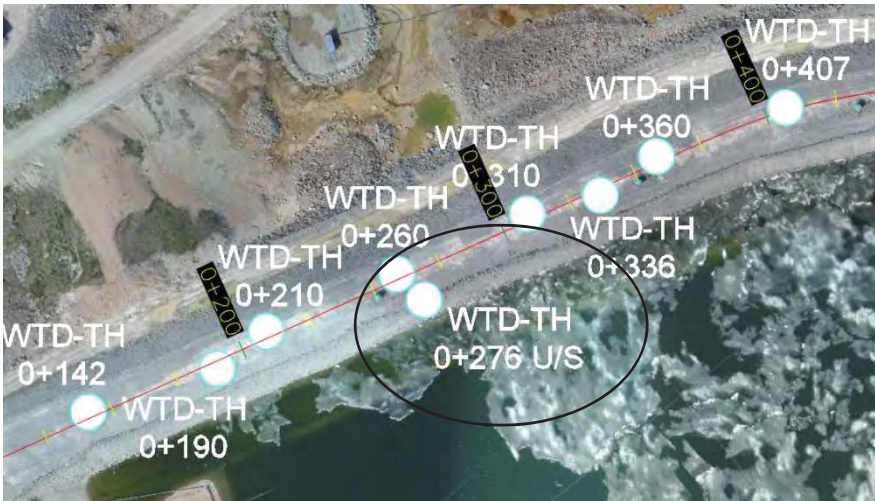


WTD-TH 0+260



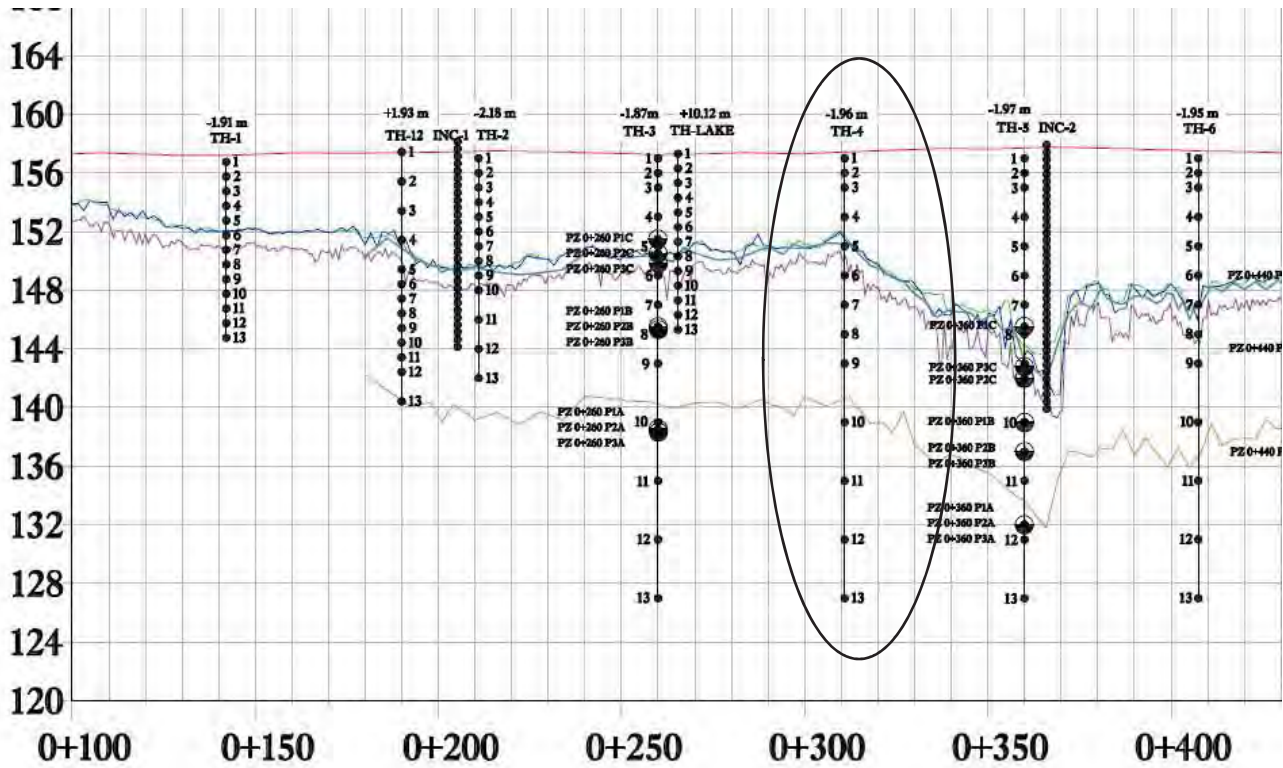
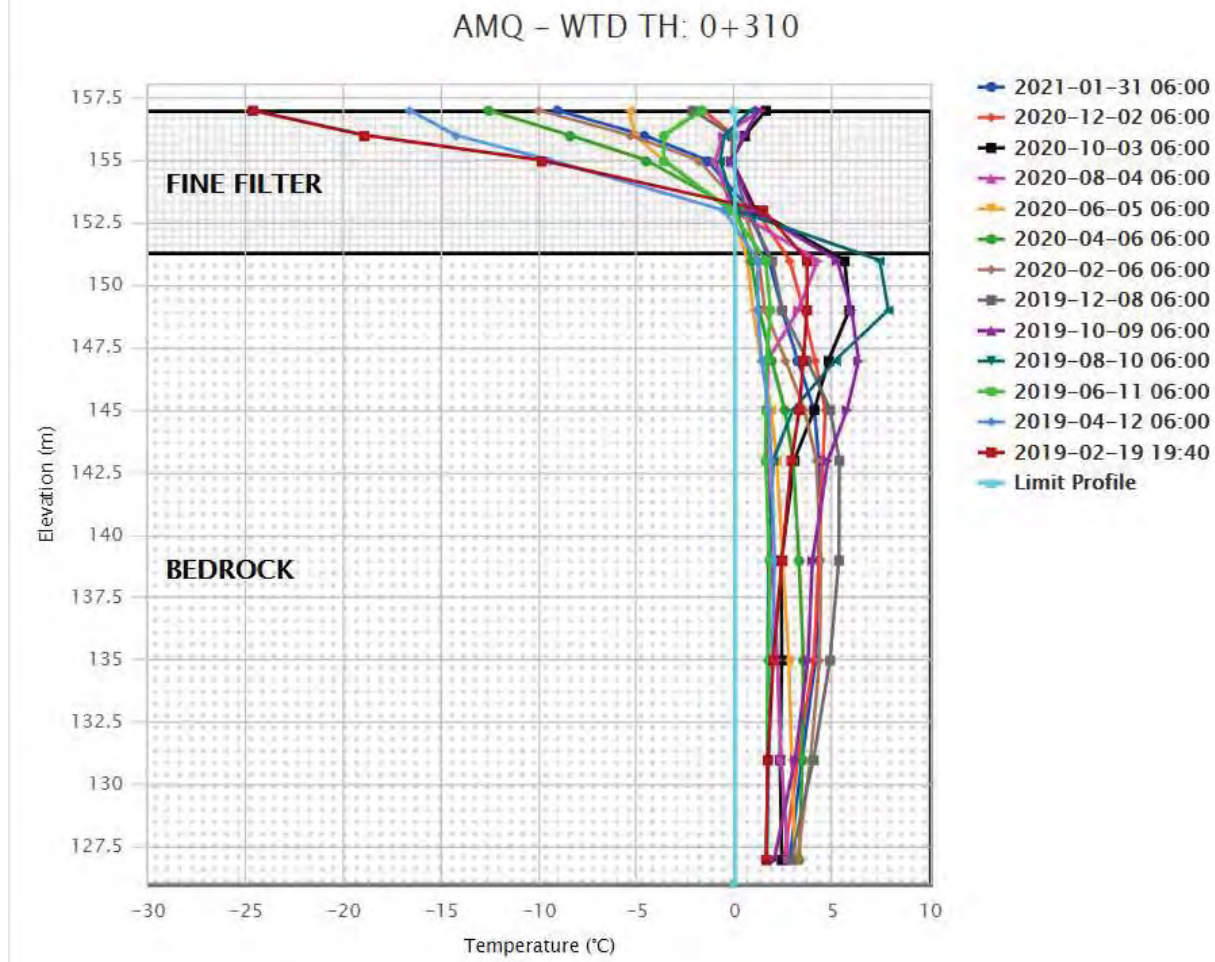
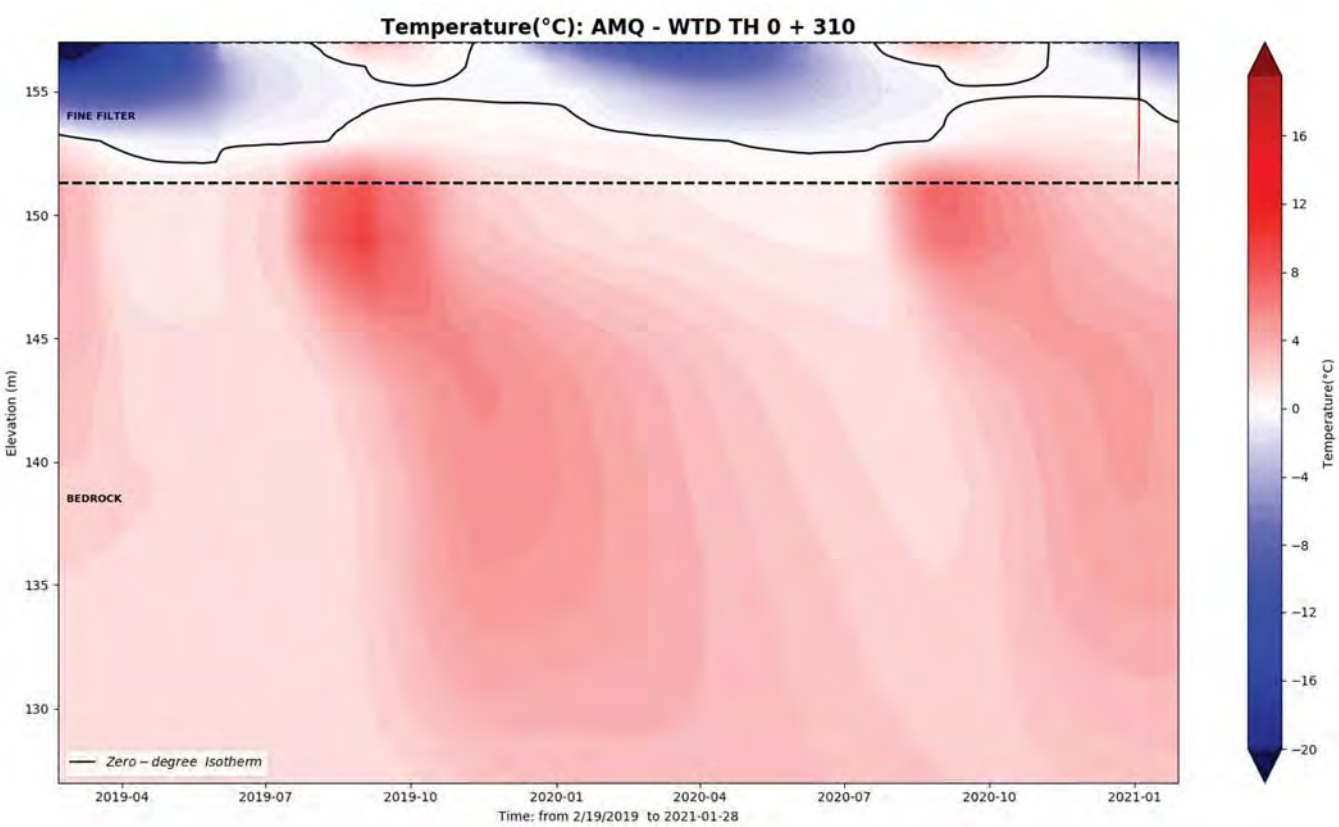


WTD-TH 0+276 U/S



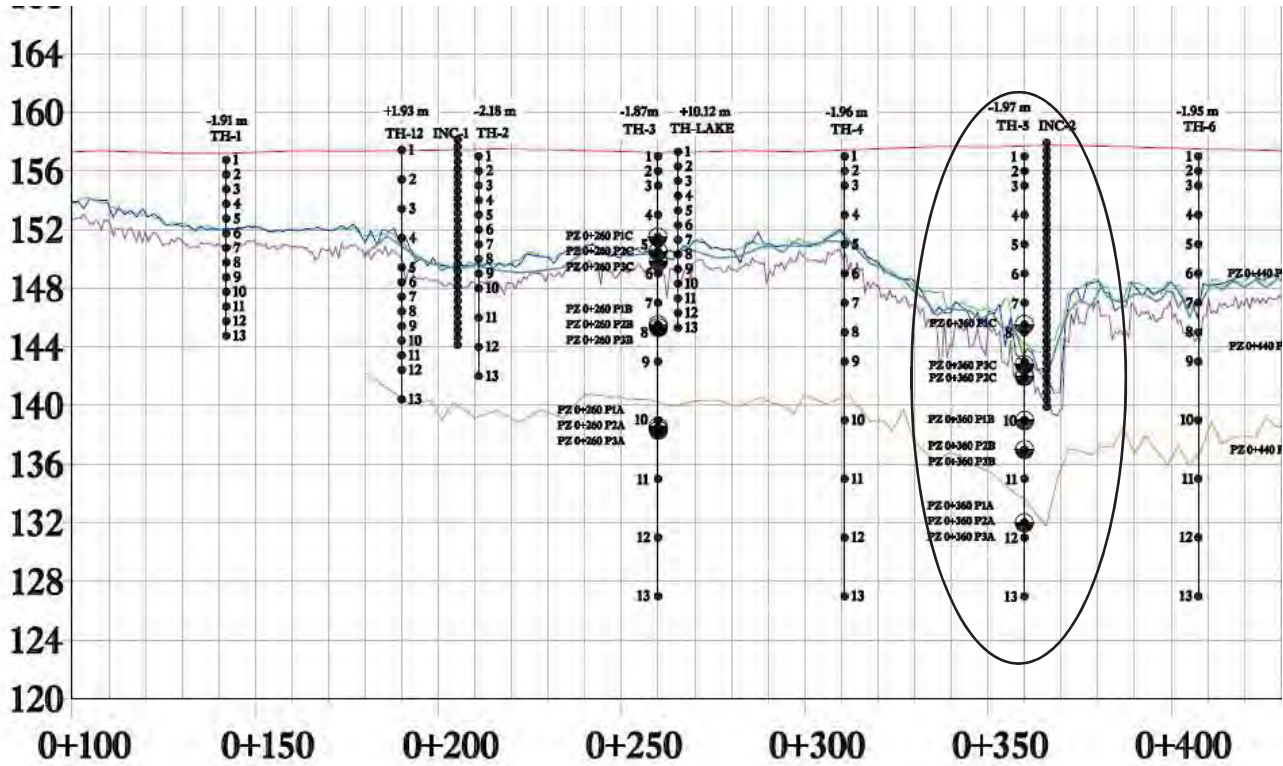
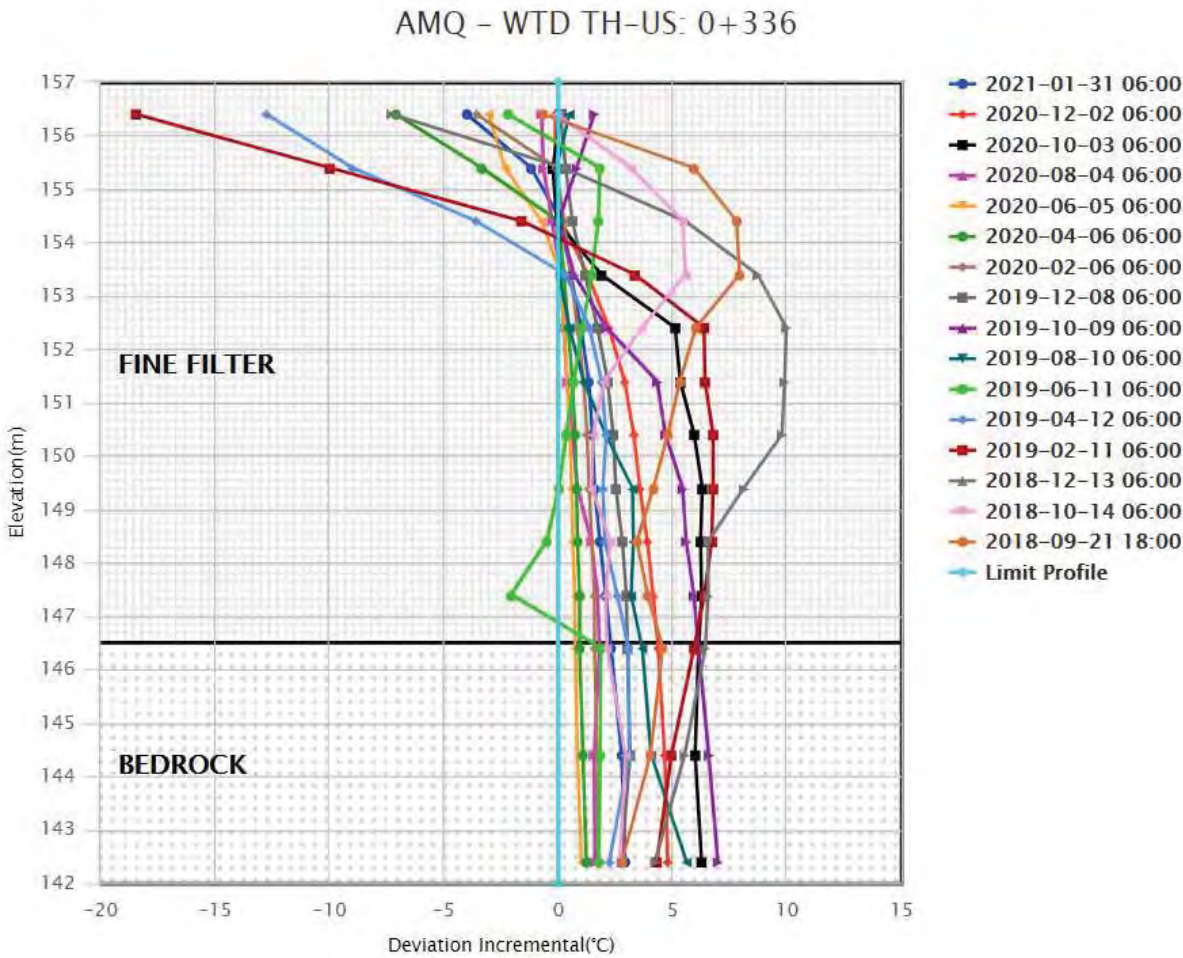
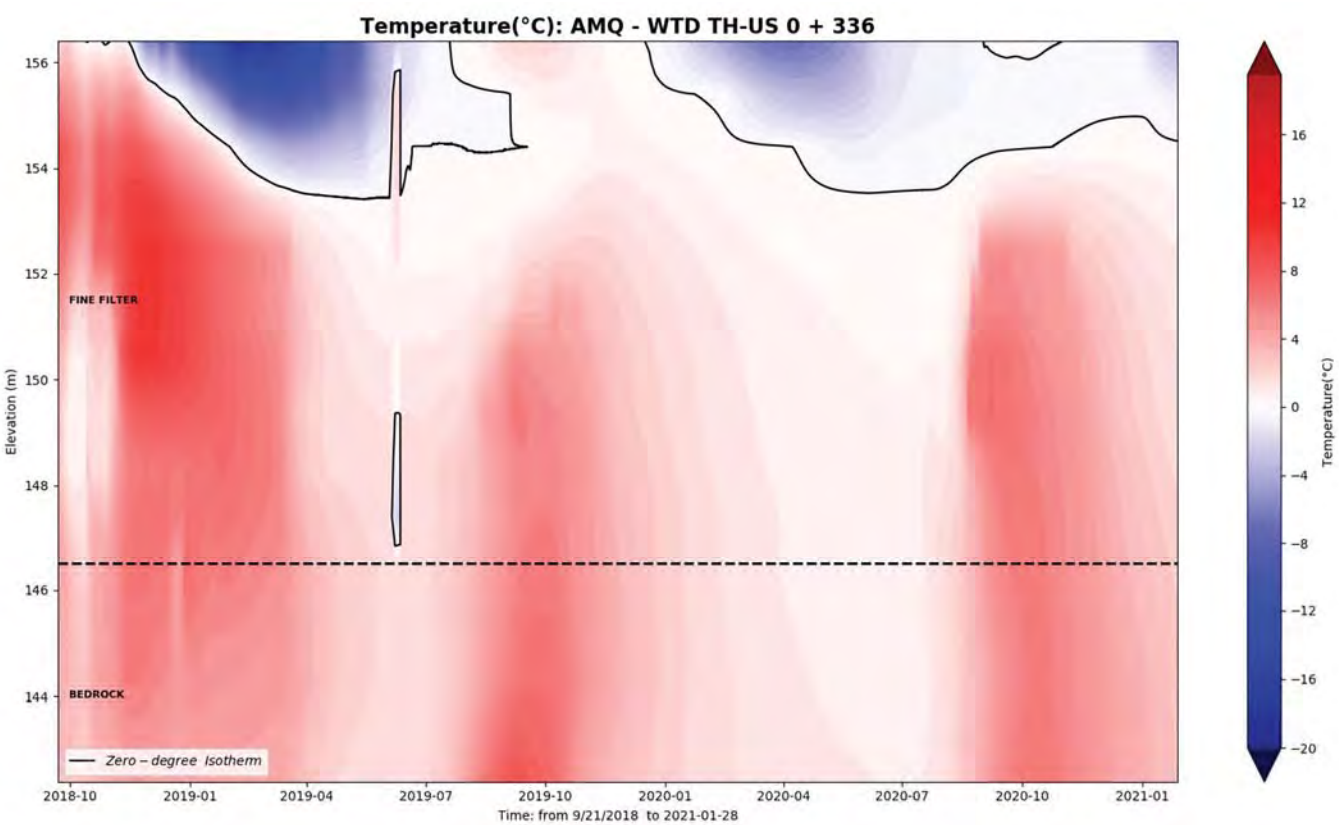


WTD-TH 0+310



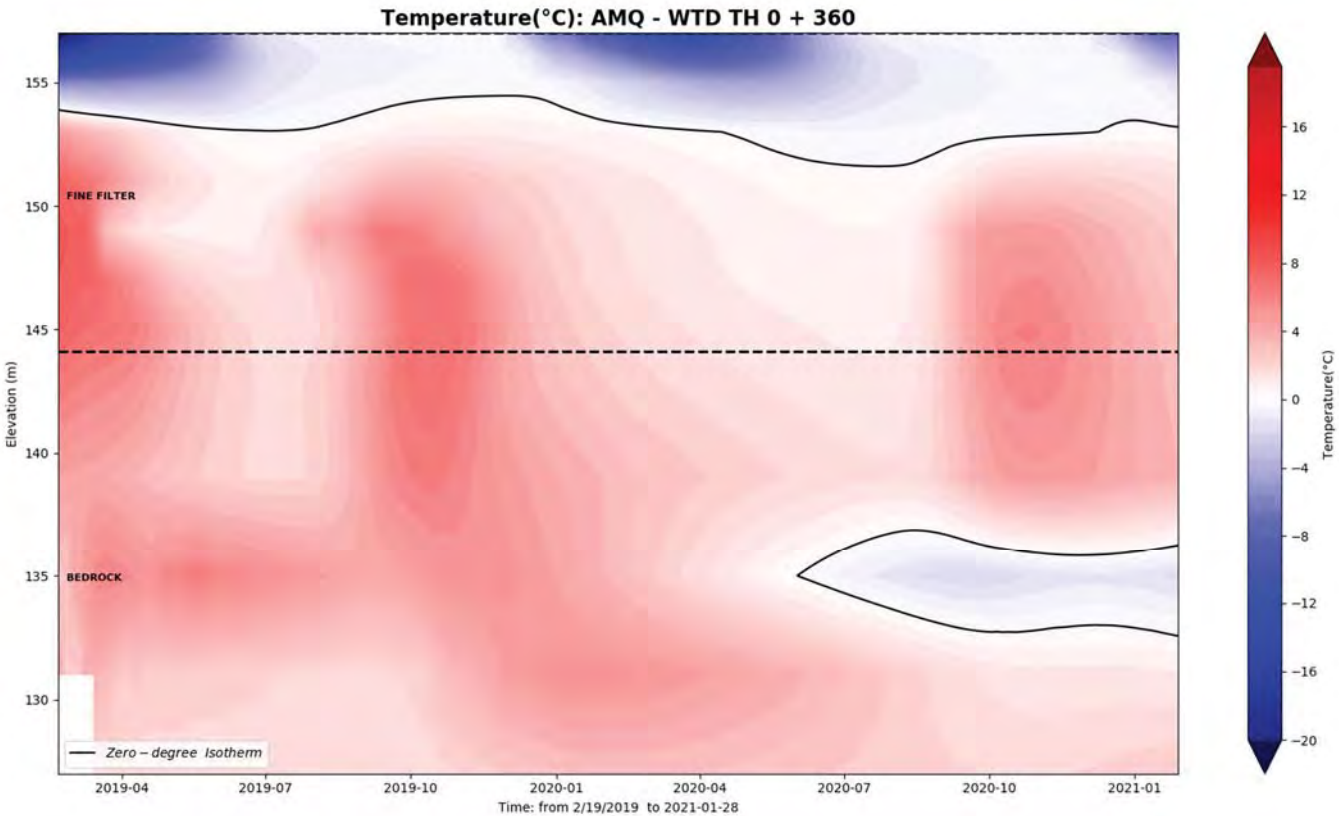


WTD-TH 0+336 U/S



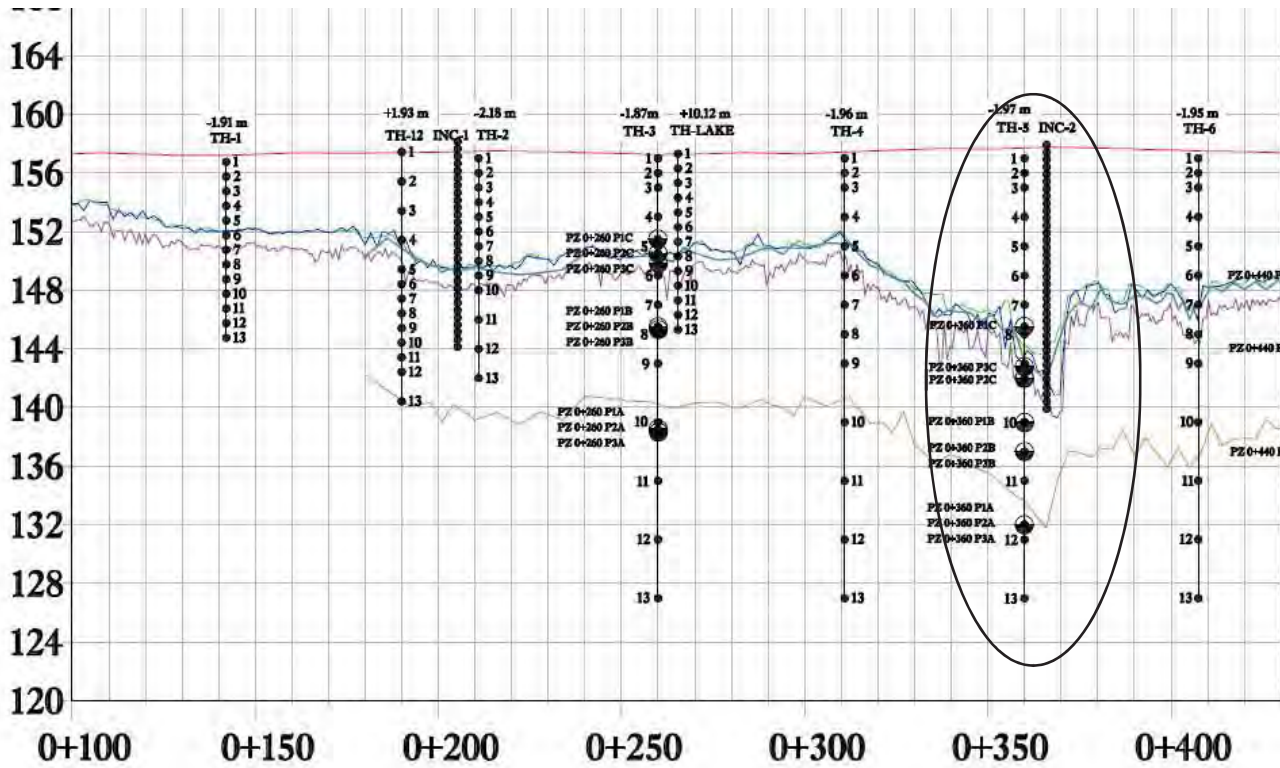
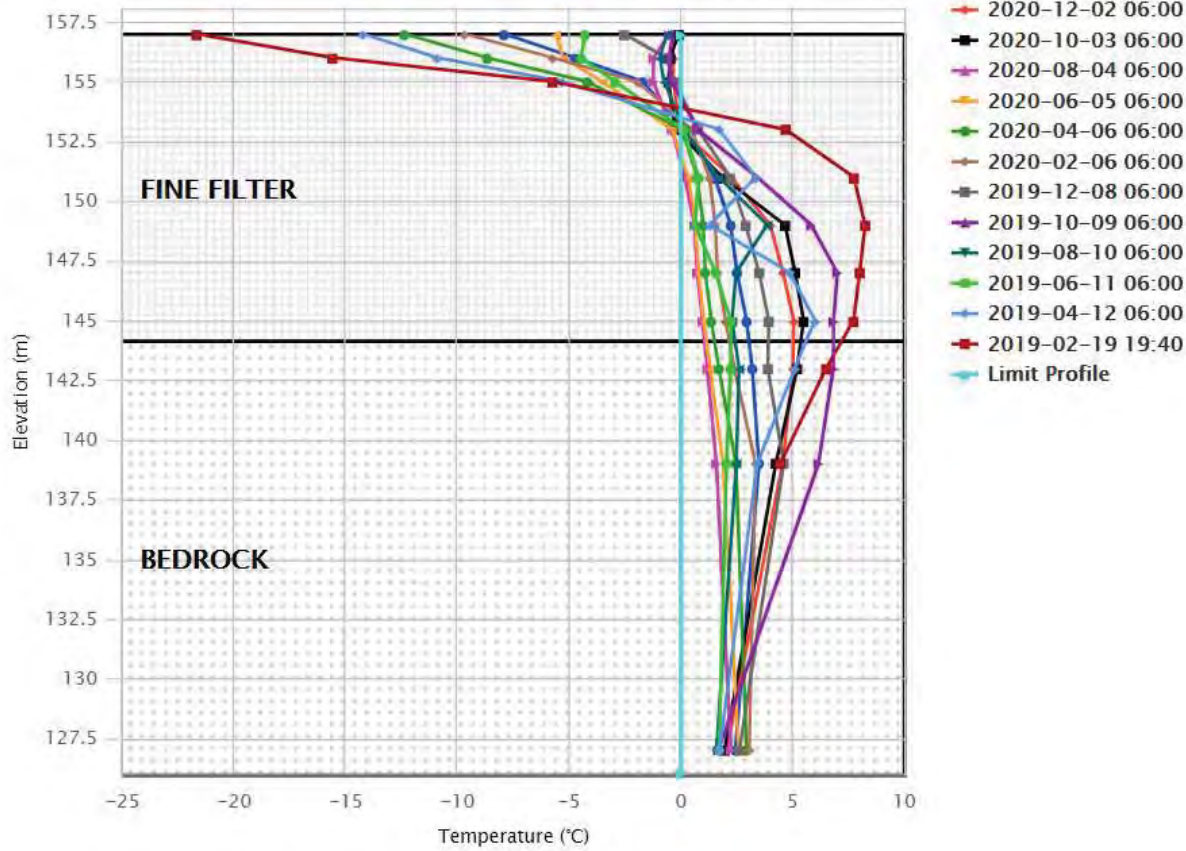


WTD-TH 0+360



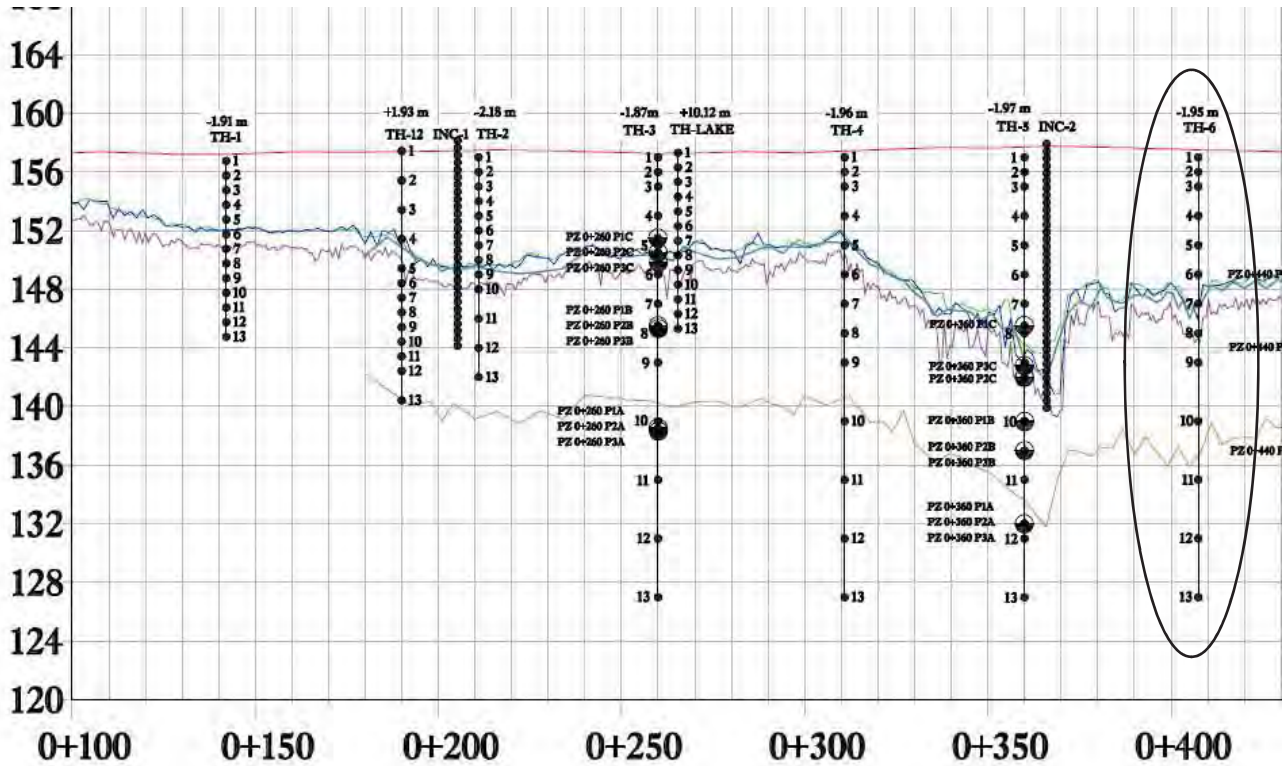
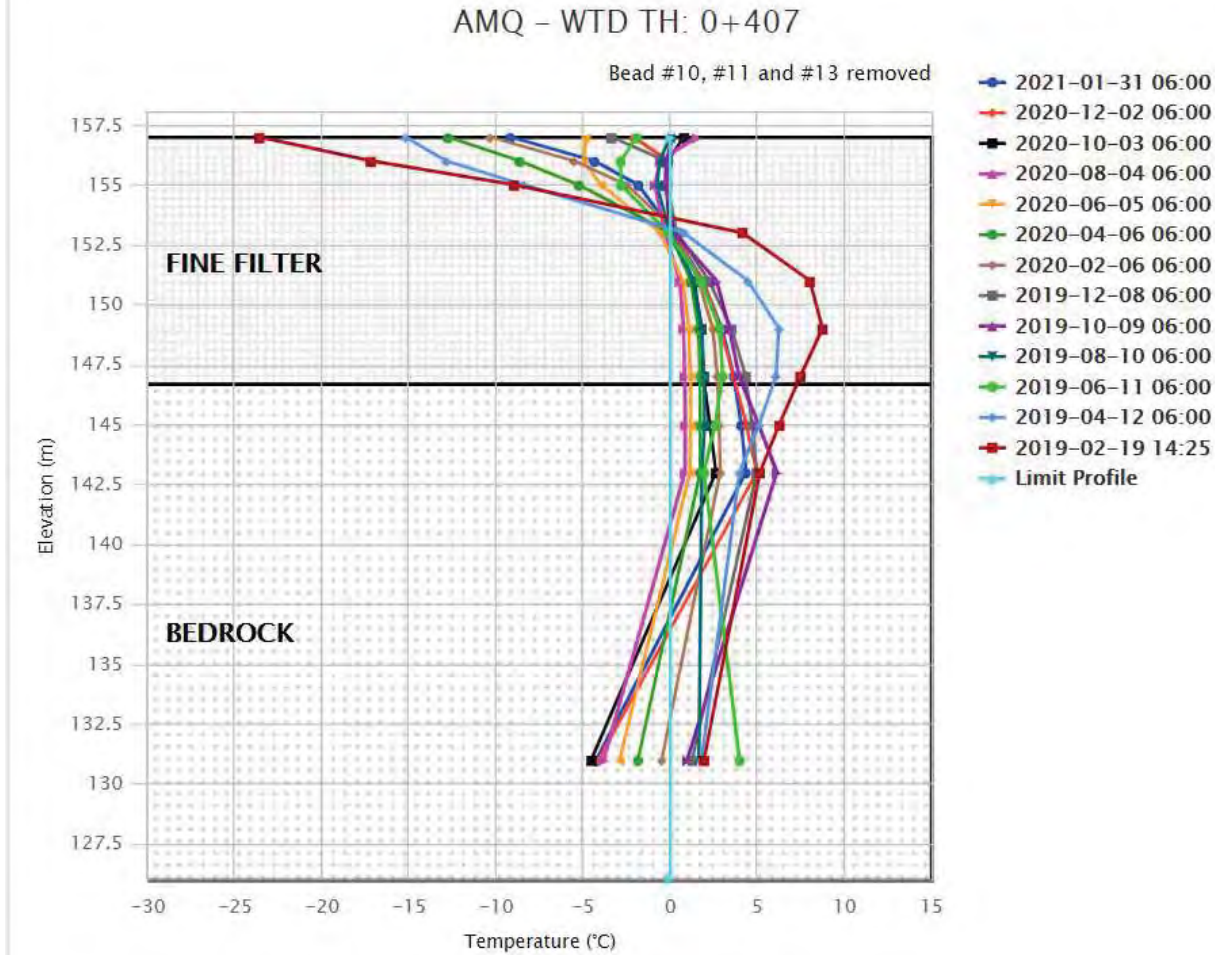
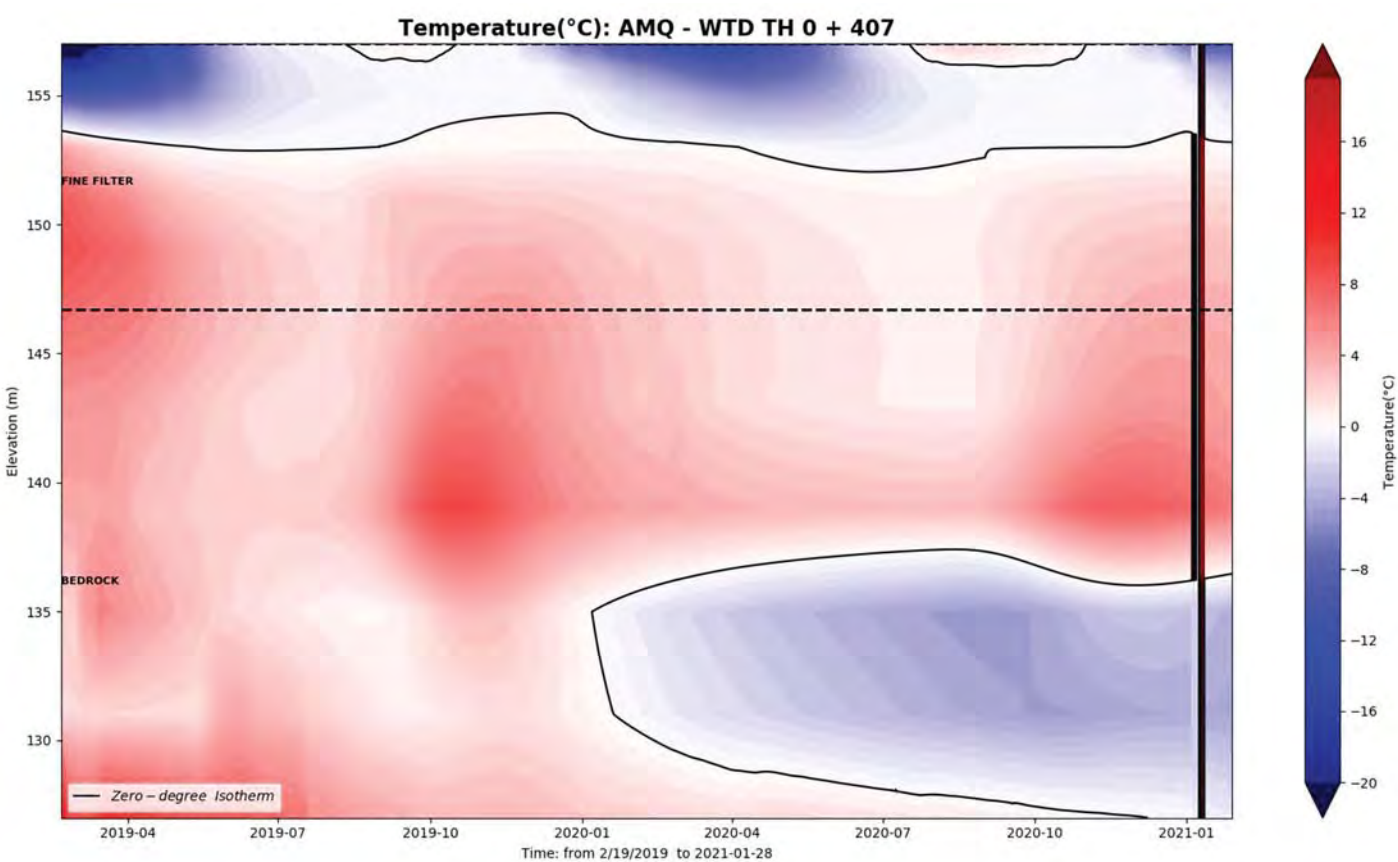
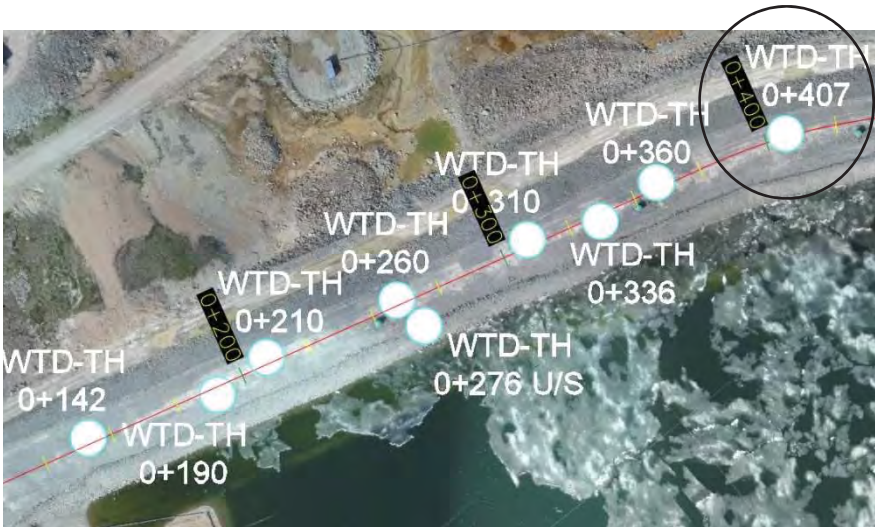
AMQ – WTD TH: 0+360

Bead #11 and #12 removed





WTD-TH 0+407

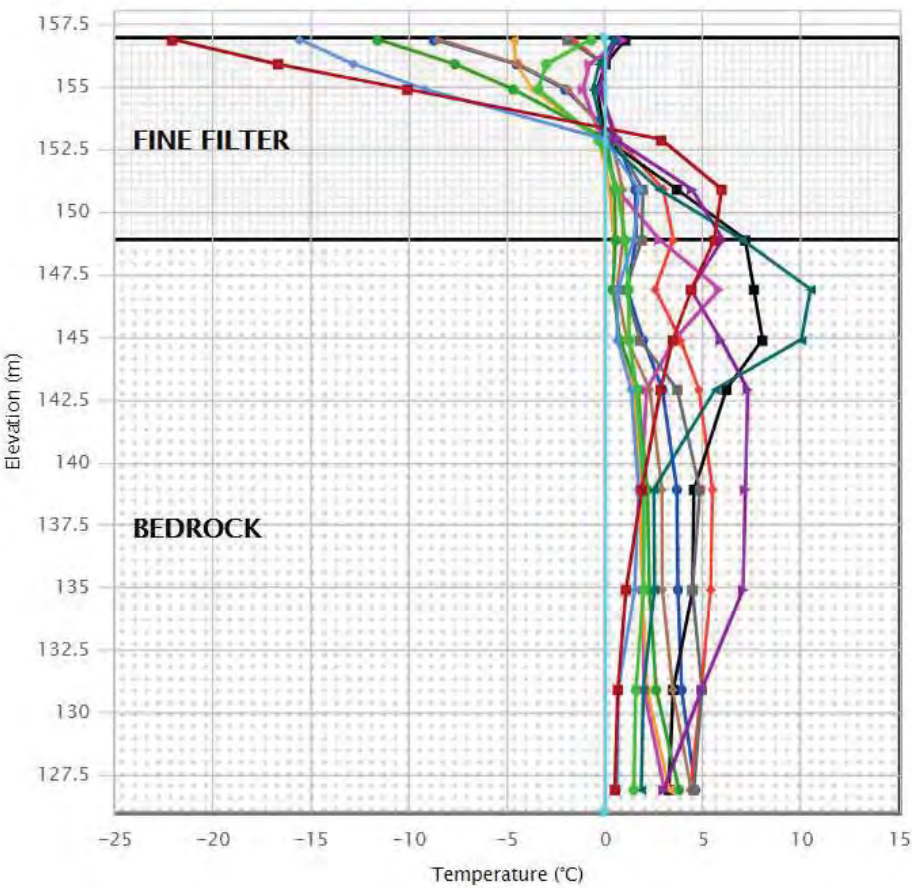




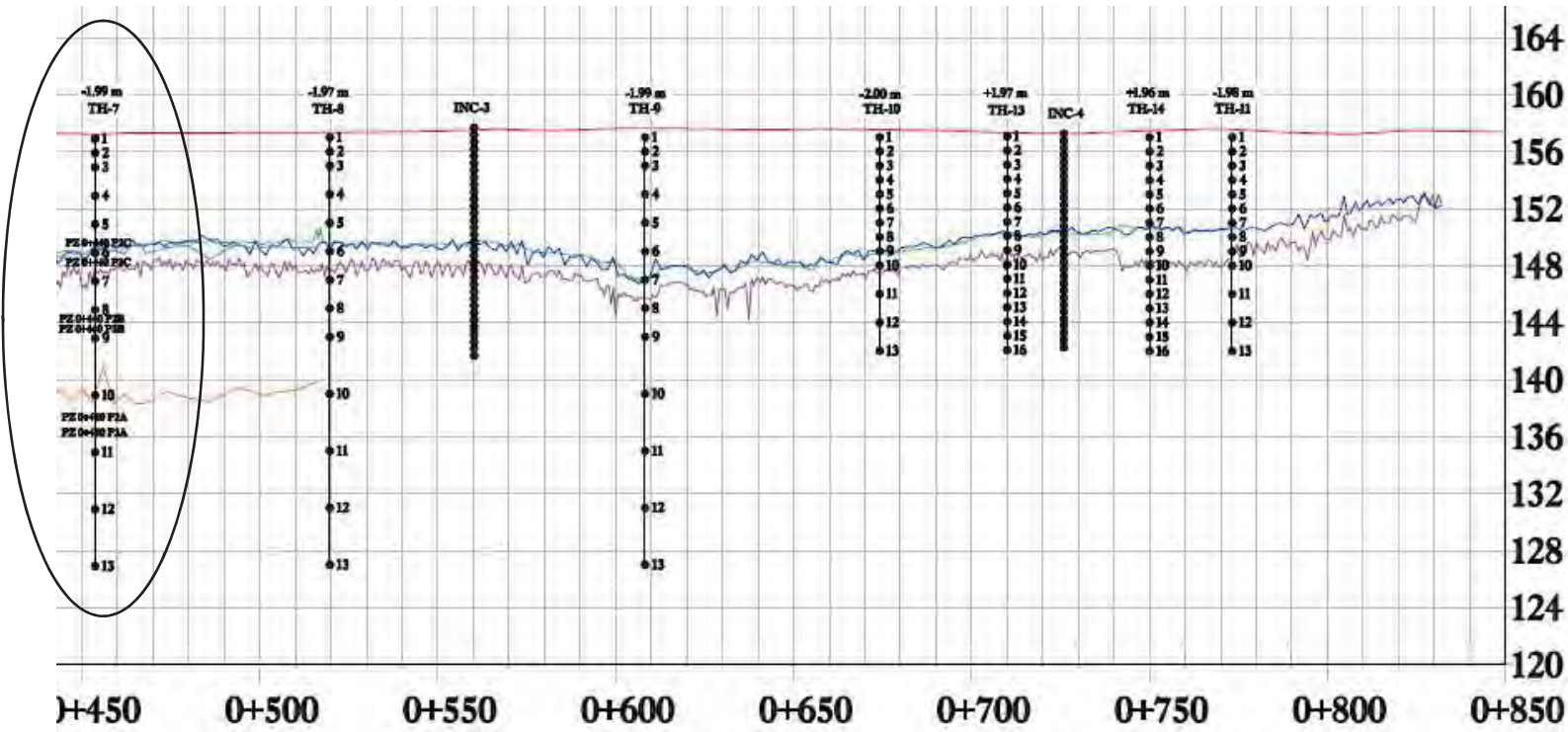
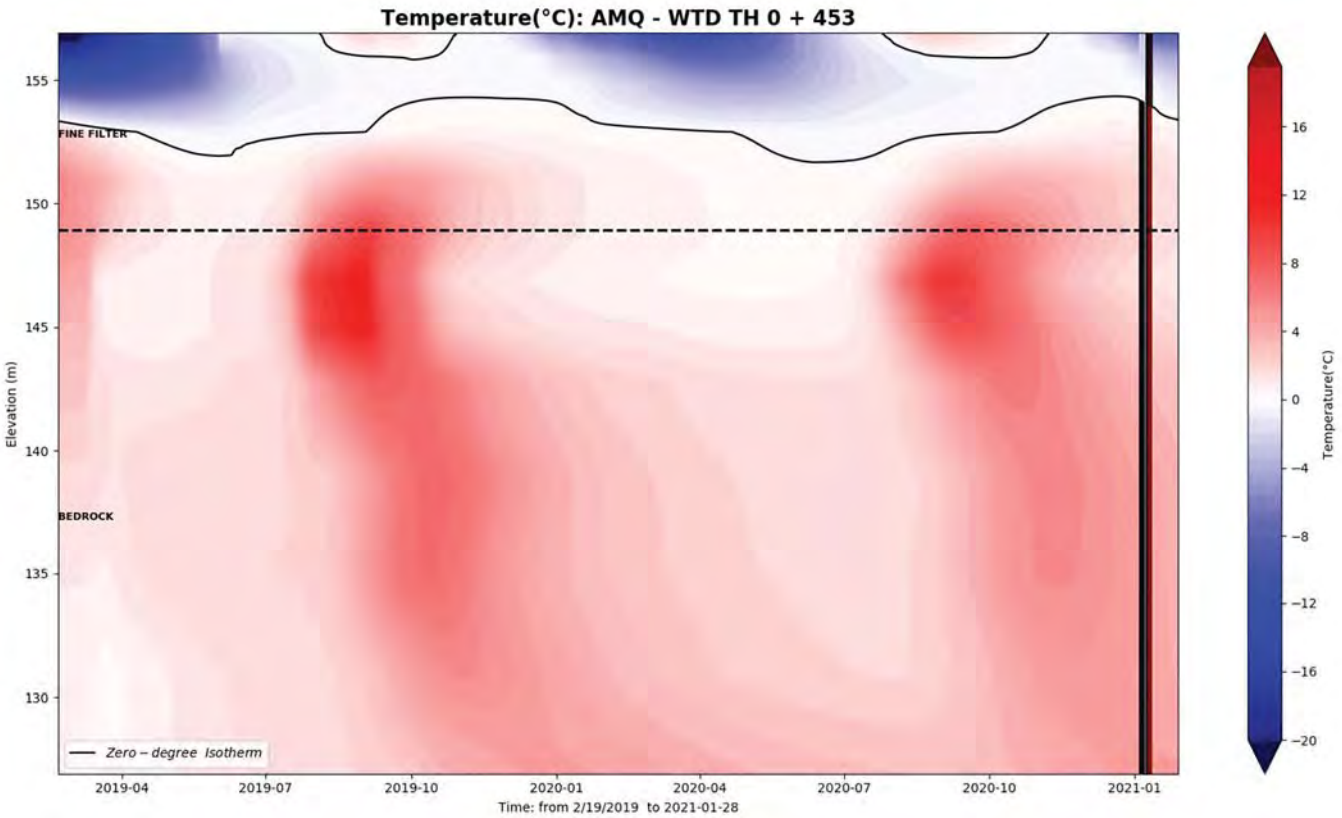
WTD-TH 0+453



AMQ - WTD TH: 0+453

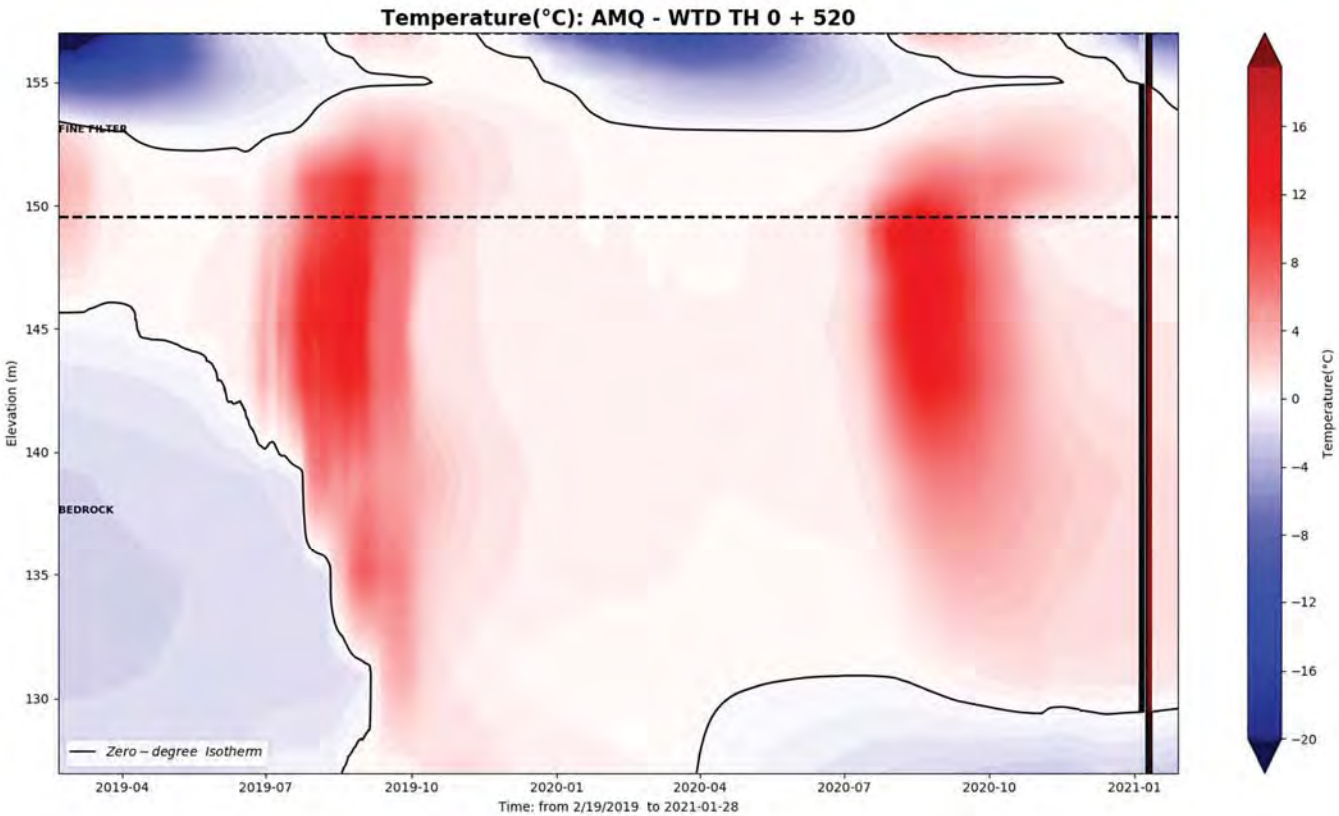


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- 2020-04-06 06:00
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- 2019-02-19 14:25
- Limit Profile

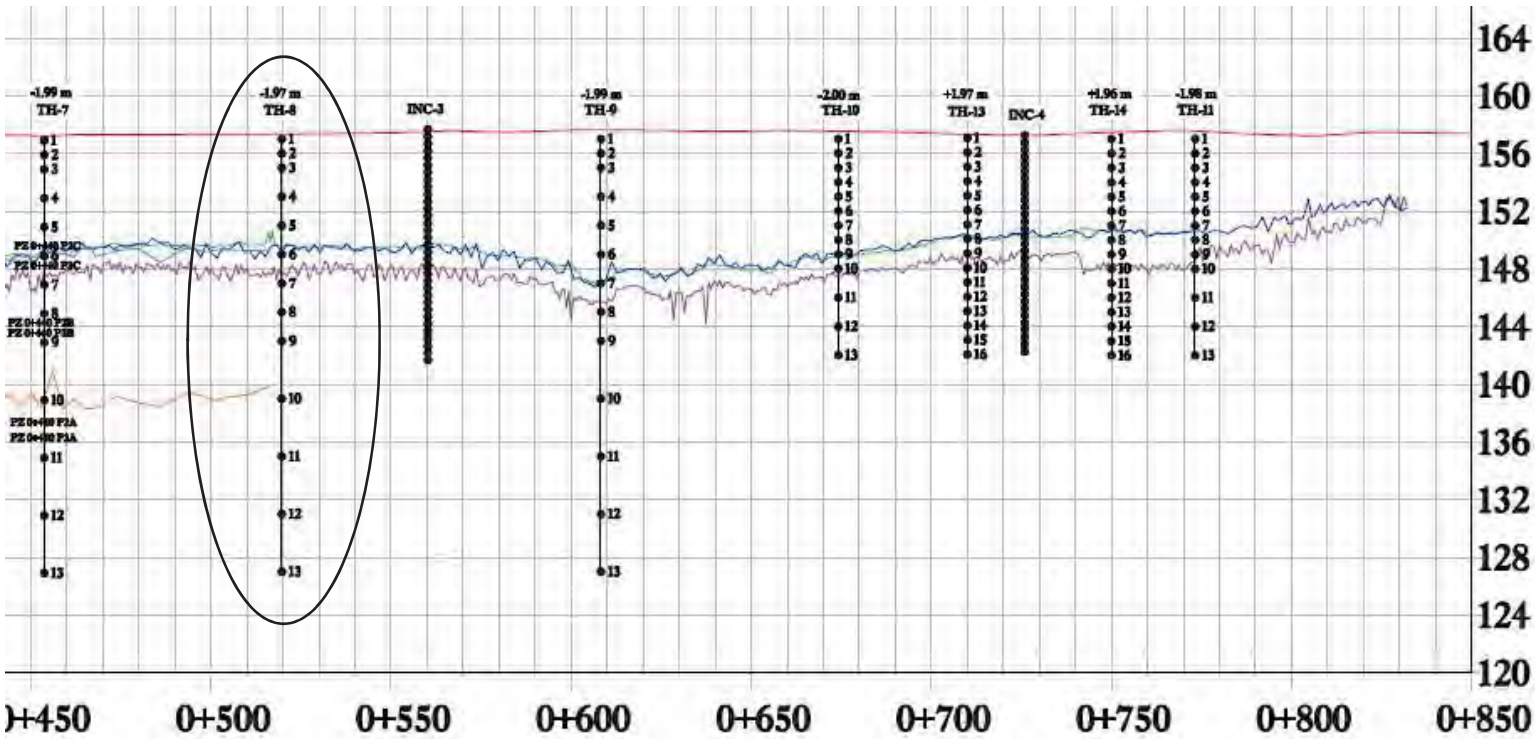
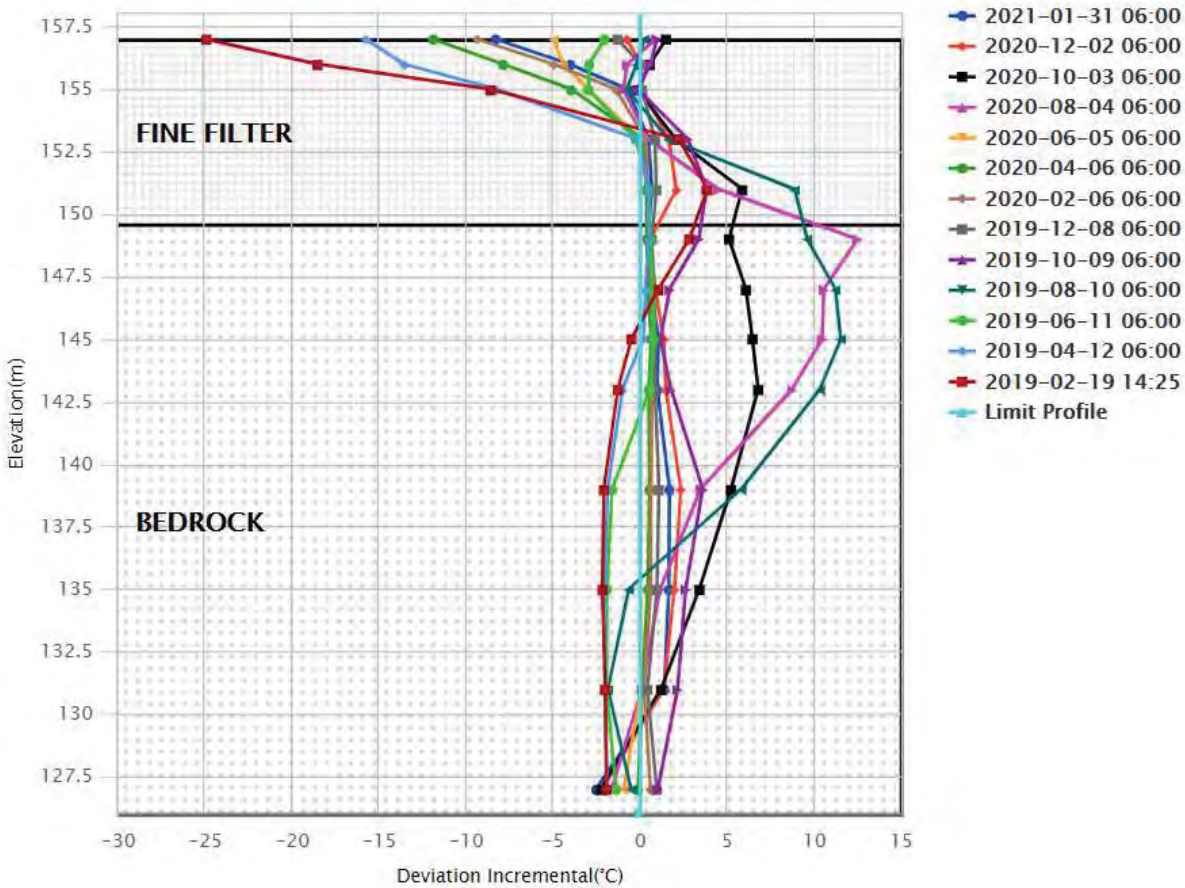




WTD-TH 0+520

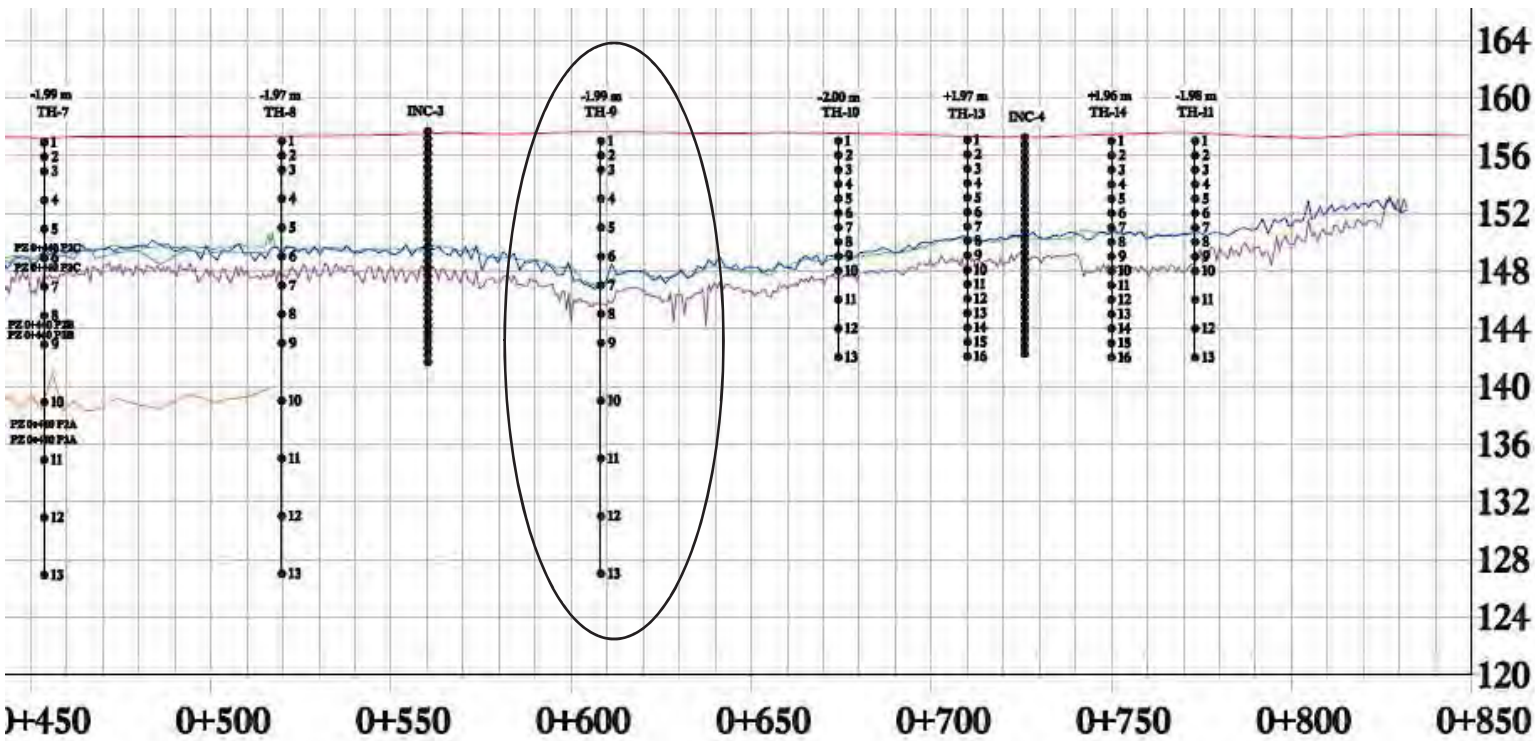
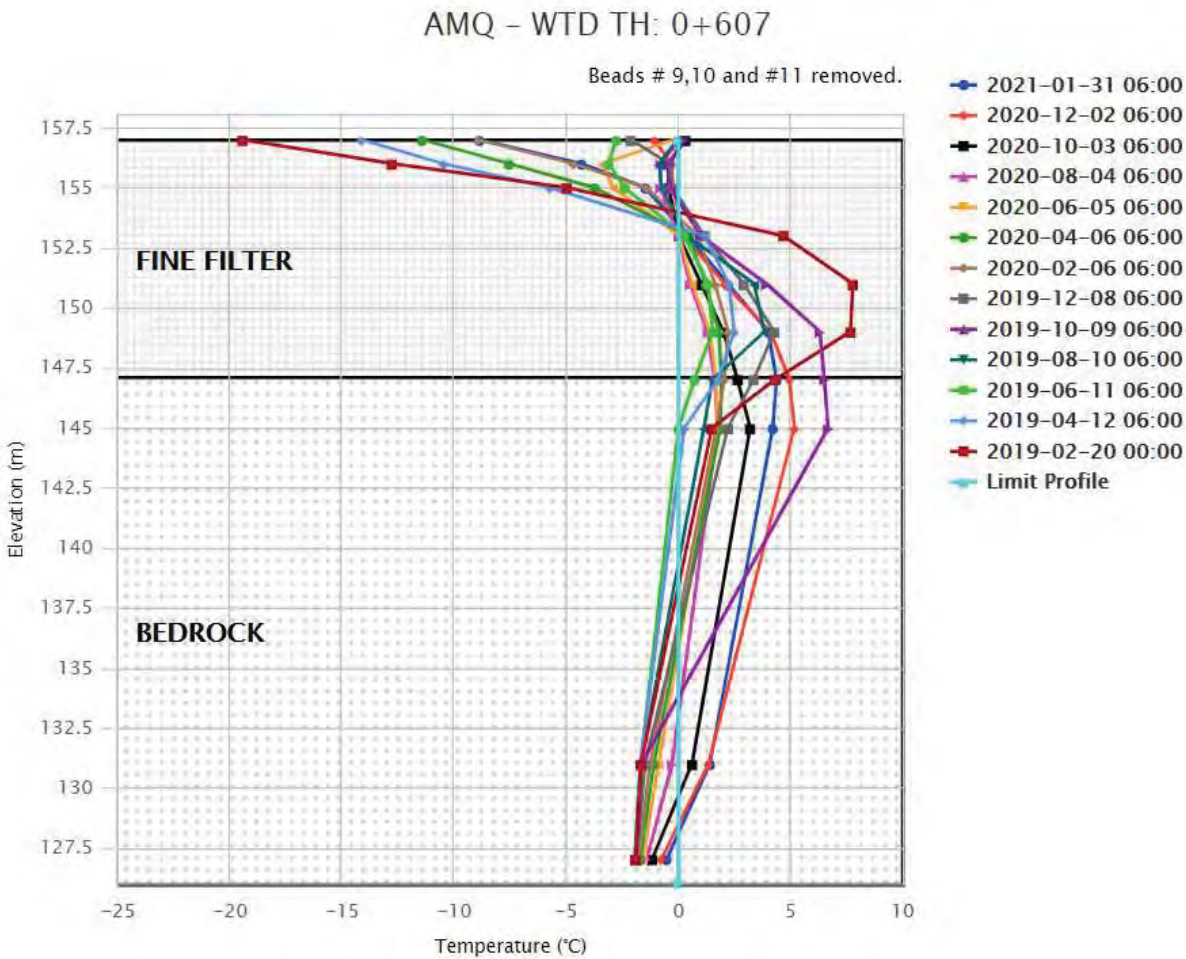
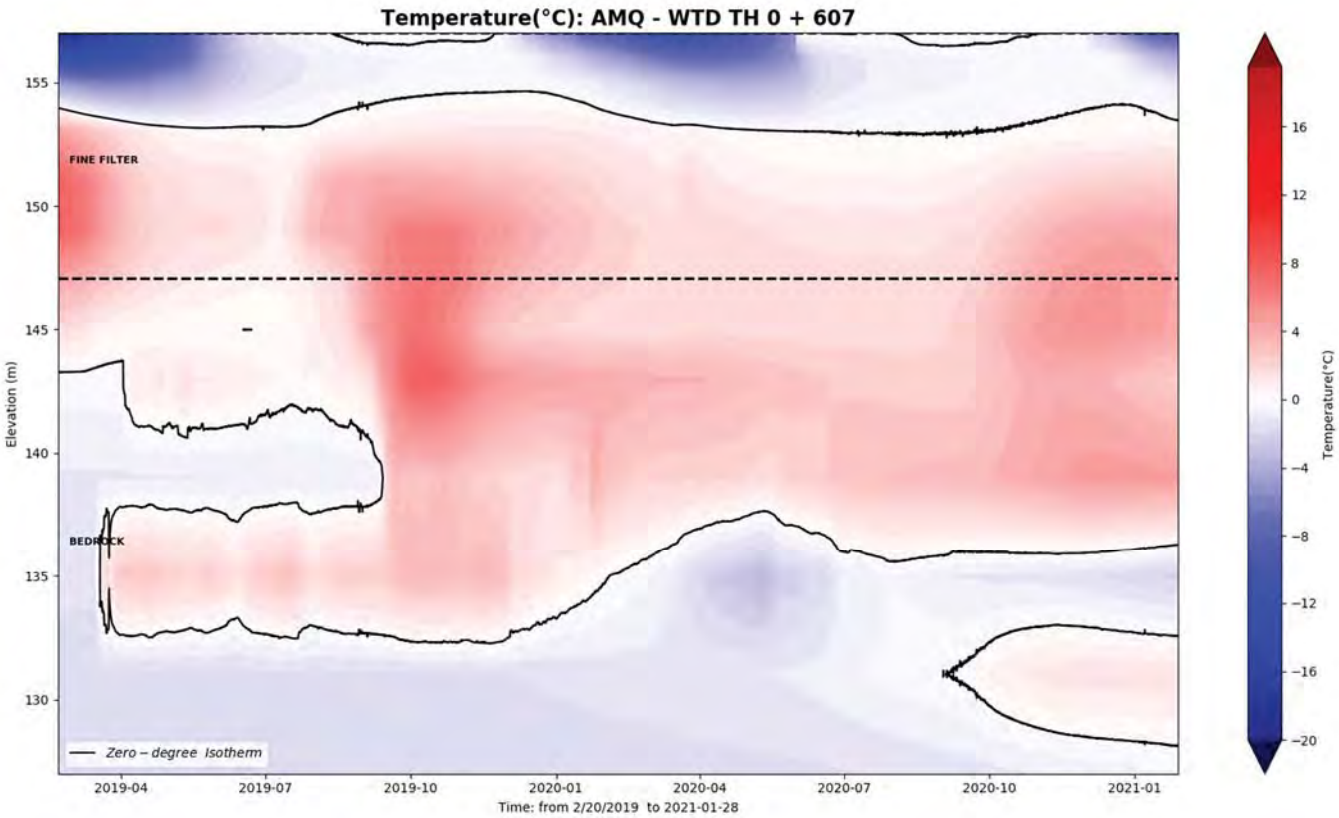


AMQ - WTD TH: 0+520



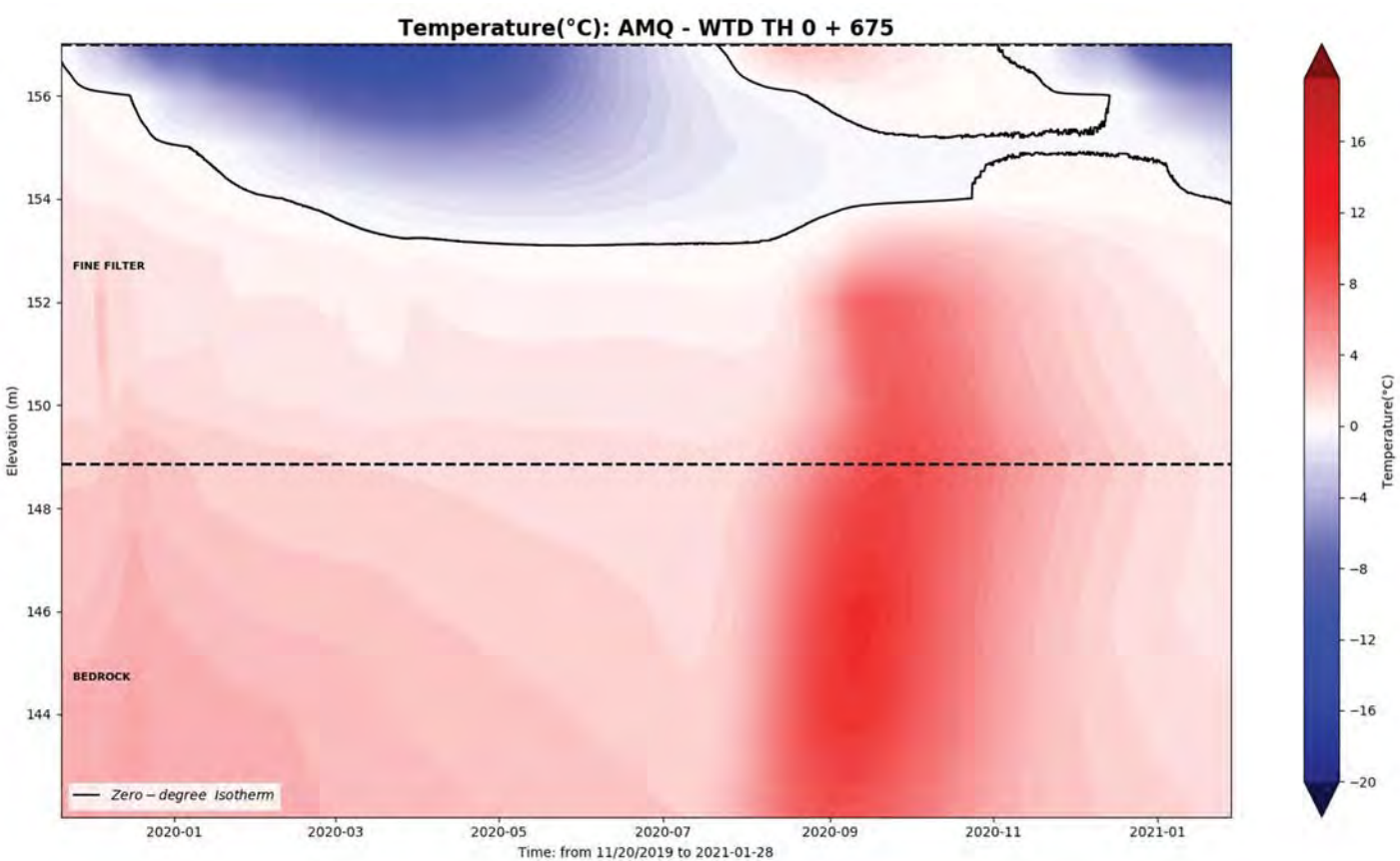


WTD-TH 0+607

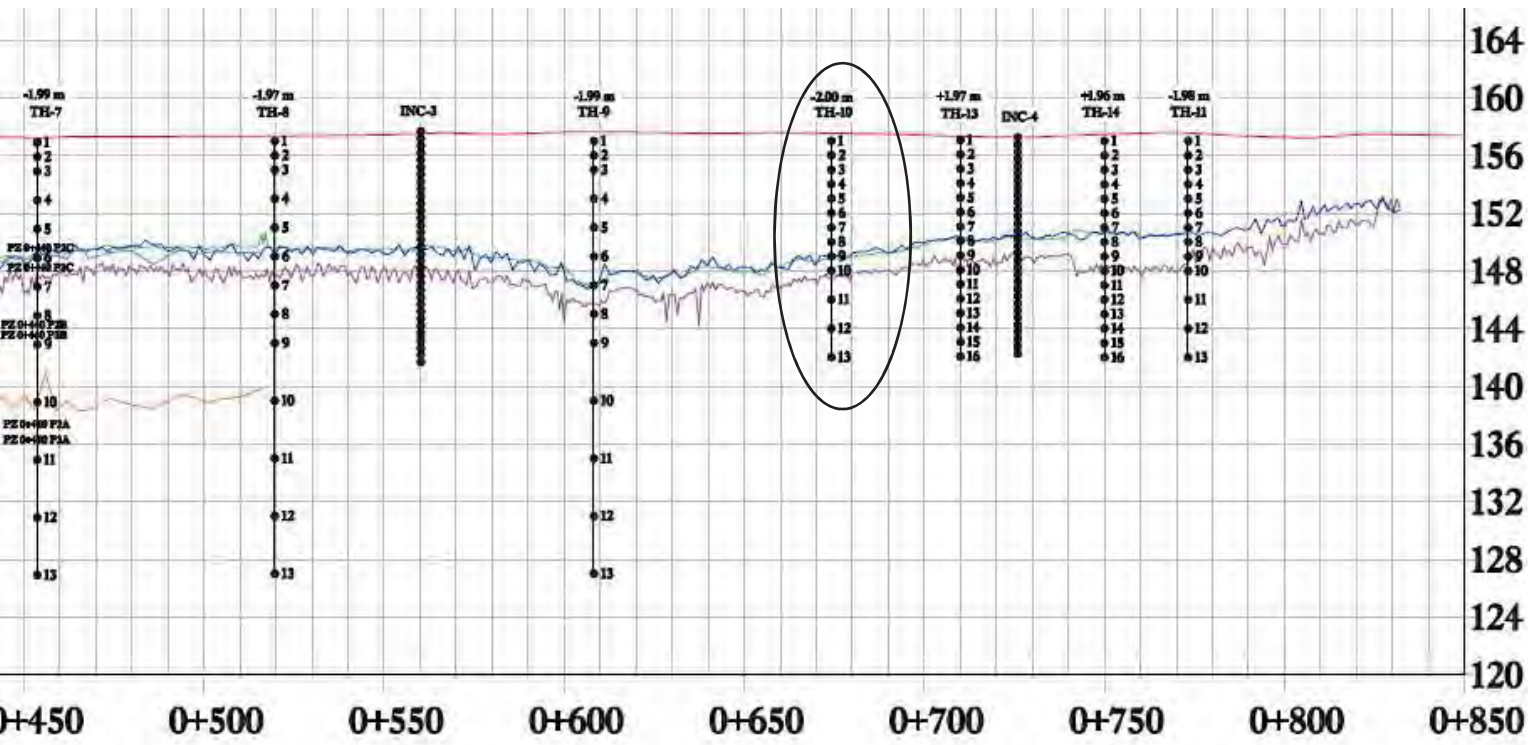
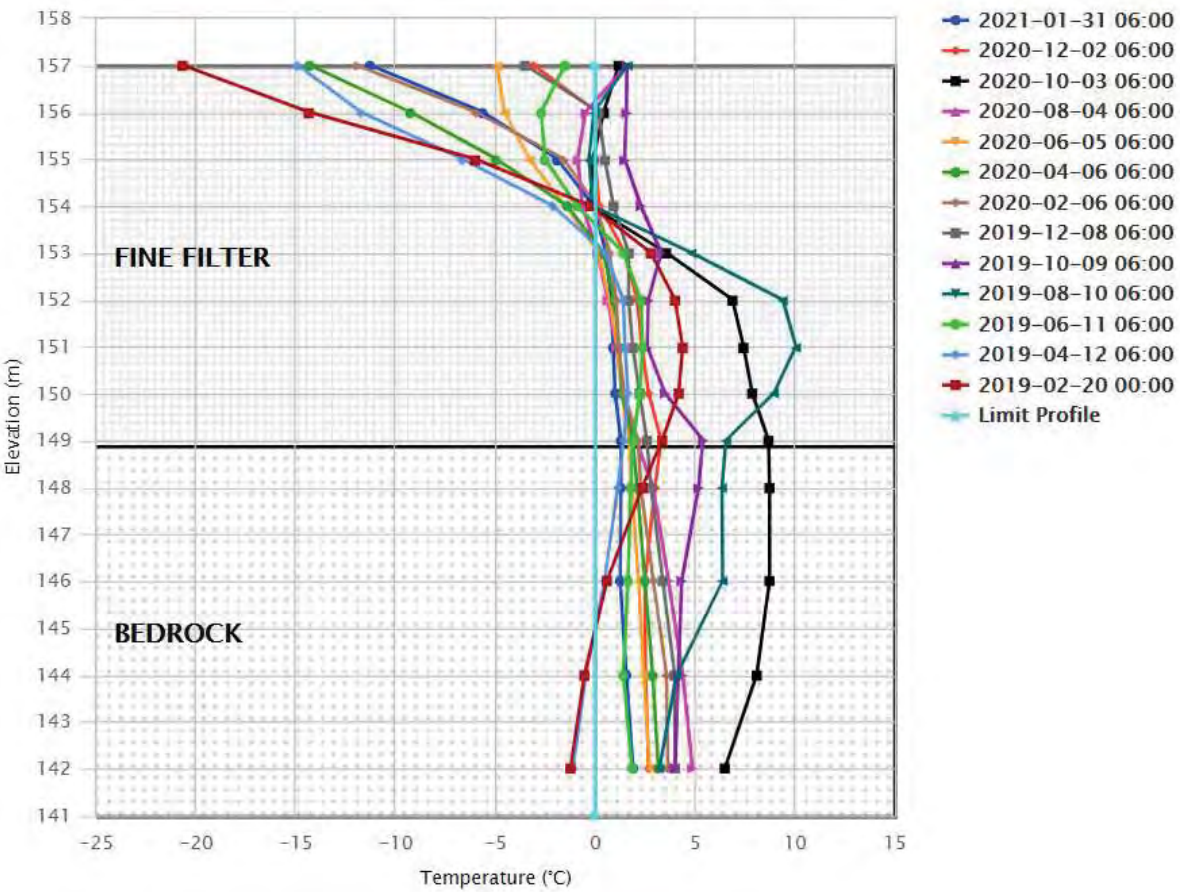




WTD-TH 0+675

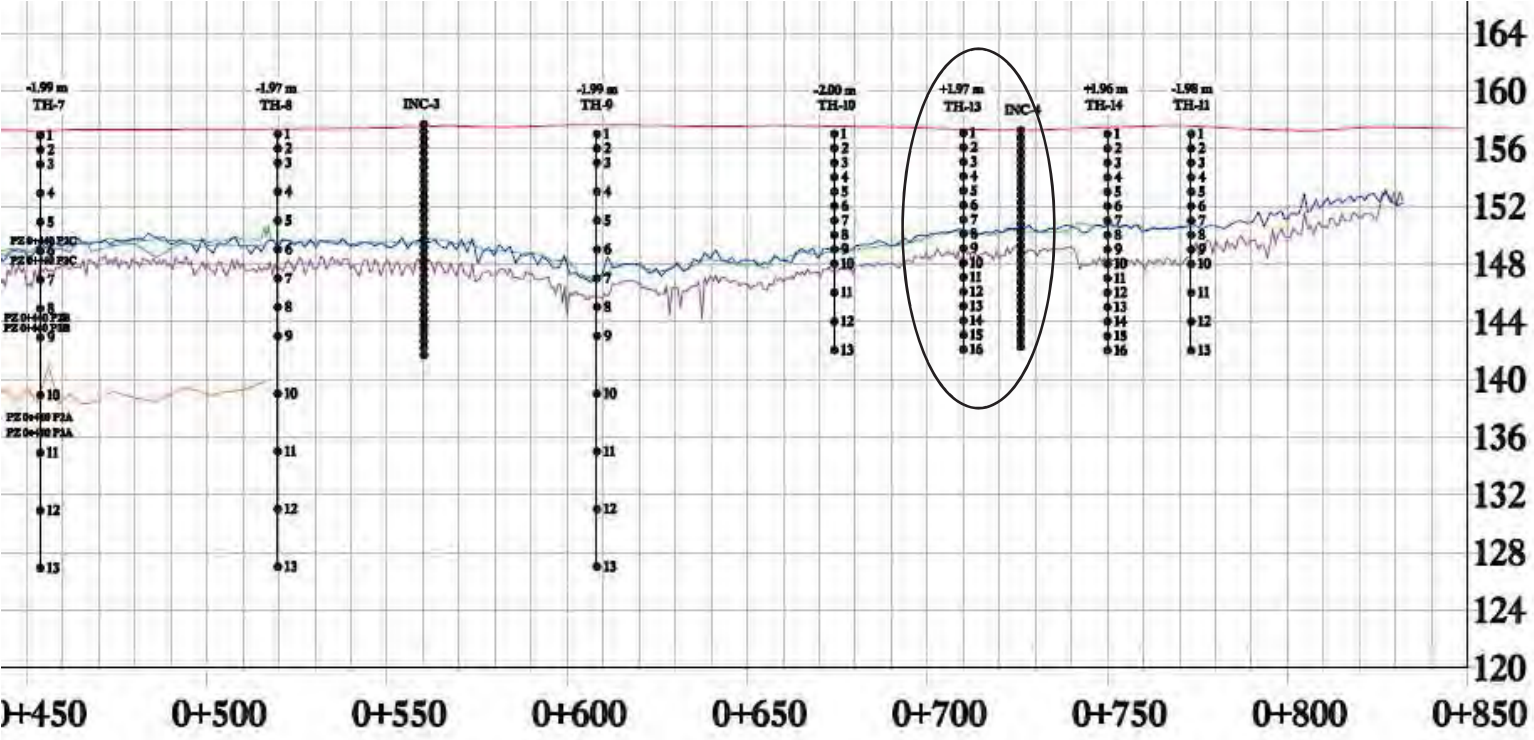
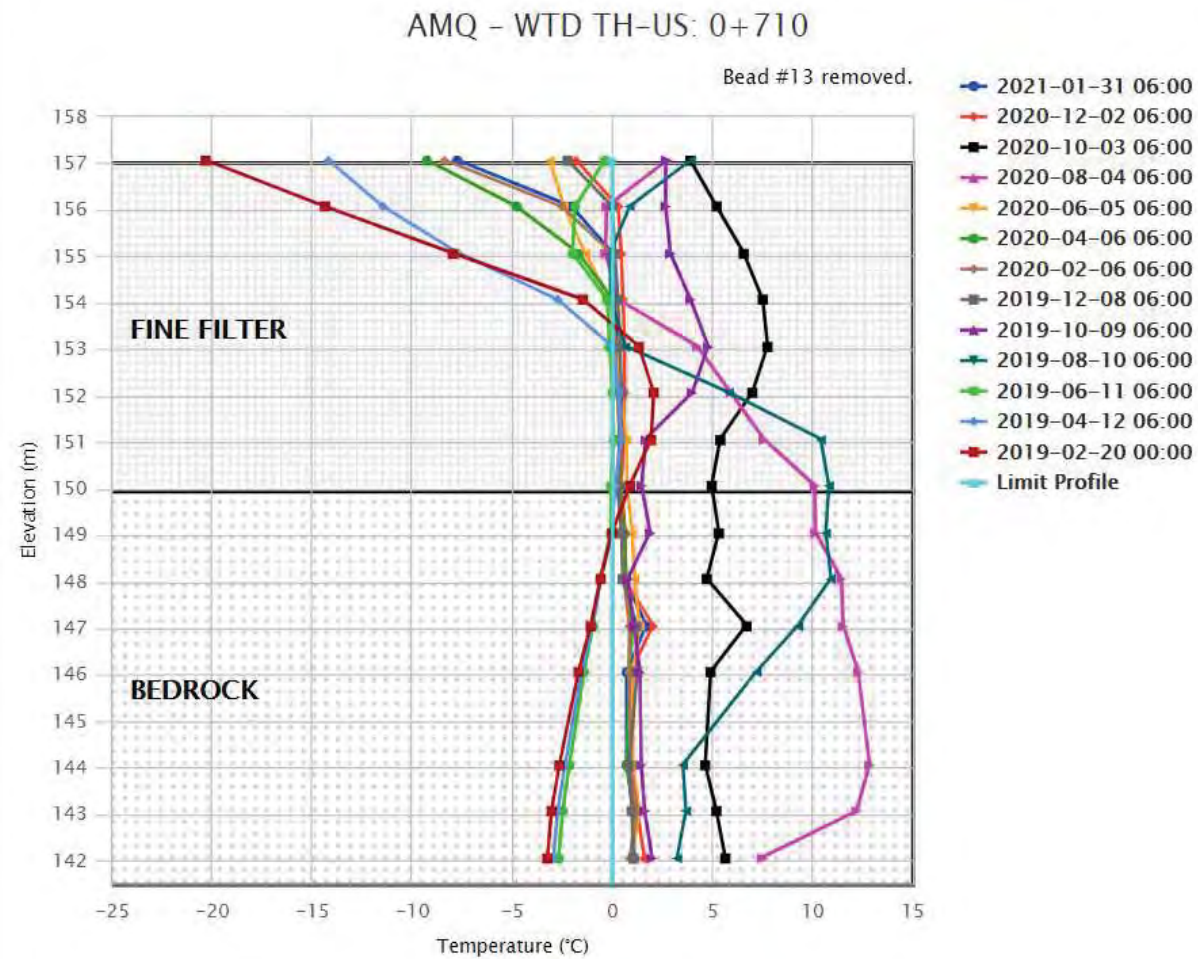
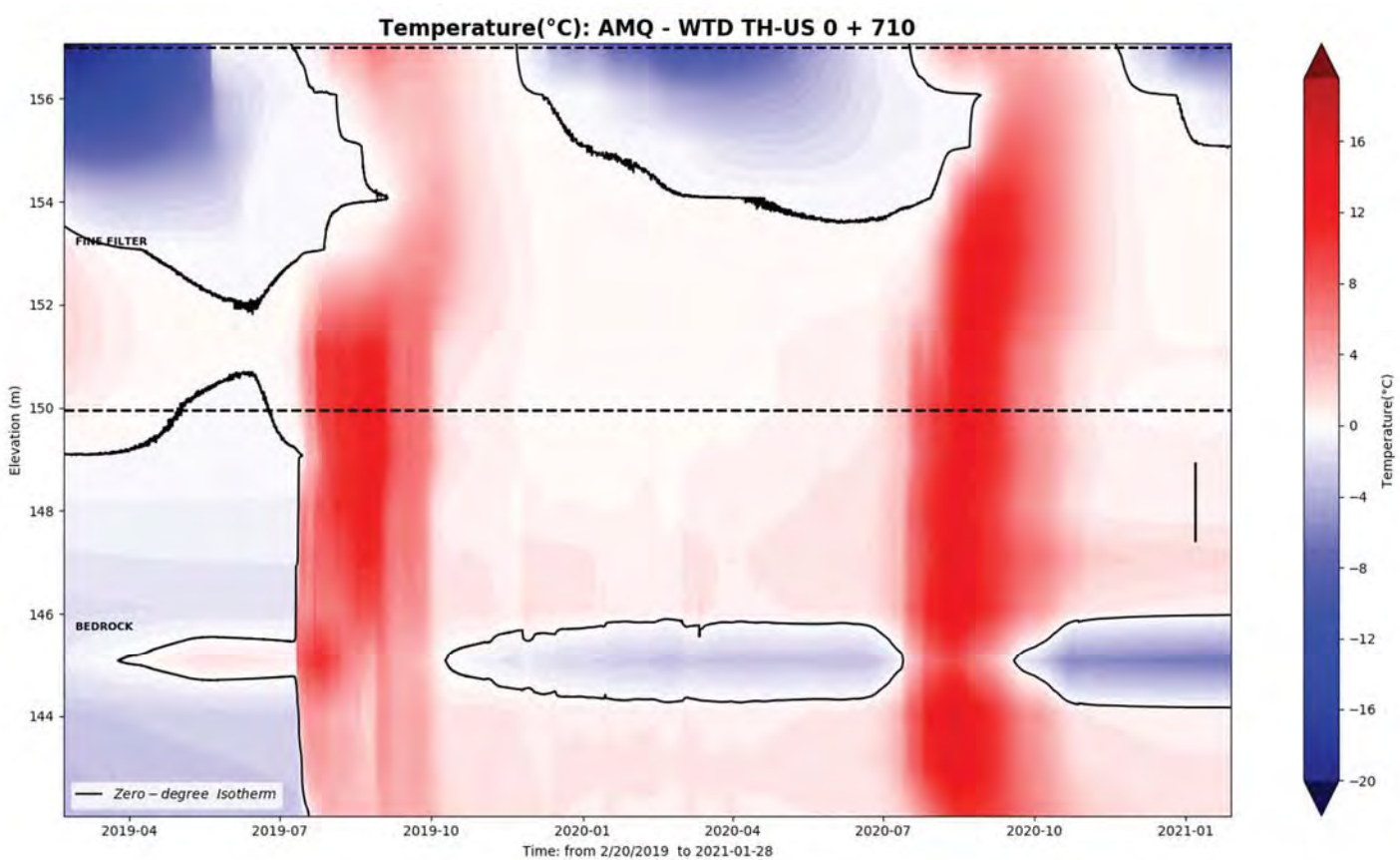


AMQ - WTD TH: 0+675



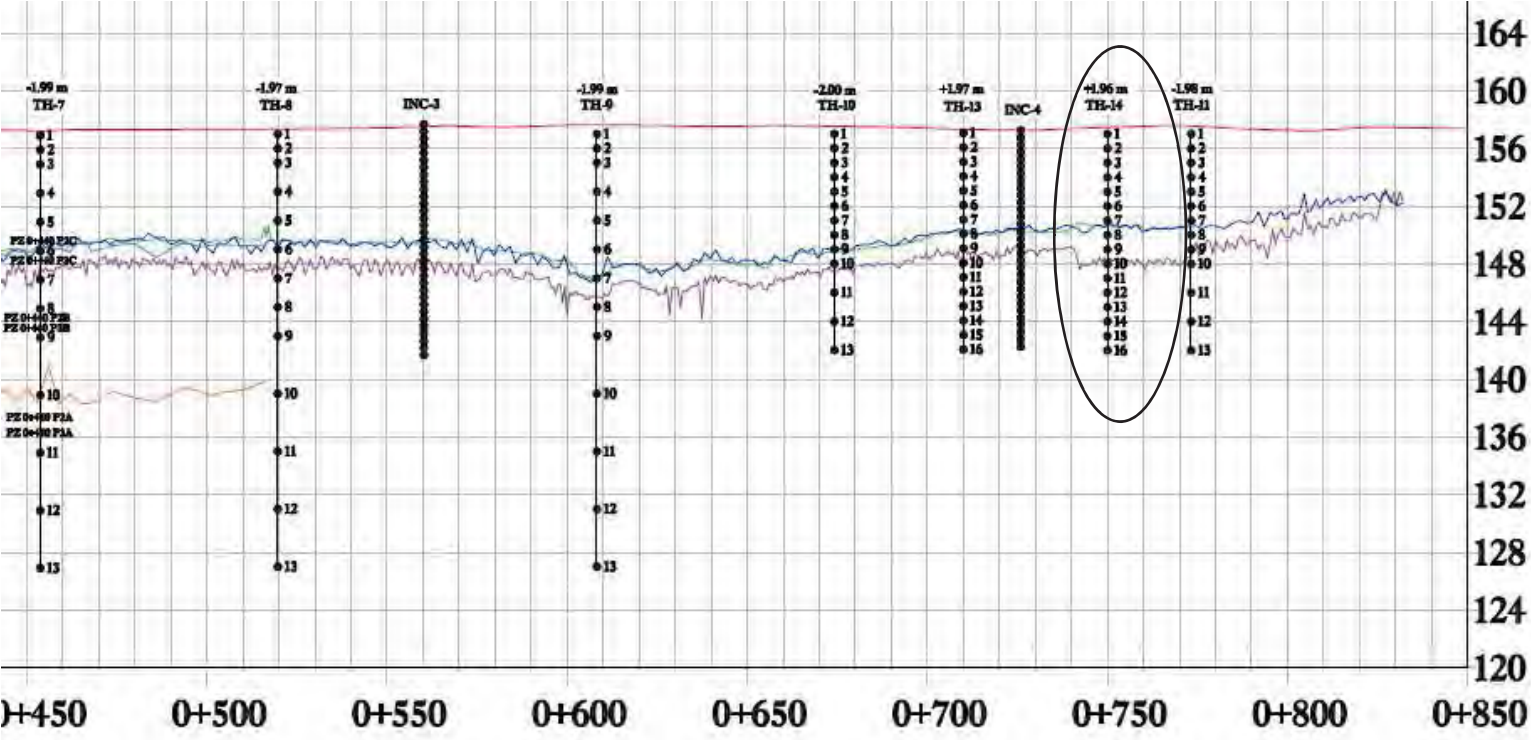
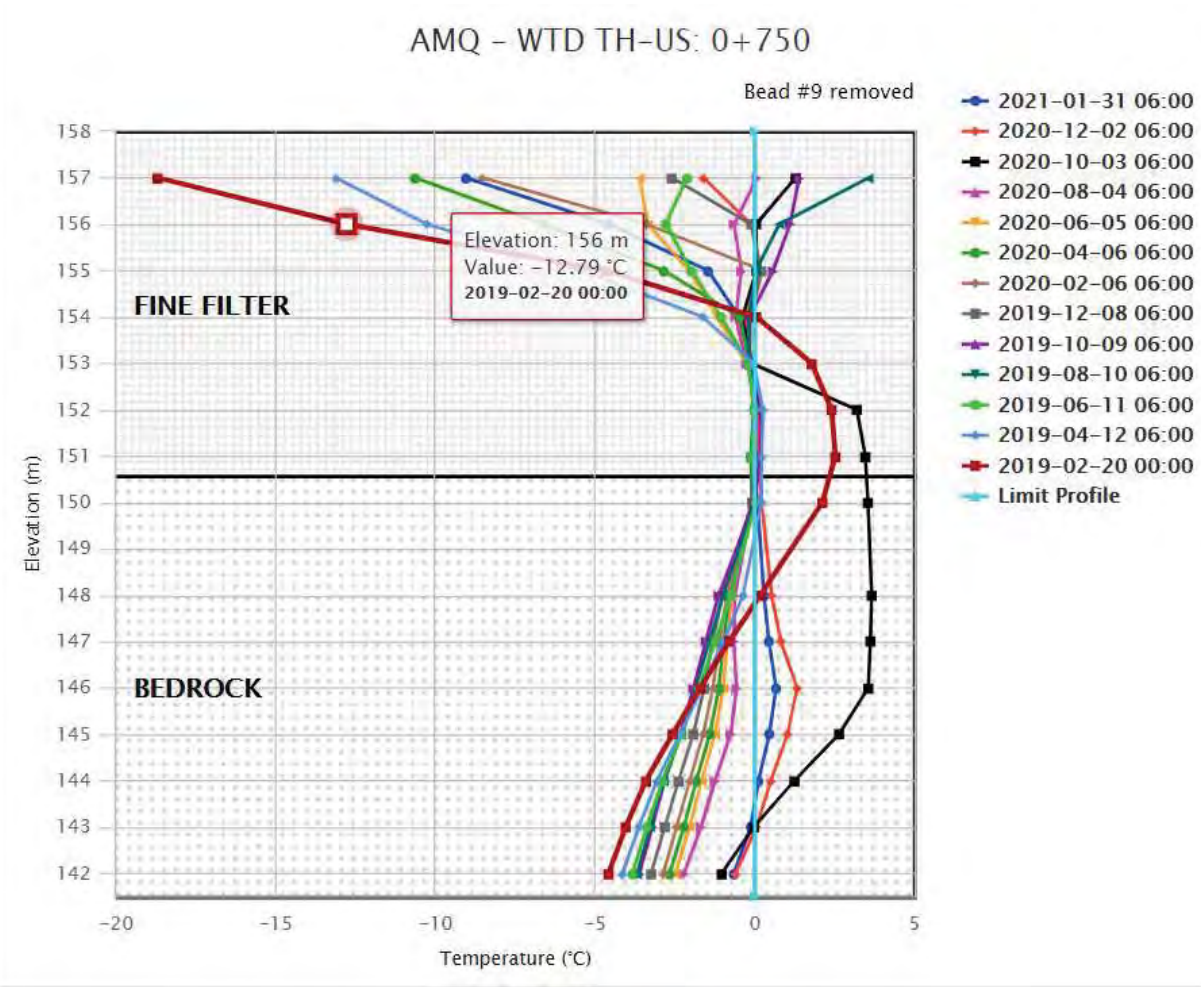
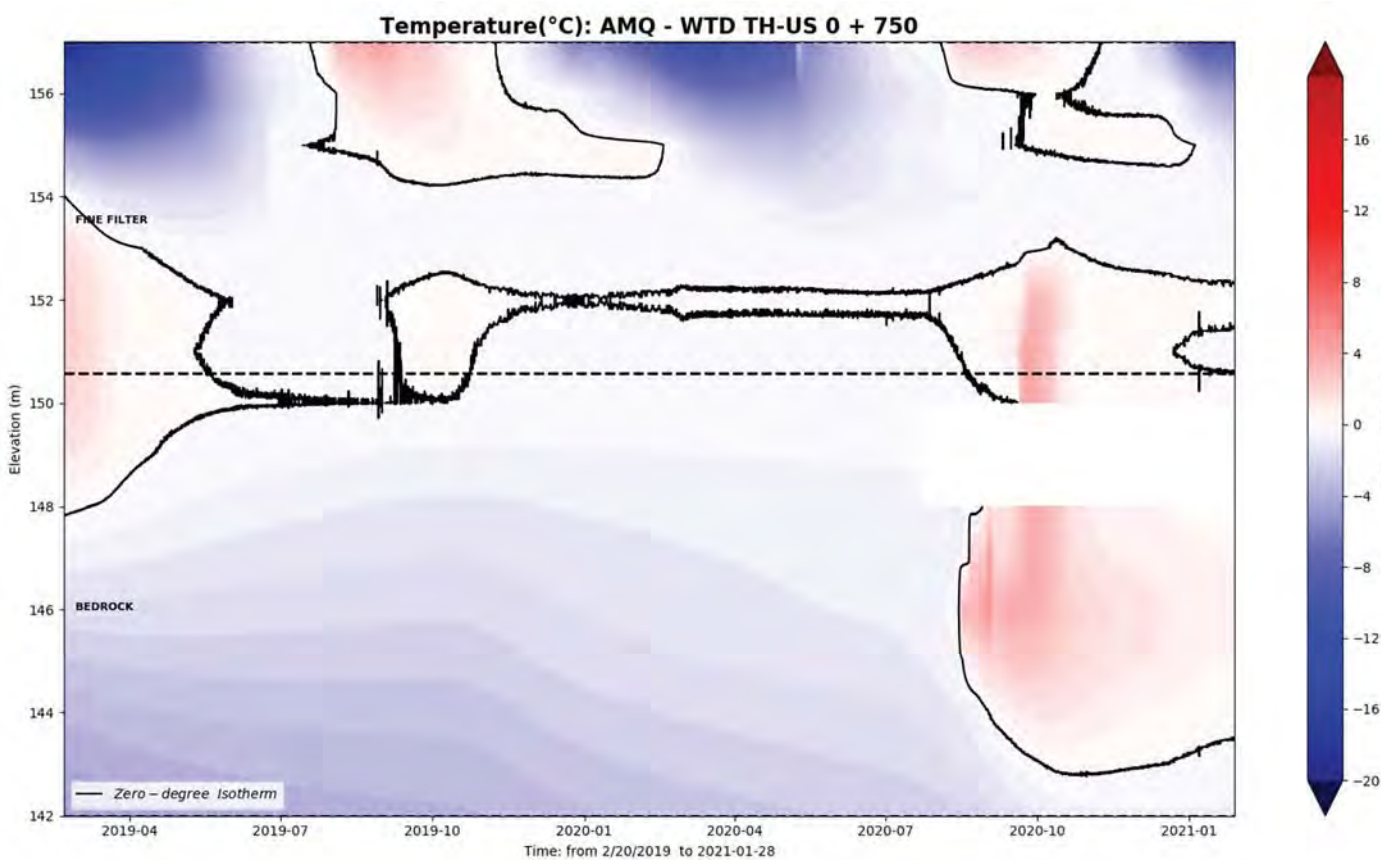


WTD-TH 0+710 U/S



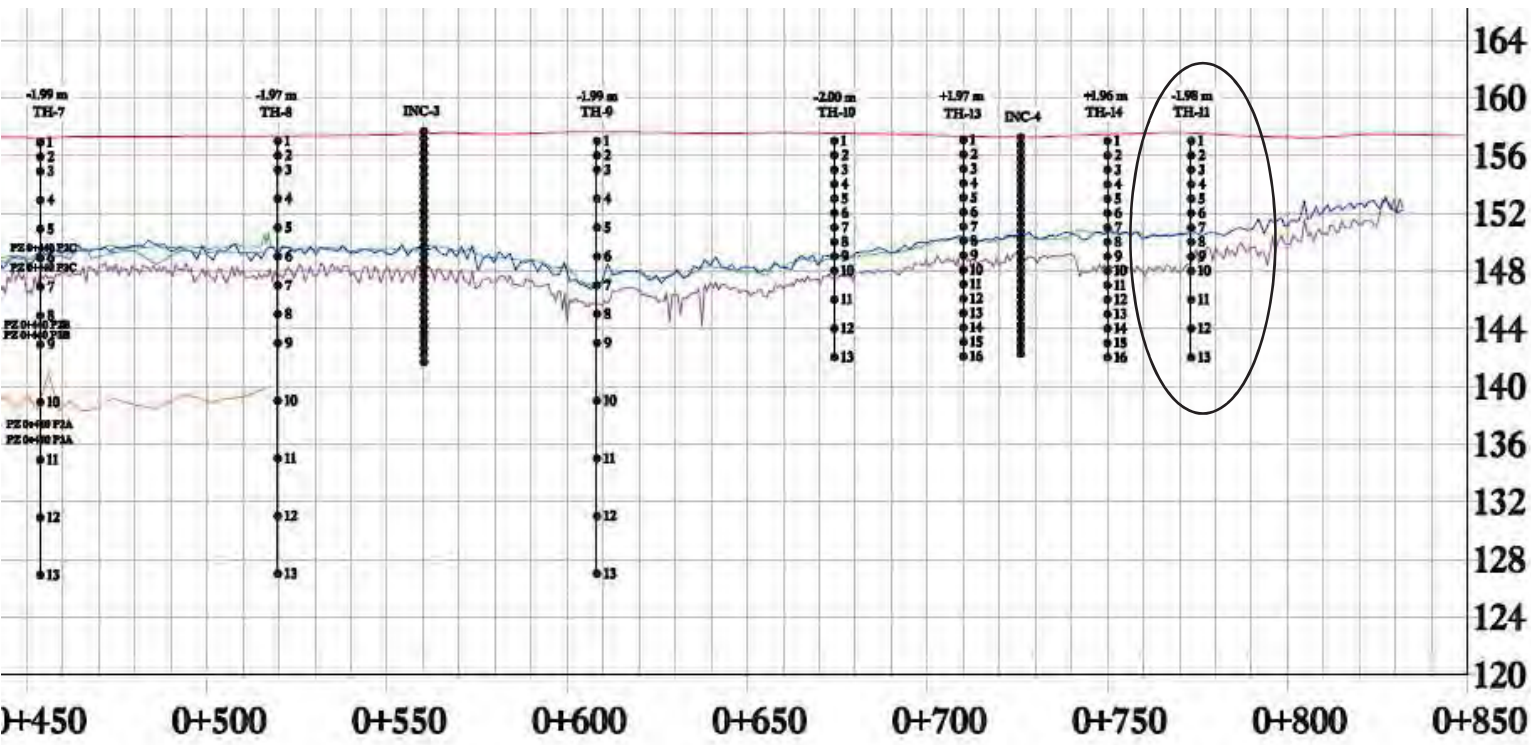
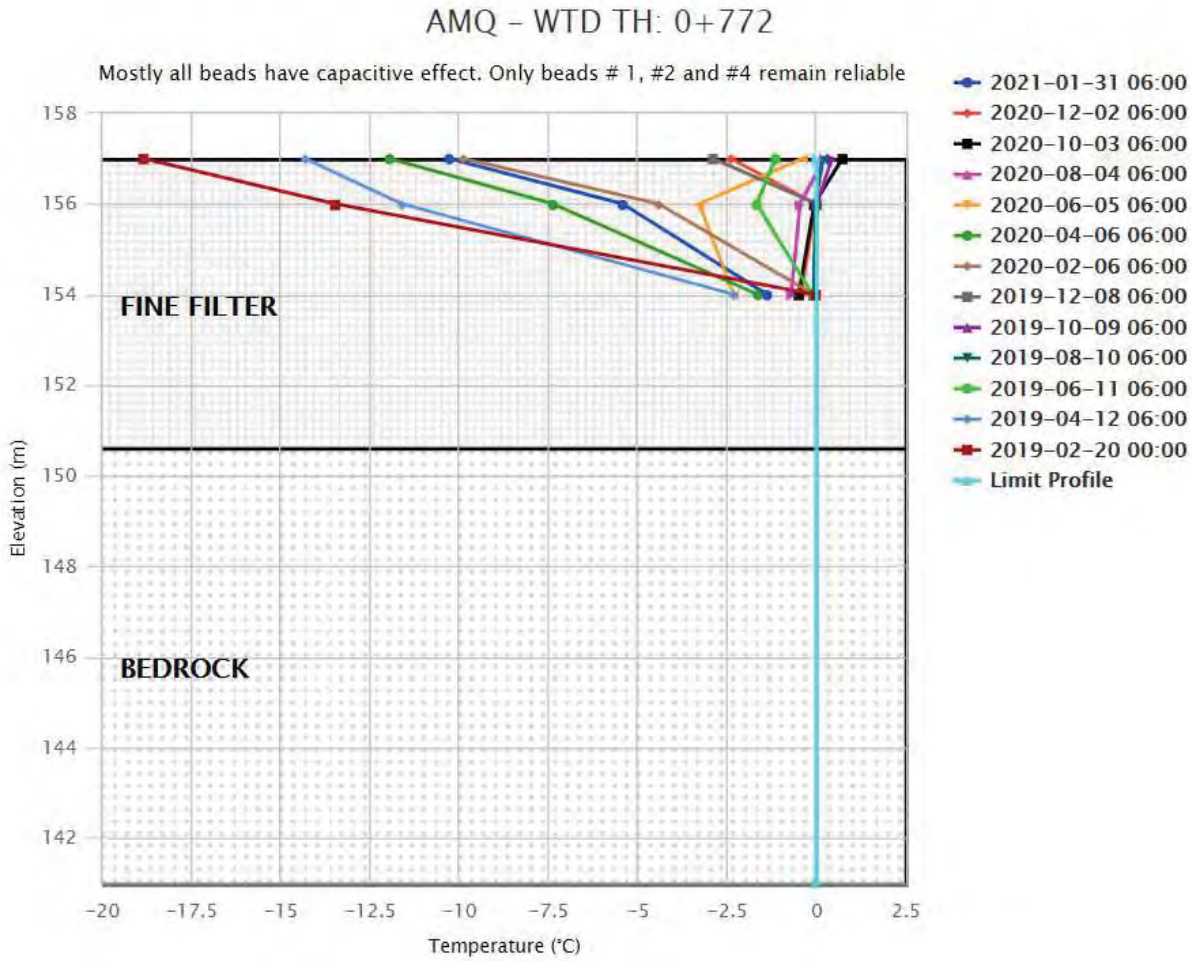
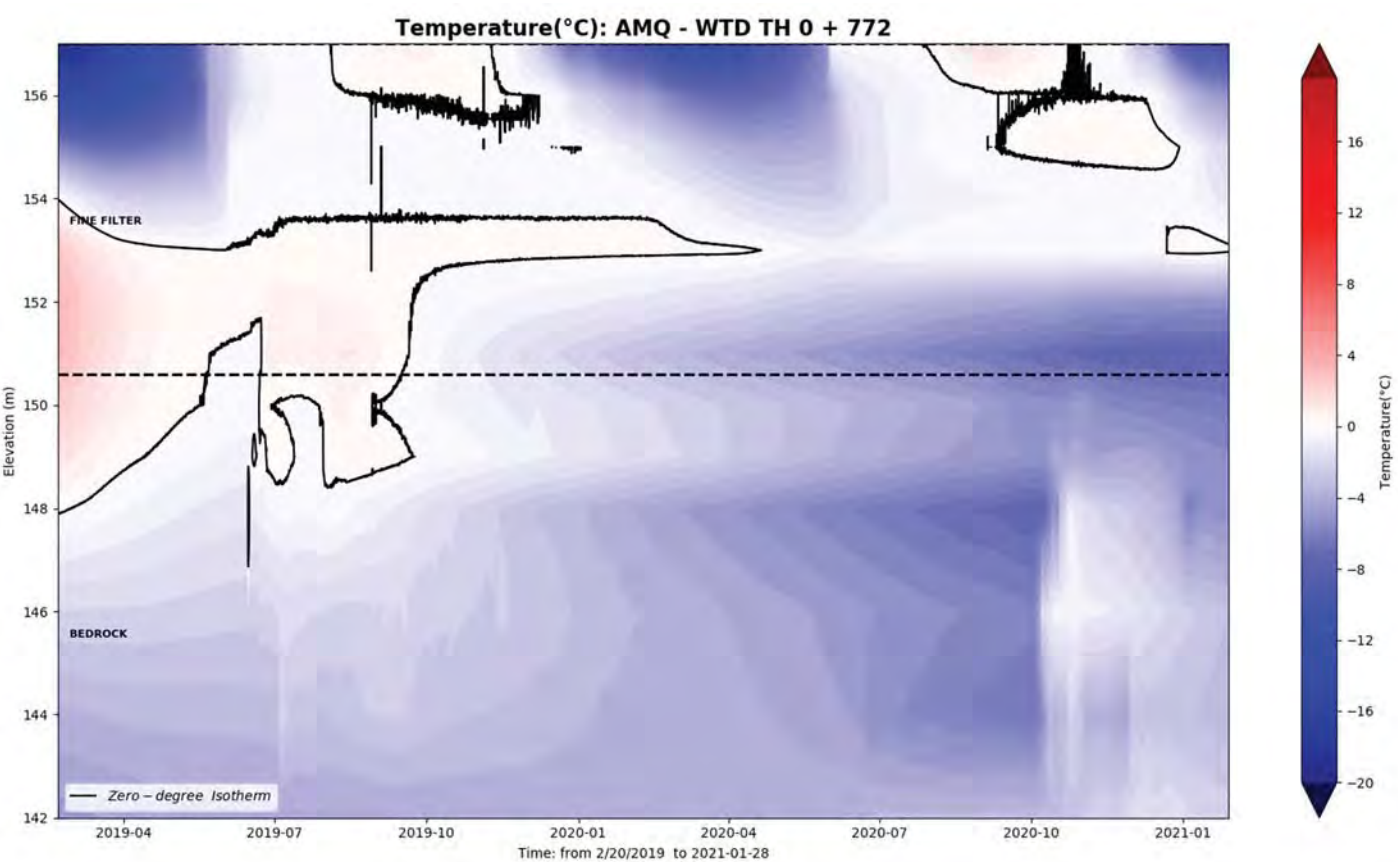


WTD-TH 0+750



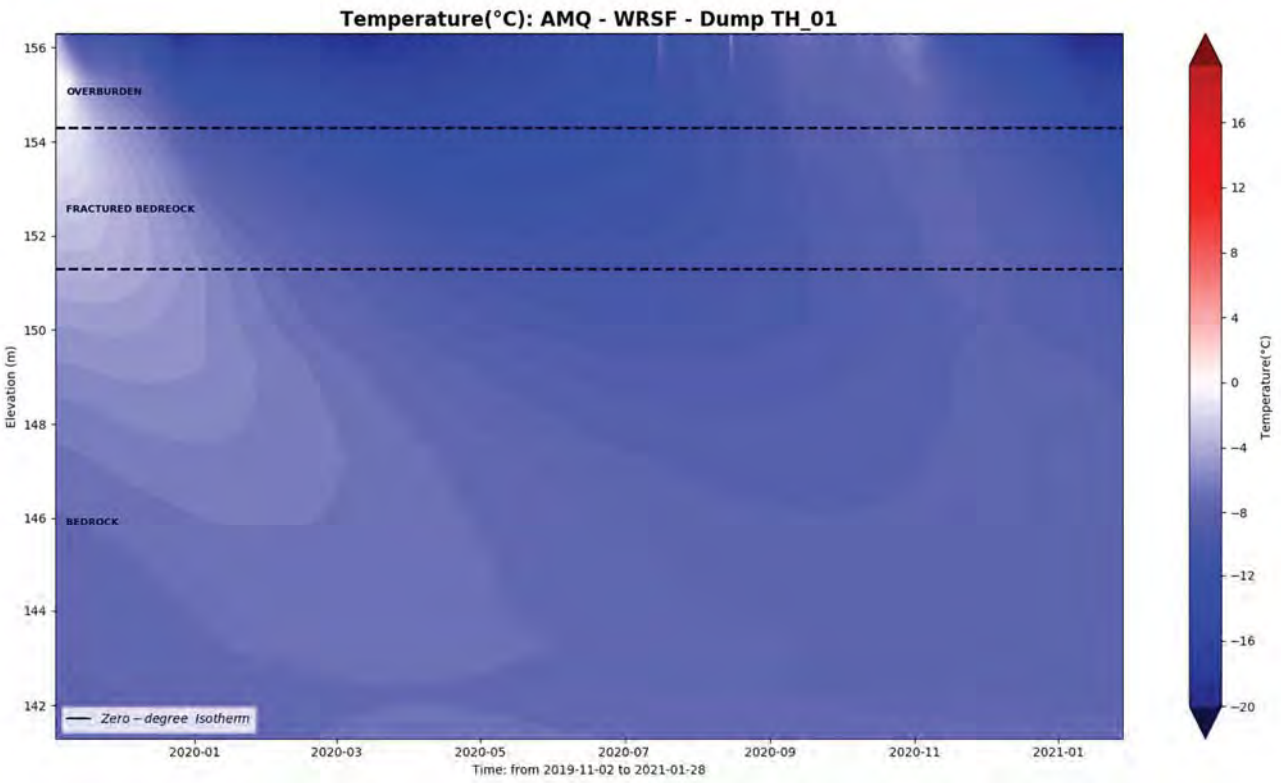
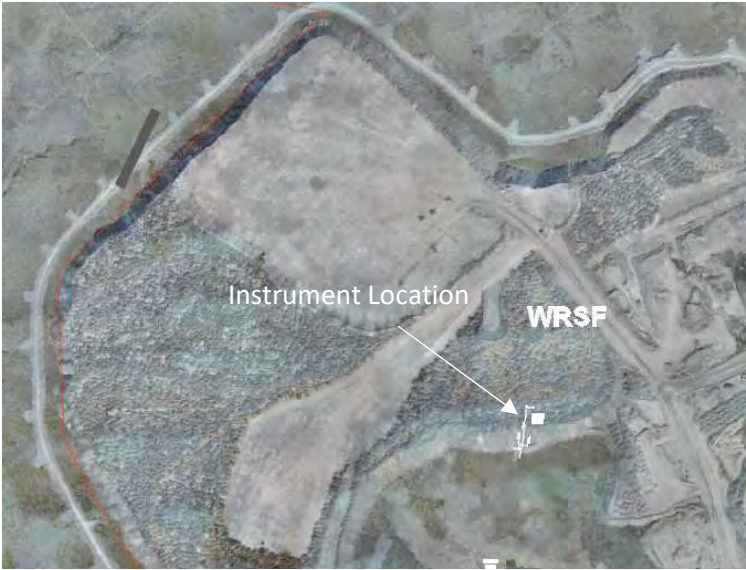


WTD-TH 0+772 U/S

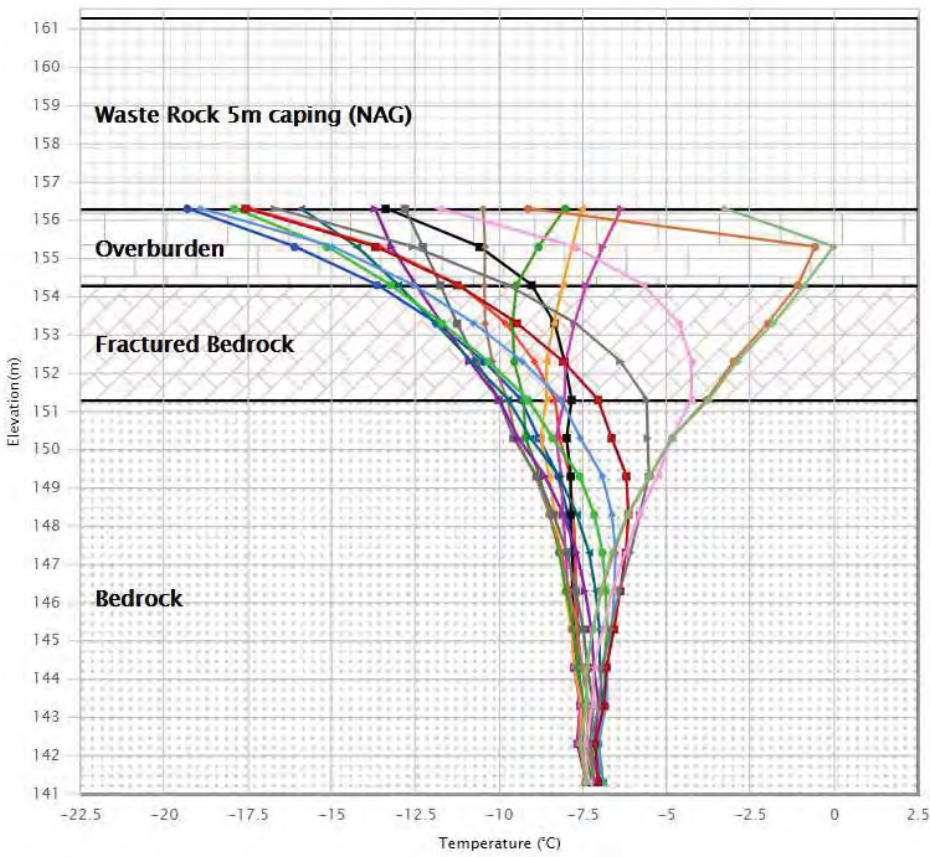




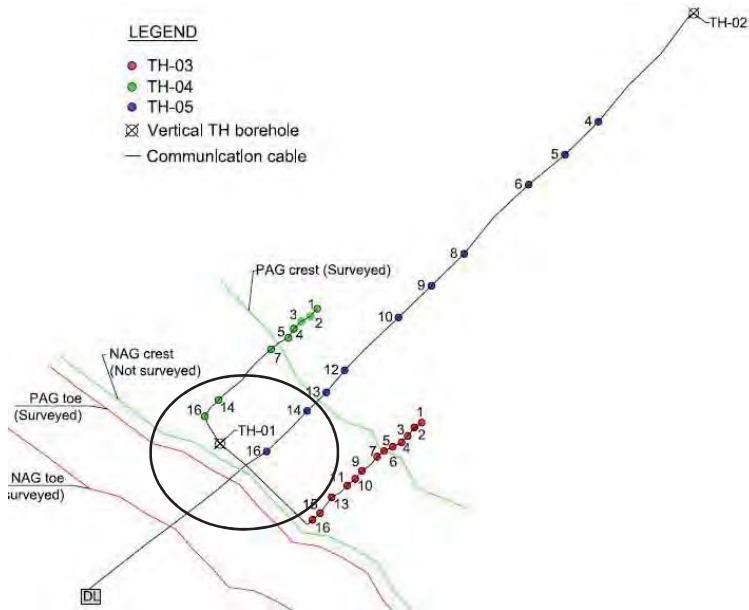
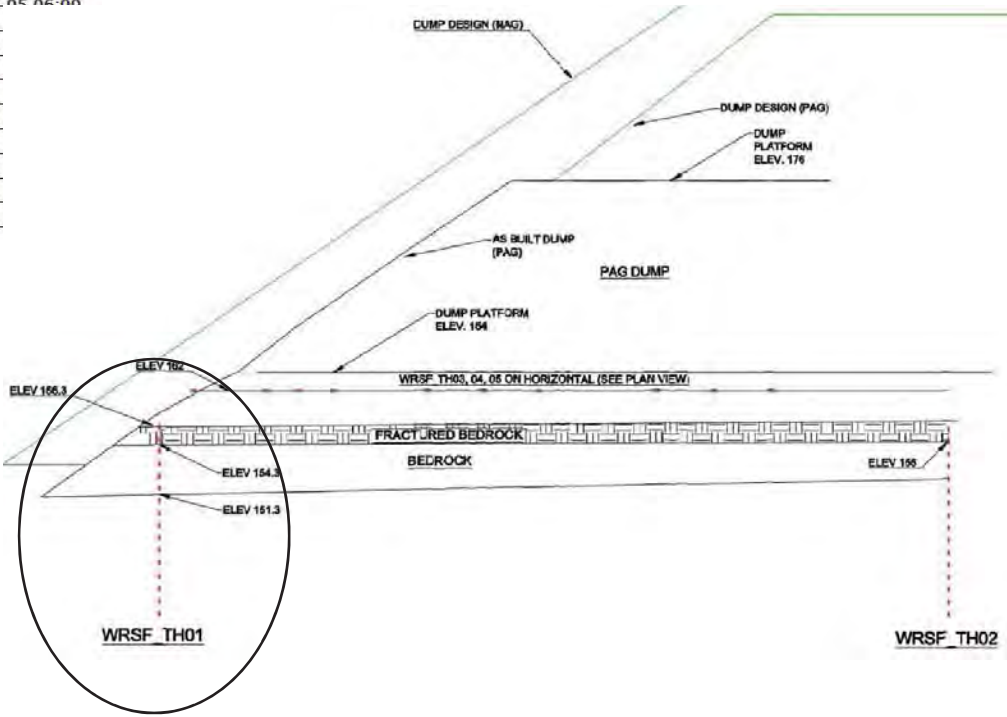
WRSF TH01



AMQ - WRSF - Dump TH\_01

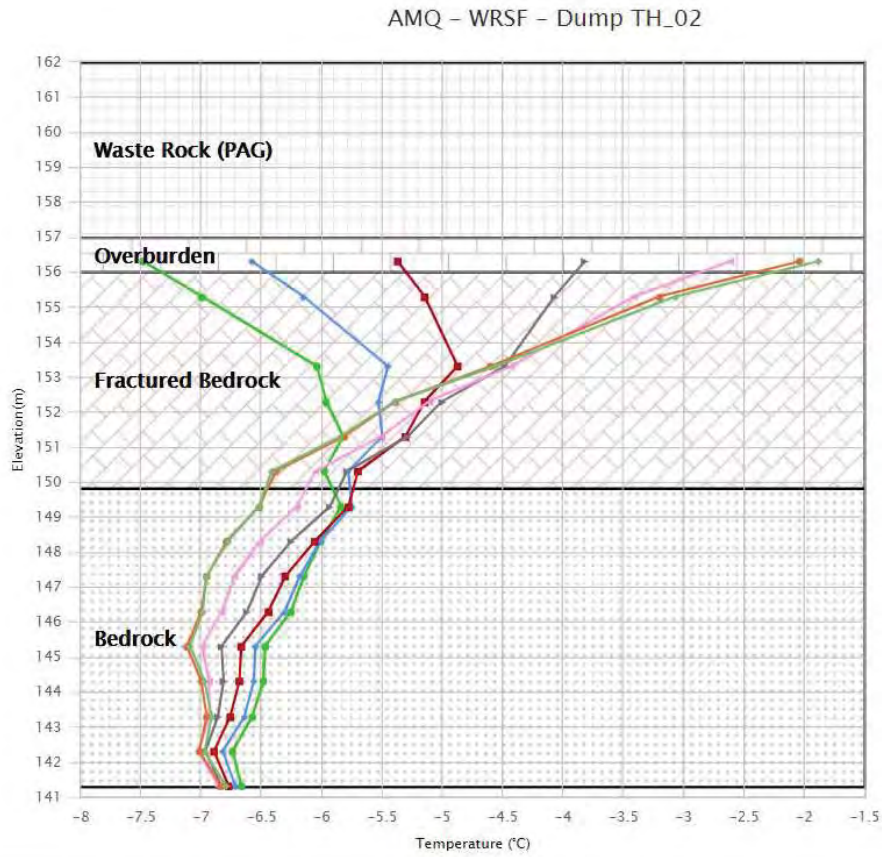
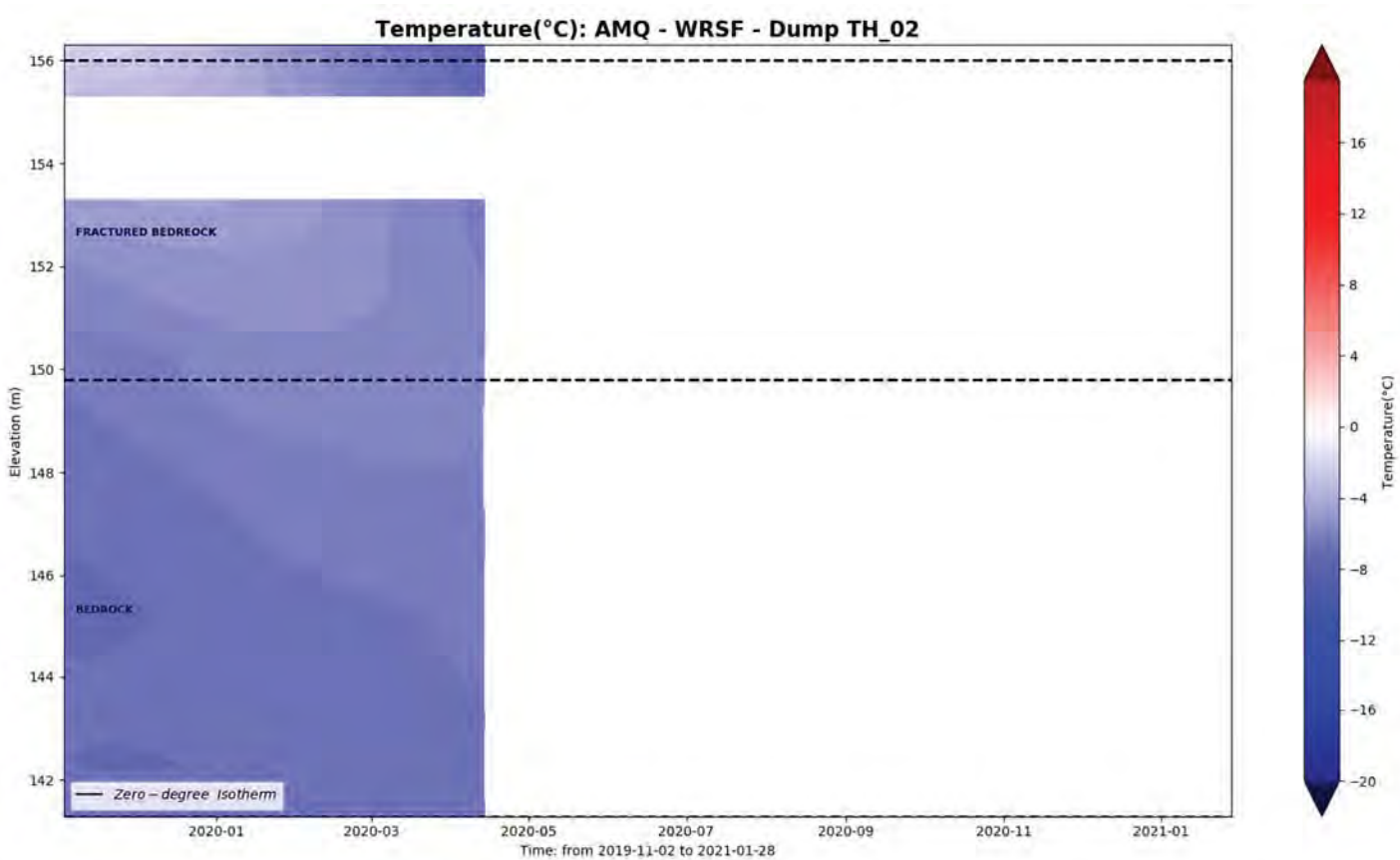
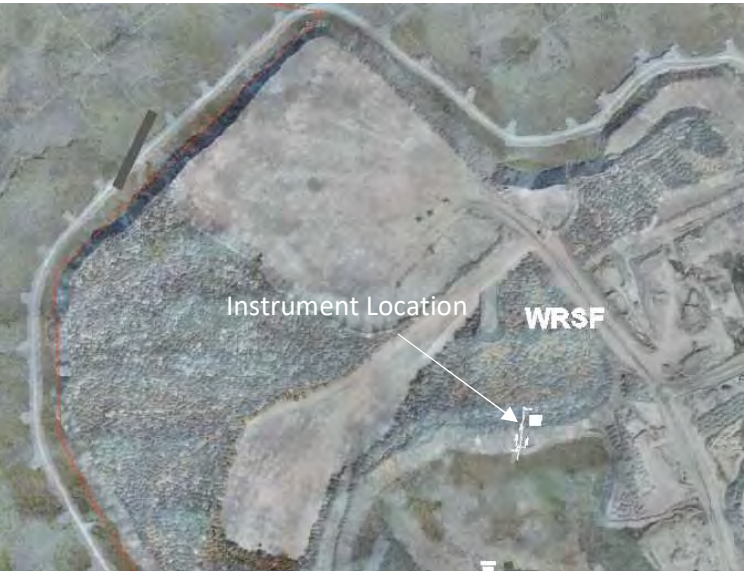


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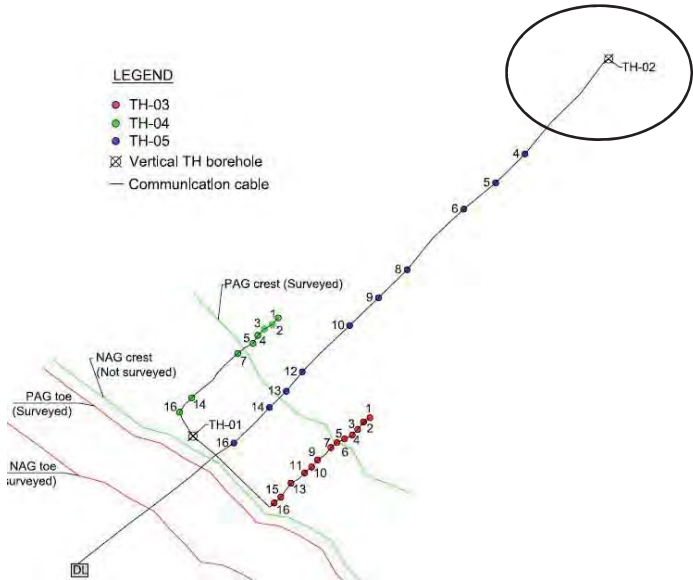
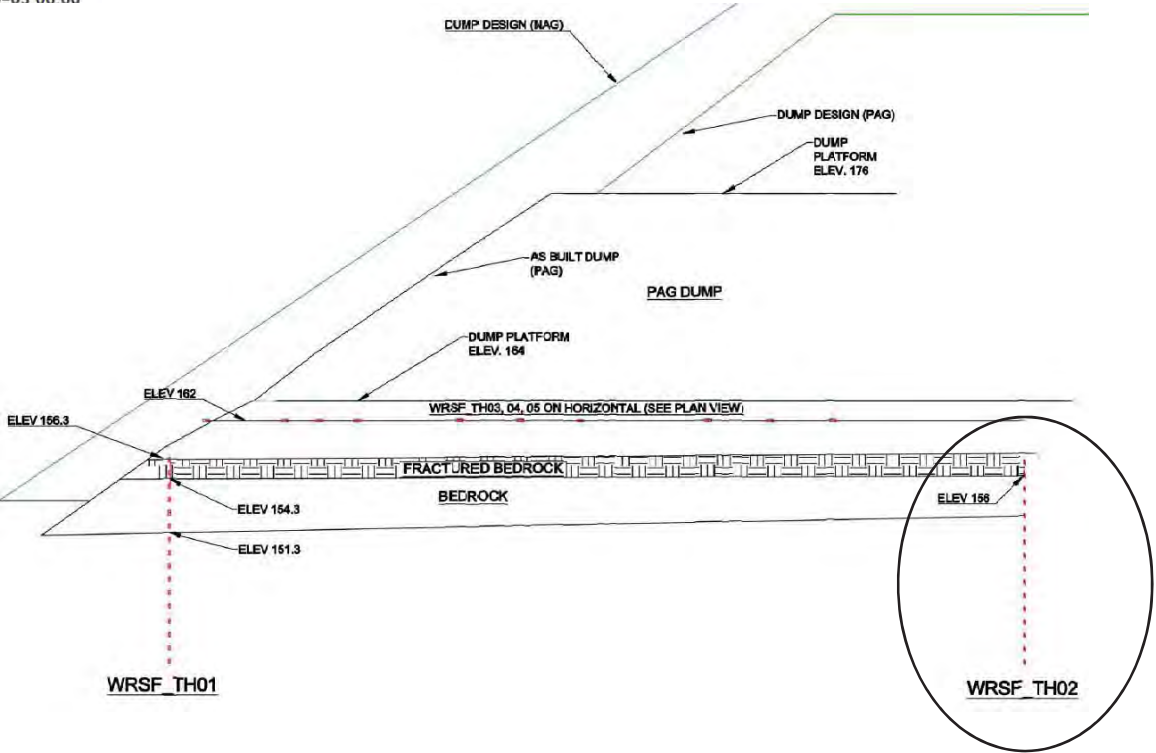




WRSF TH02



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- 2021-01-01 06:00
- 2020-12-02 06:00
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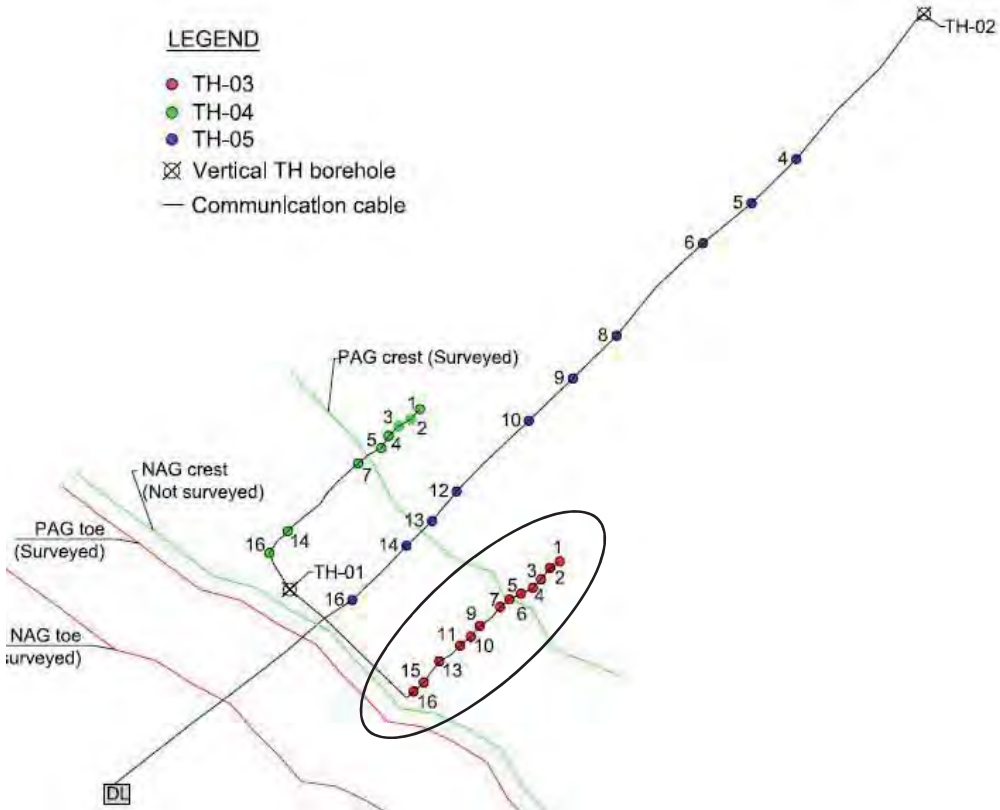
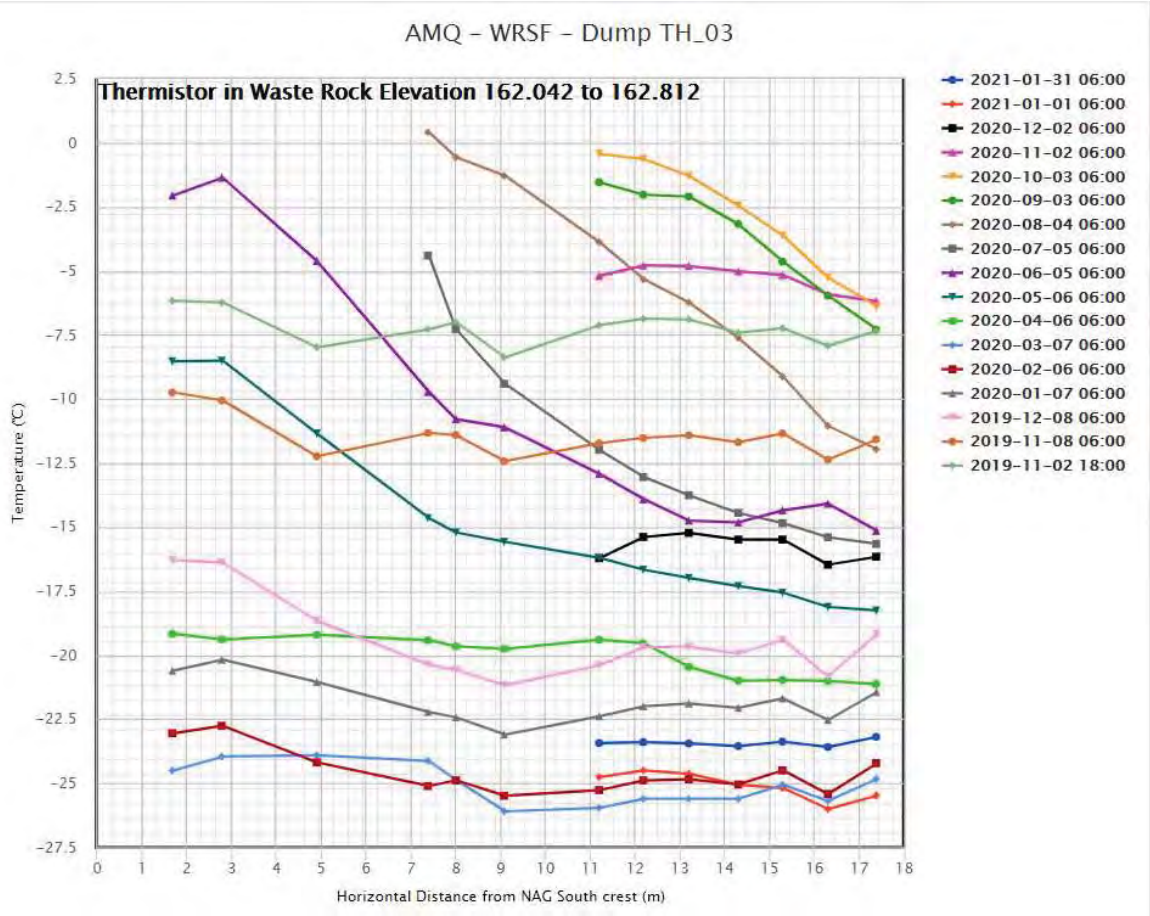
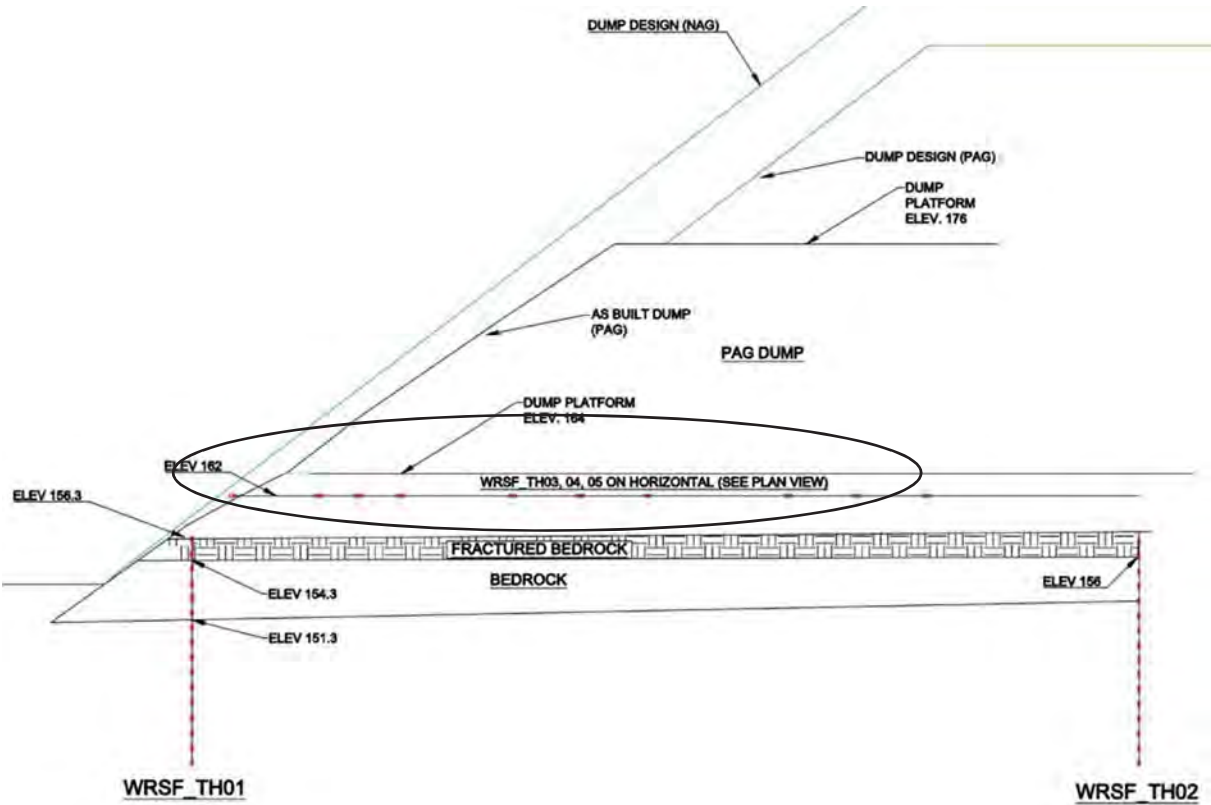




WRSF TH03

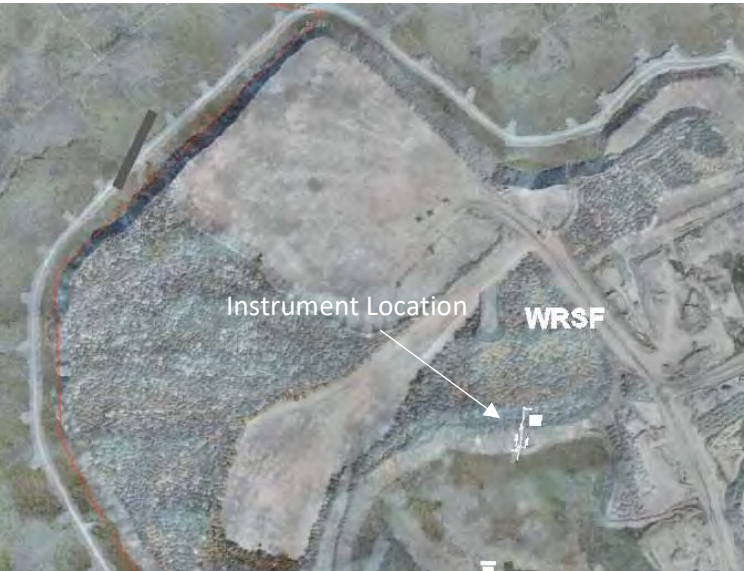


Thermistor in Waste Rock Elevation 162.042 to 162.812.

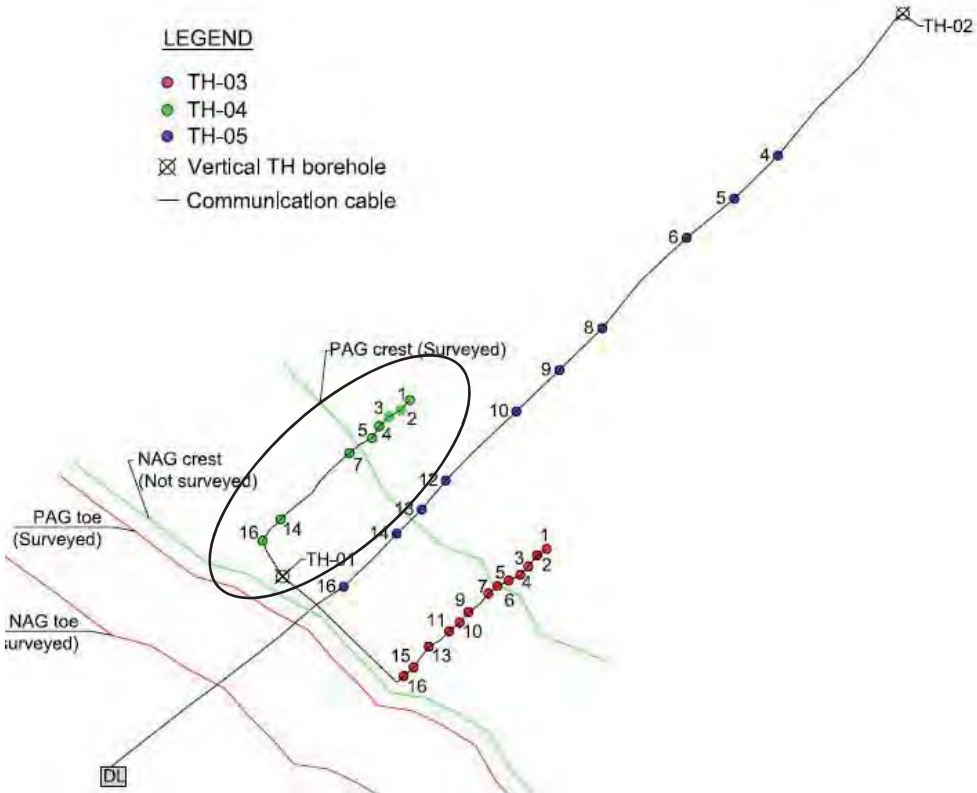
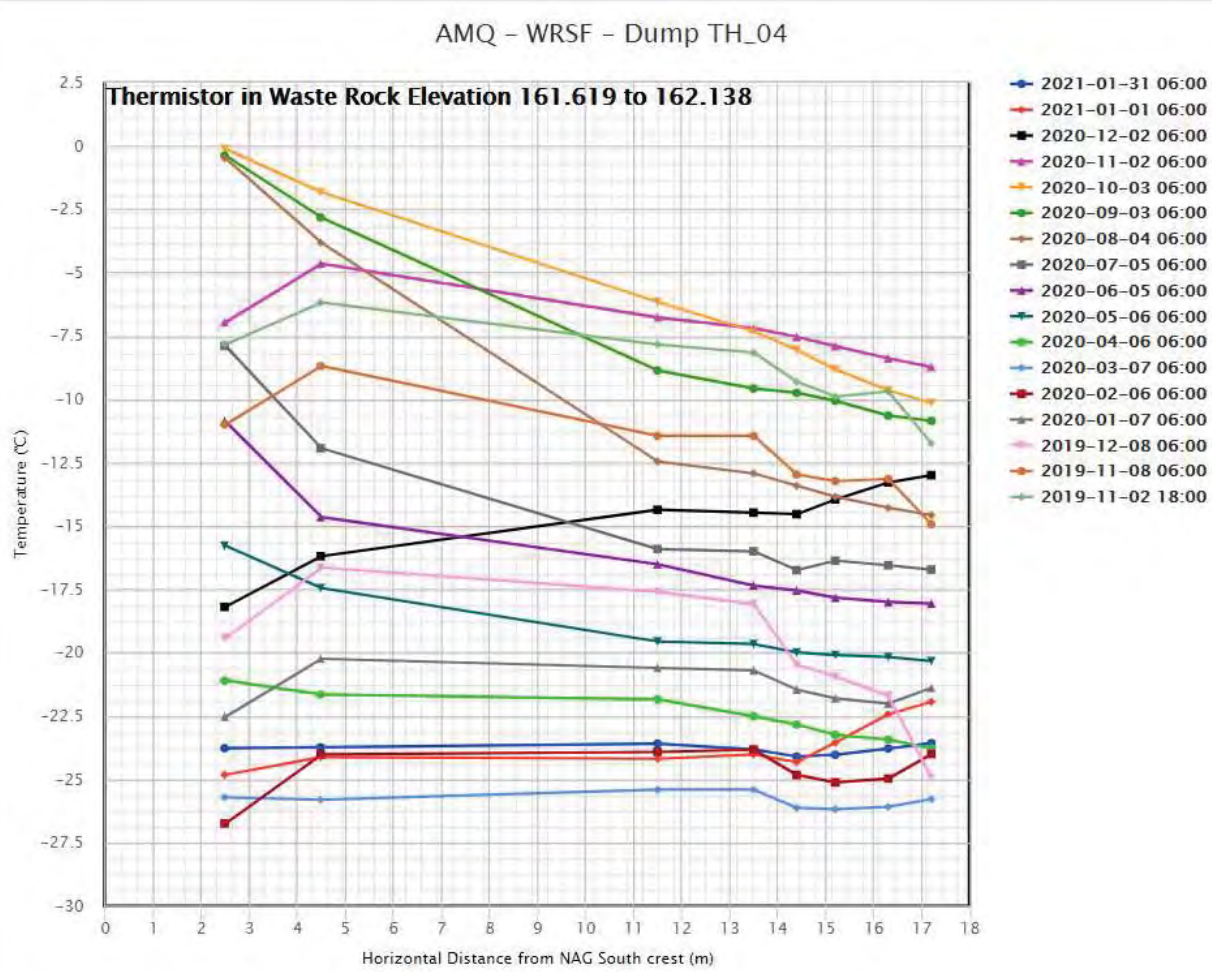
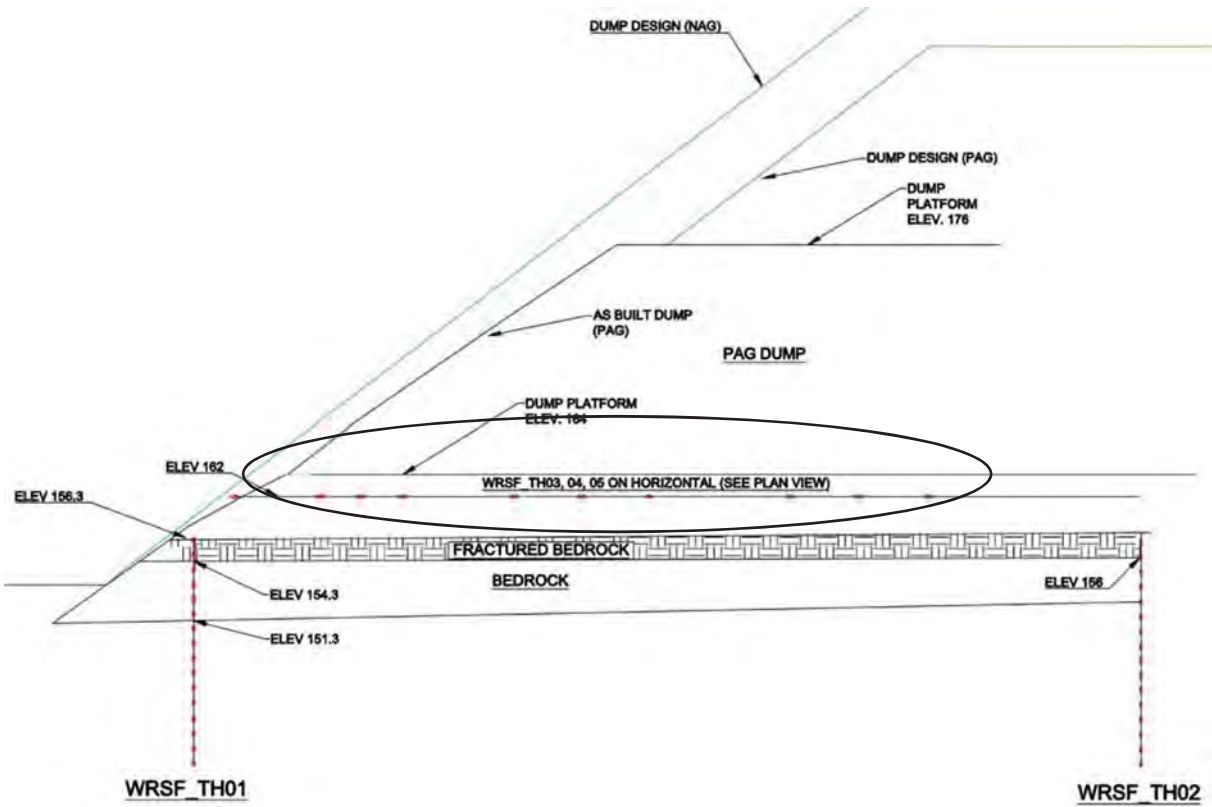




WRSF TH04

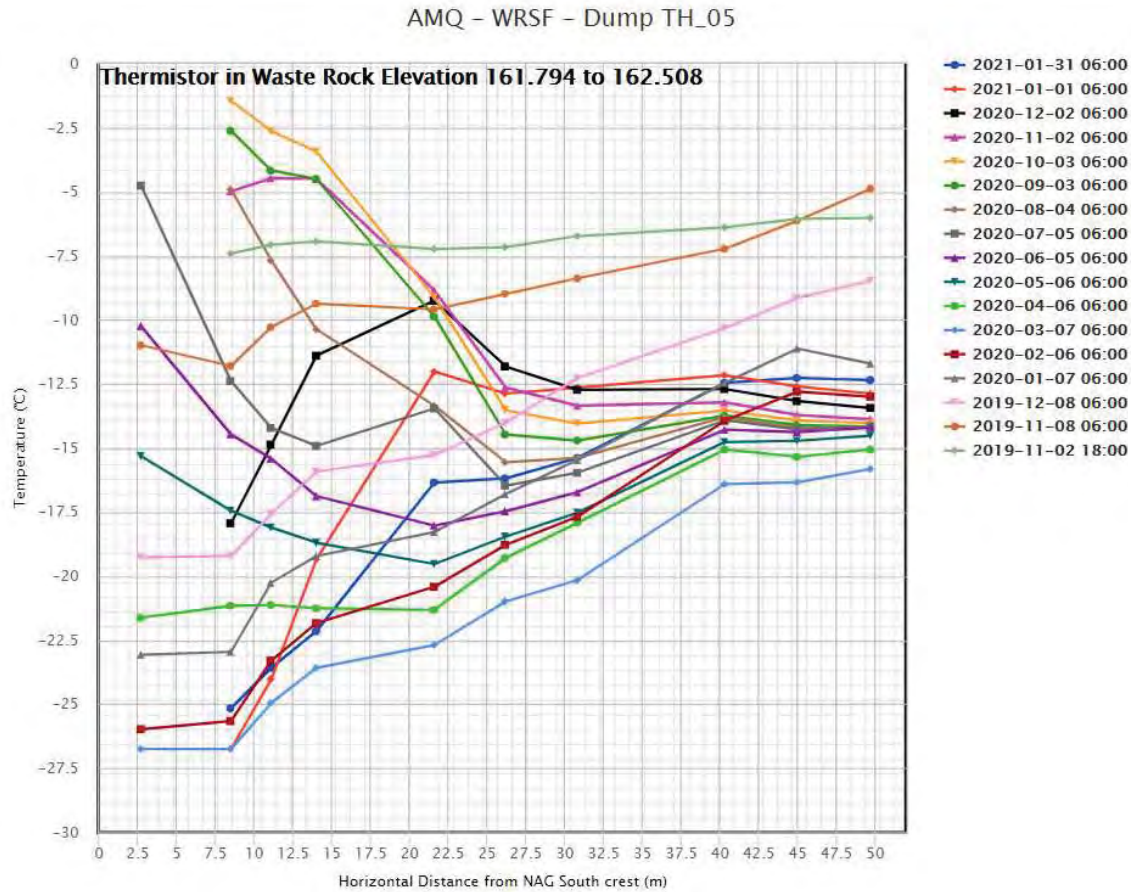
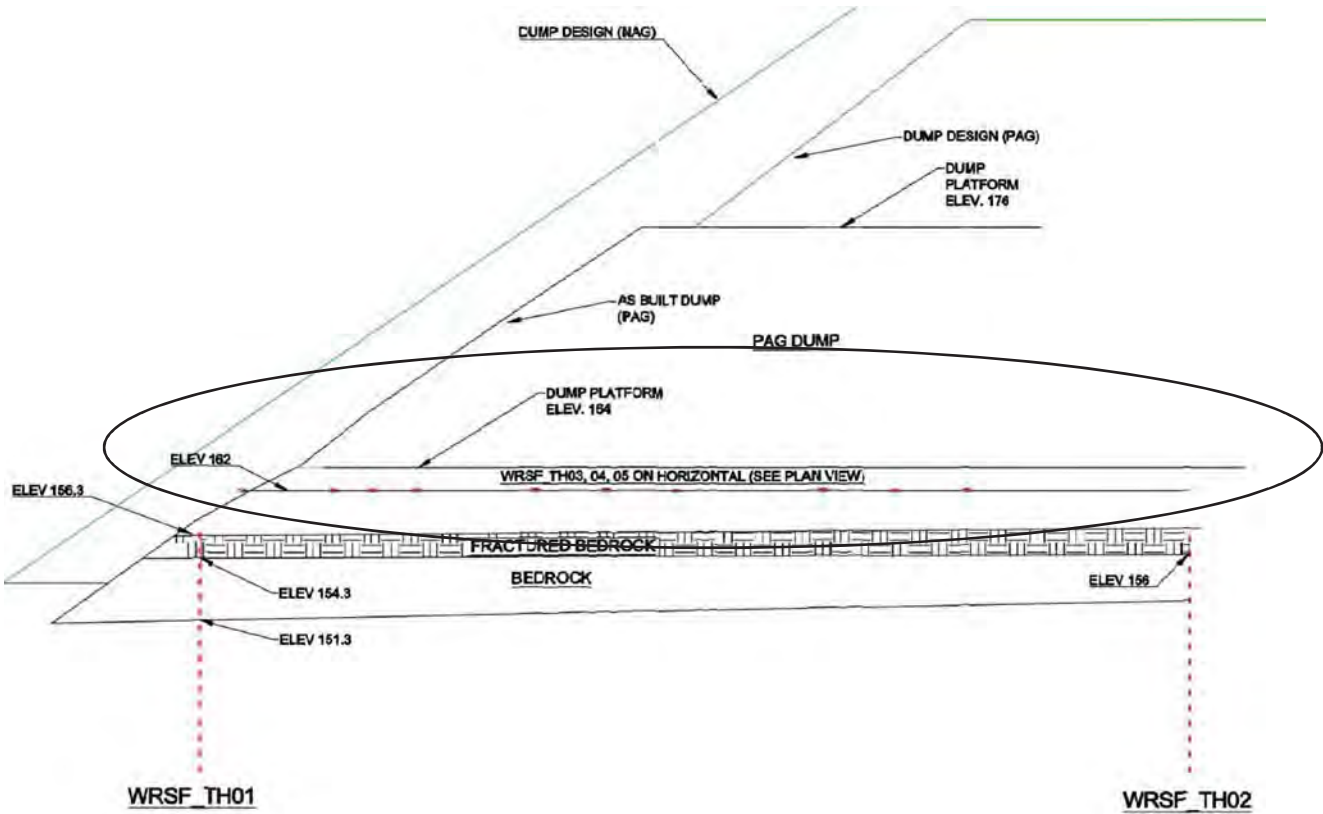
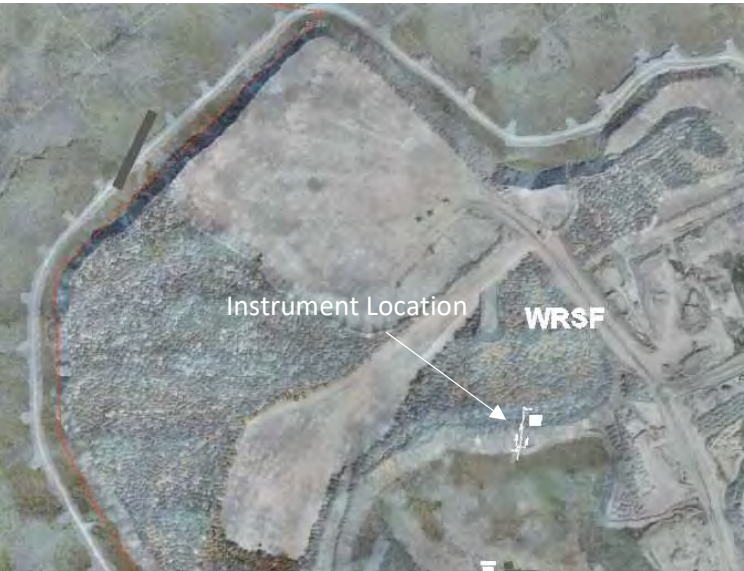


Thermistor in Waste Rock Elevation 161.619 to 162.138.

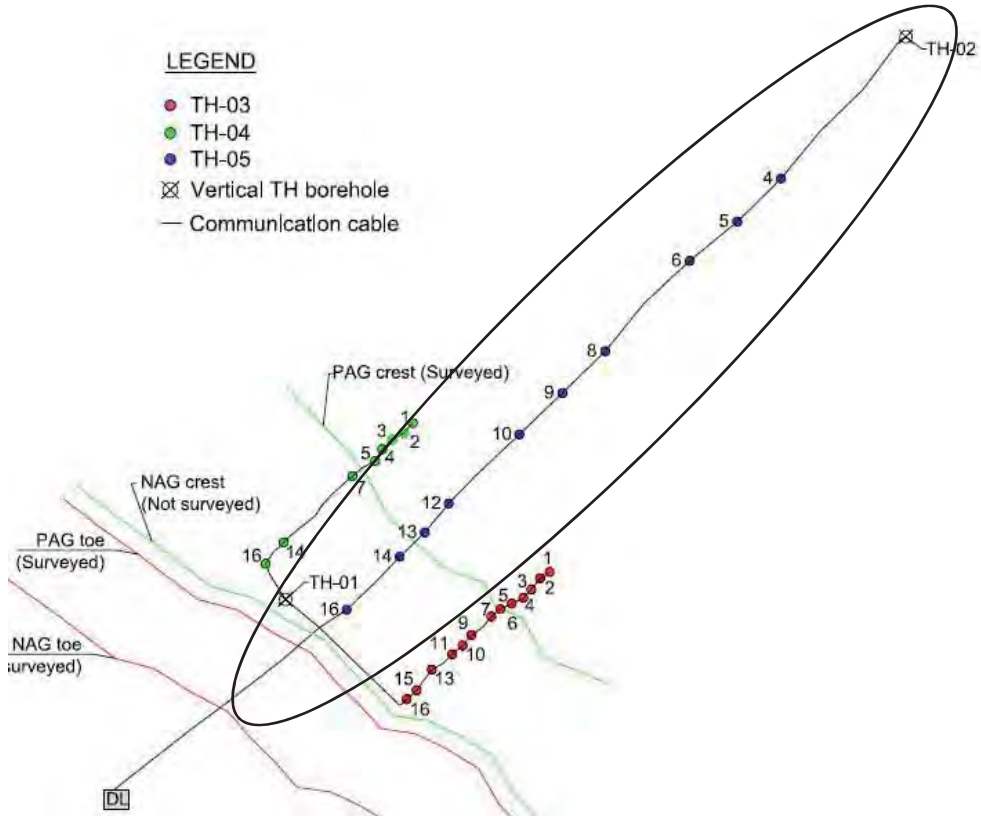




WRSF TH05

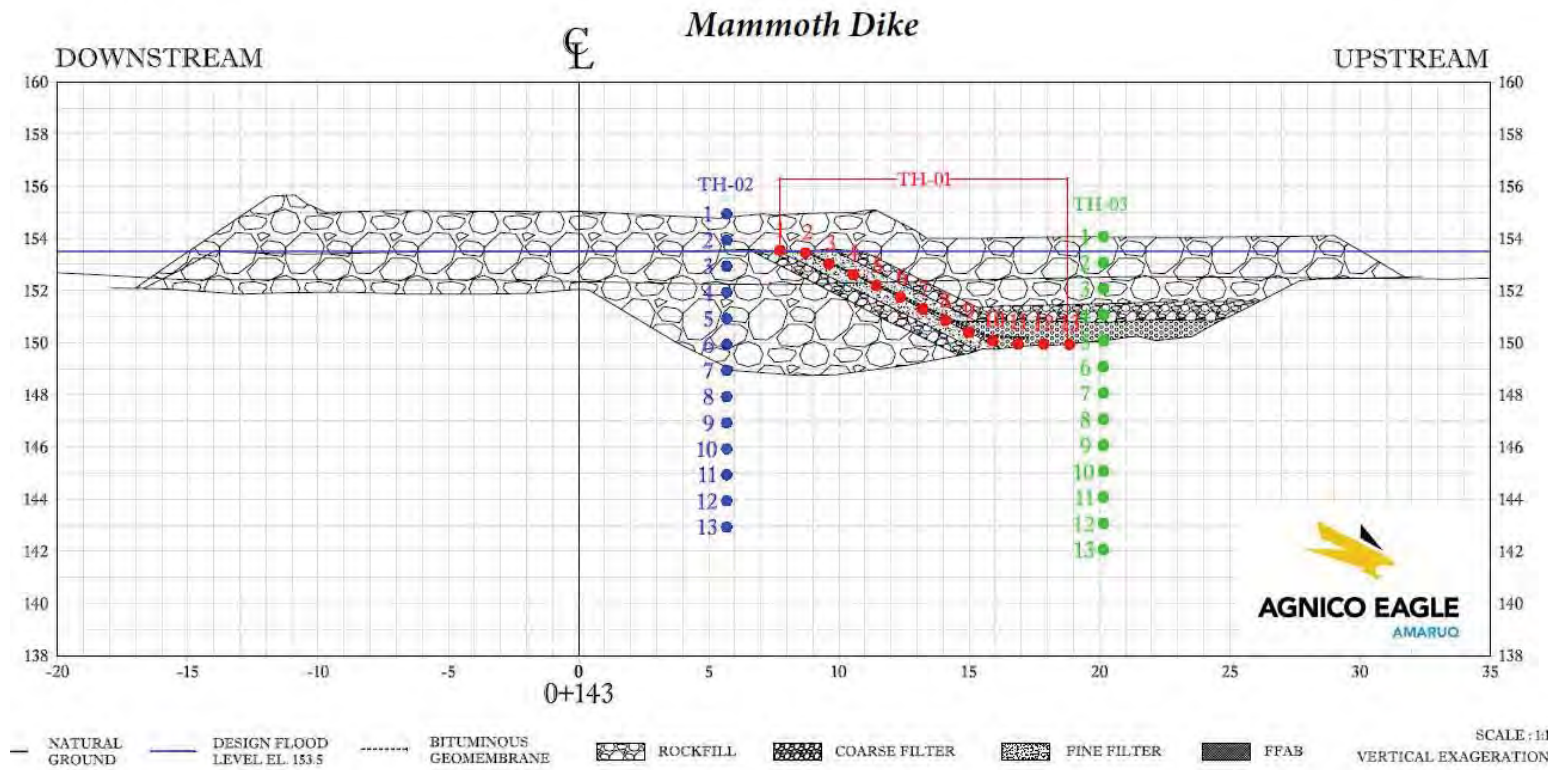
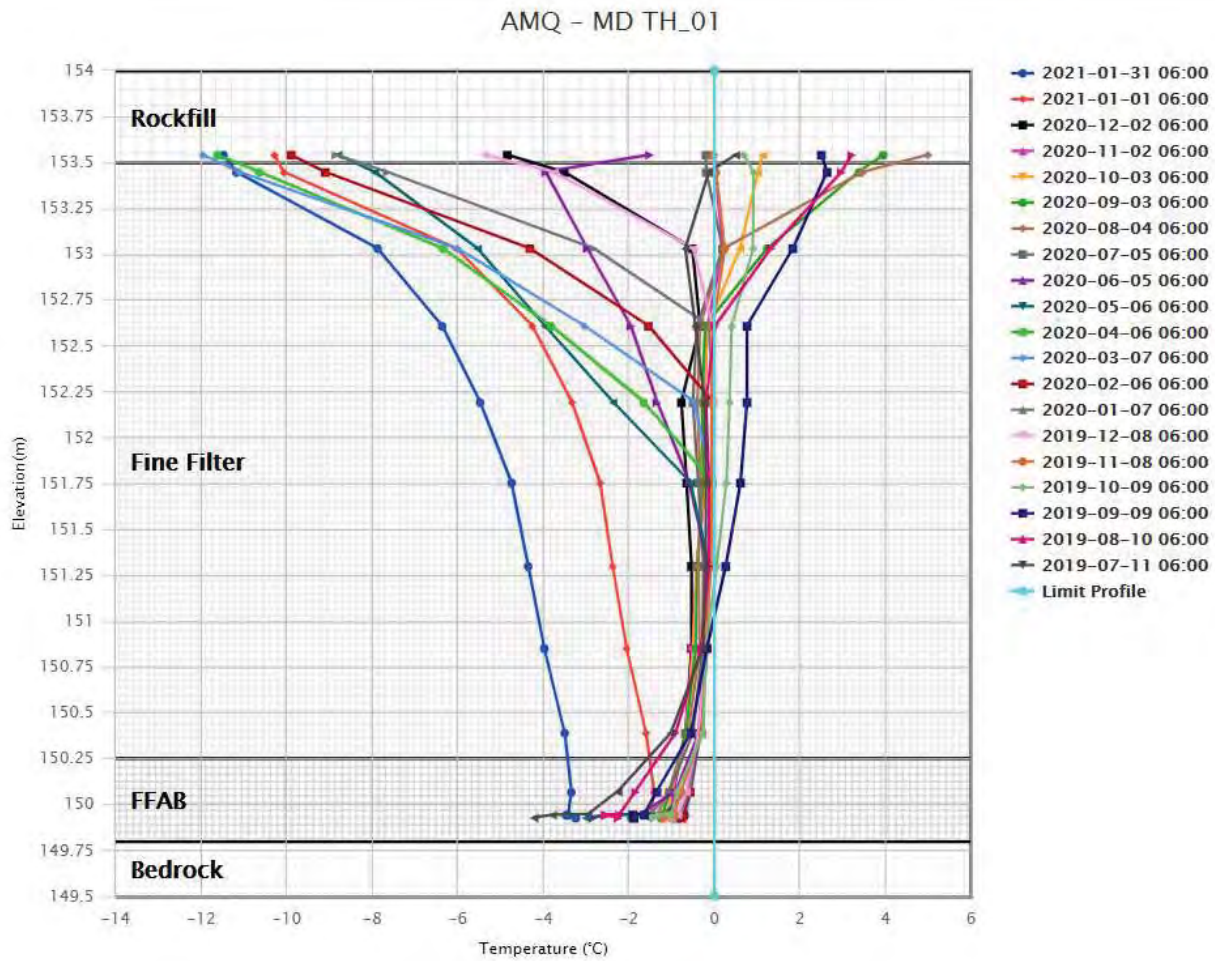
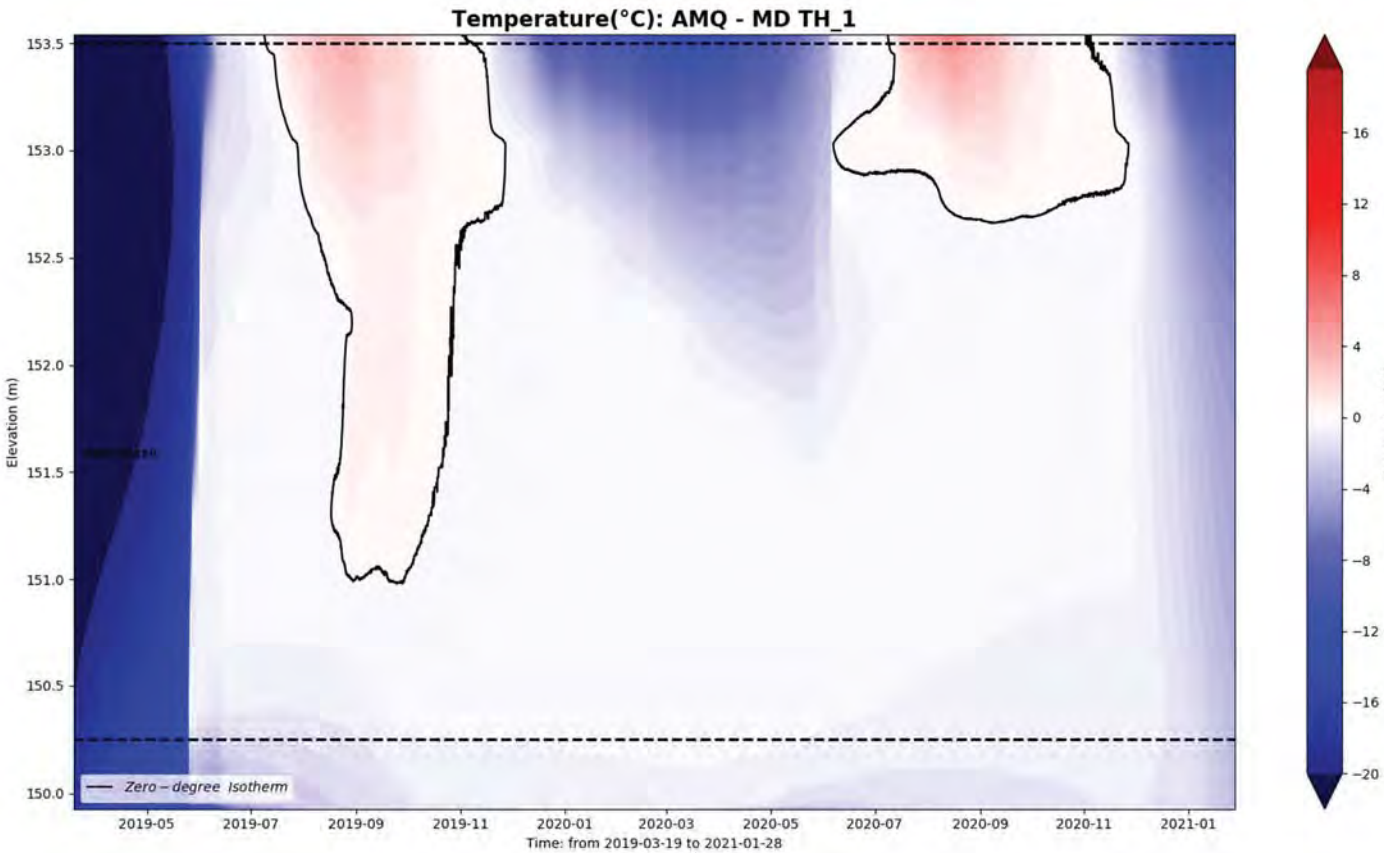


Thermistor in Waste Rock Elevation  
161.794 to 162.508





MD TH01

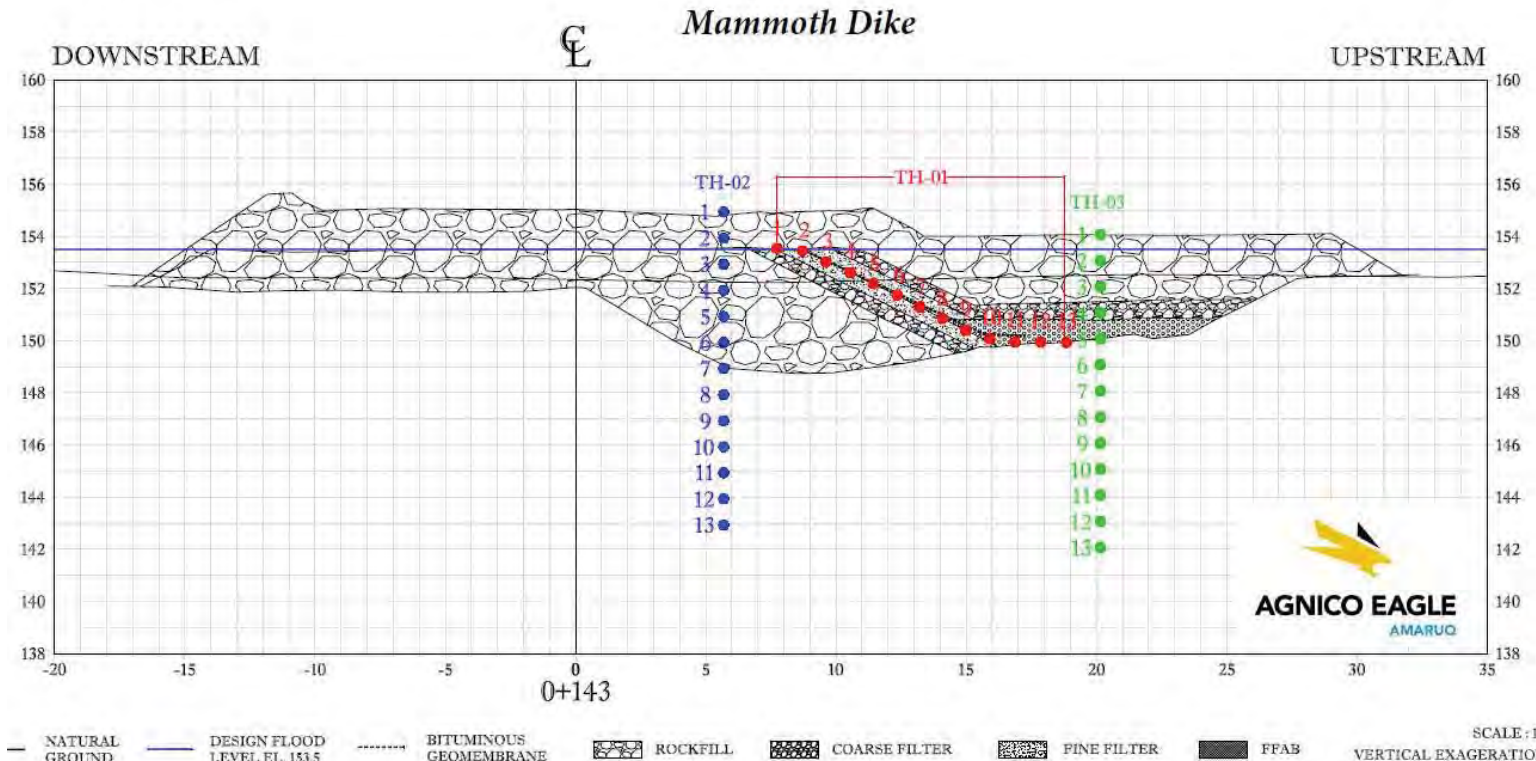
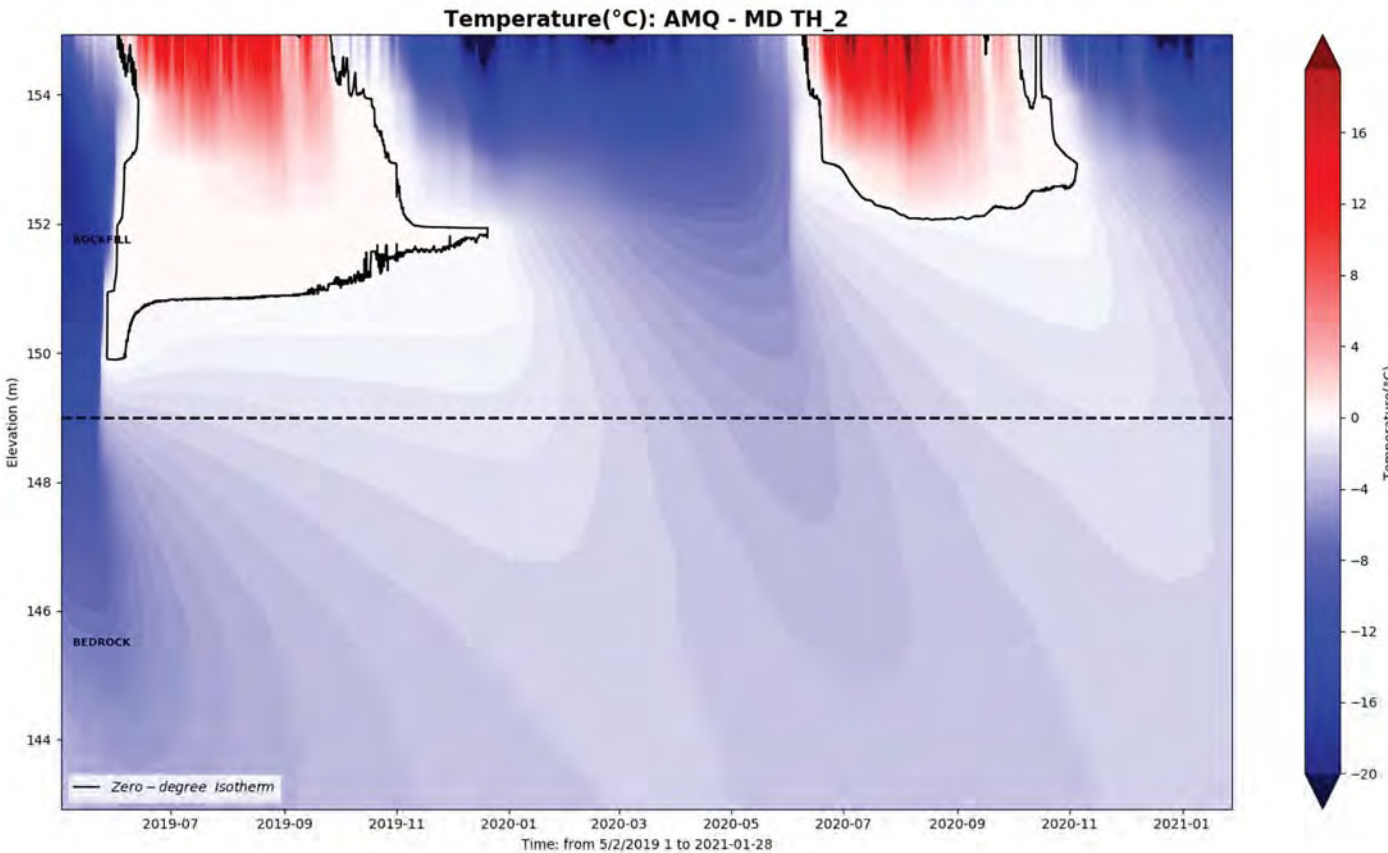
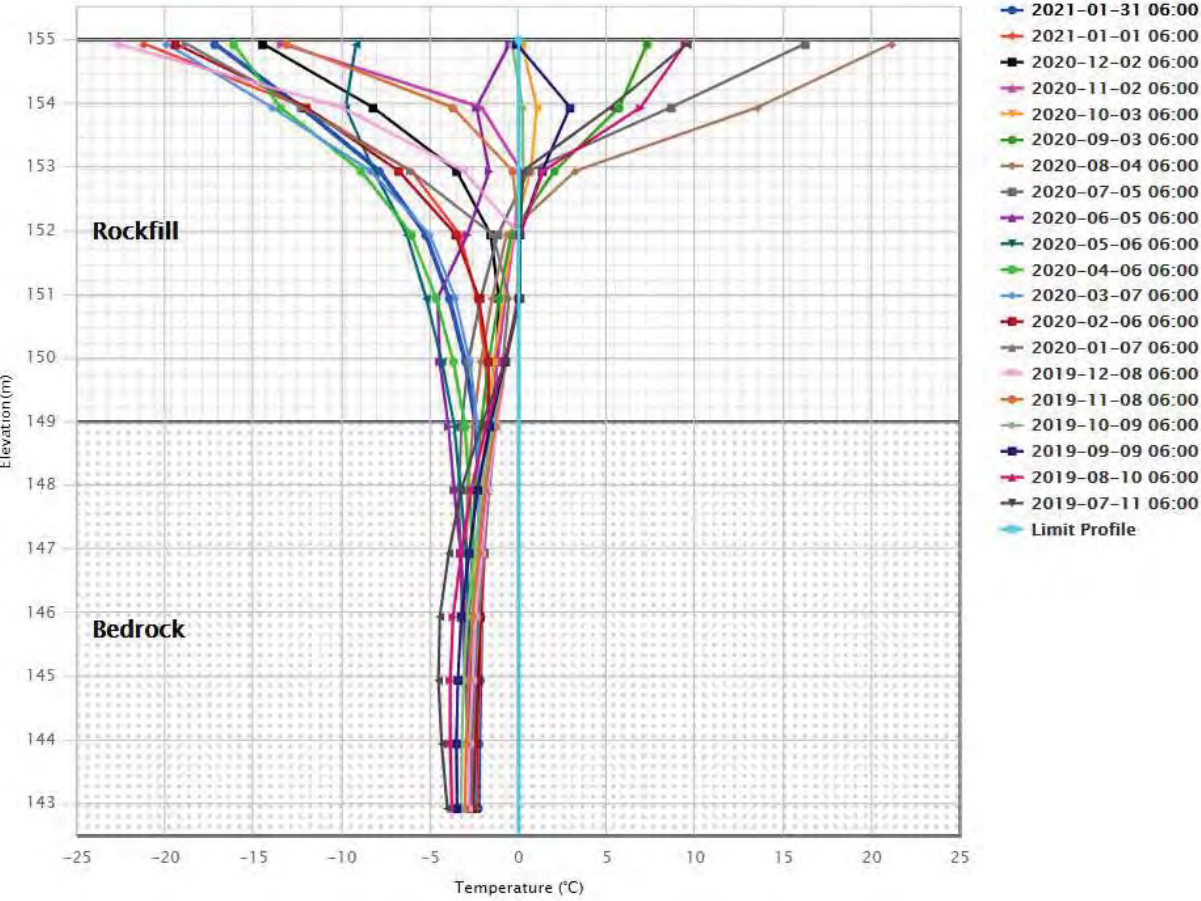




MD TH02



AMQ - MD TH\_02

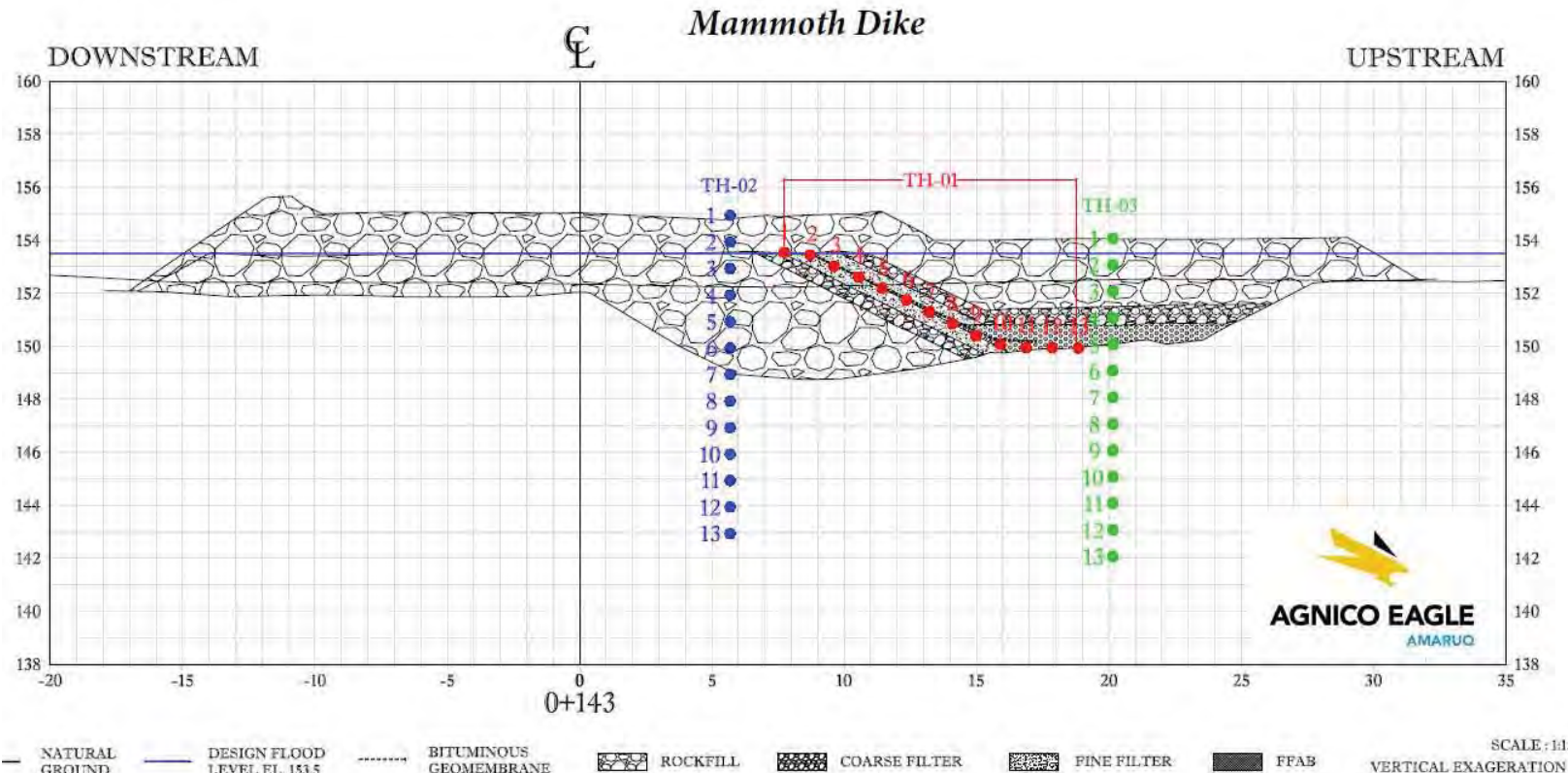
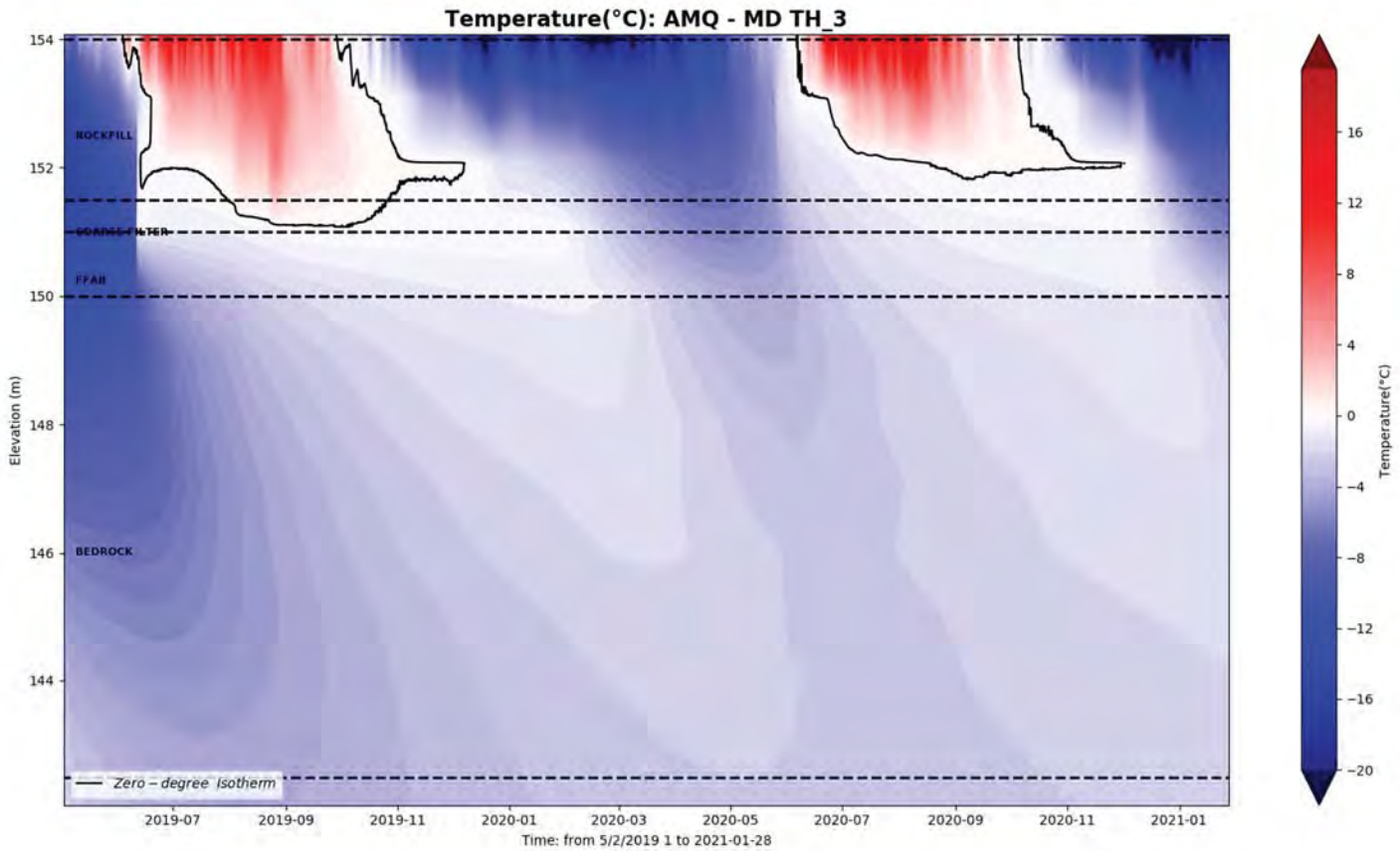
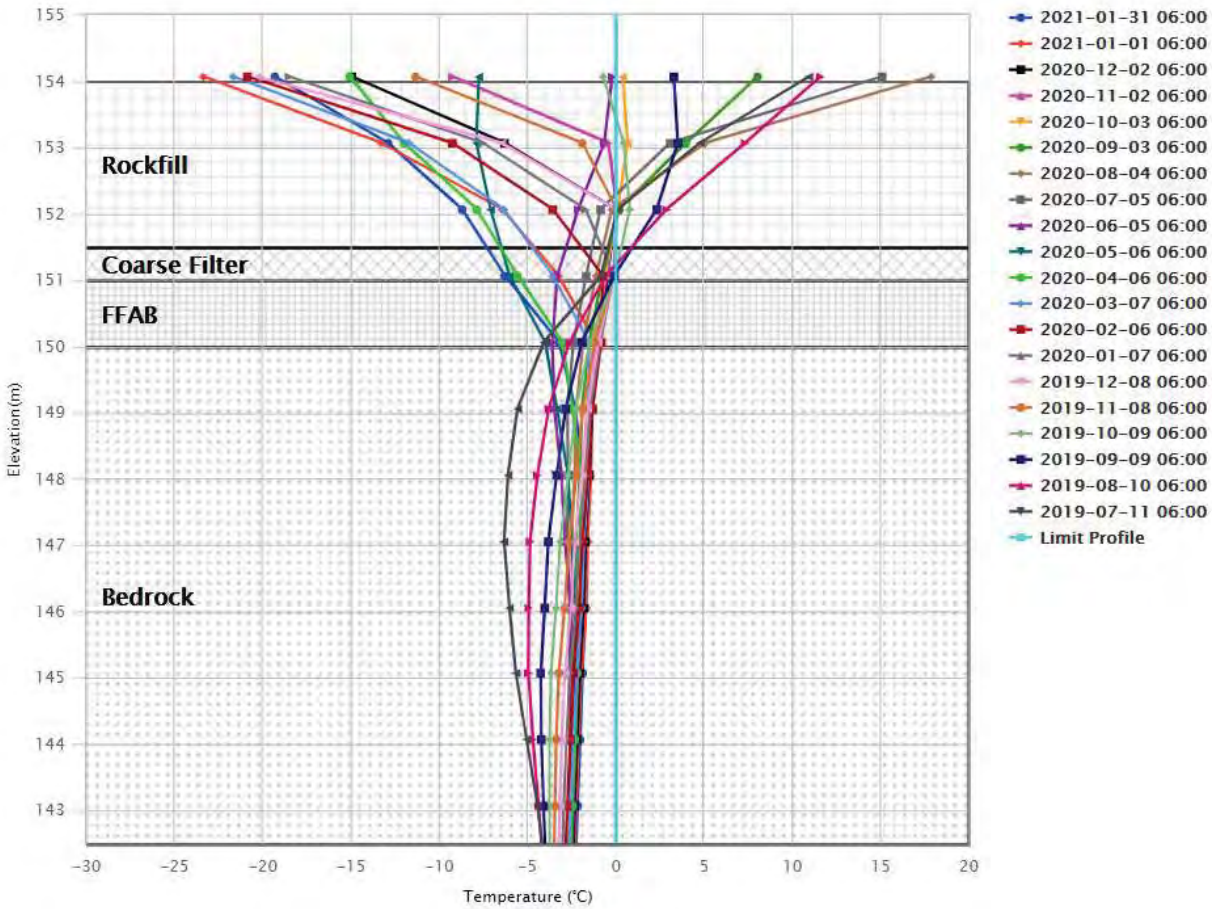




MD TH03

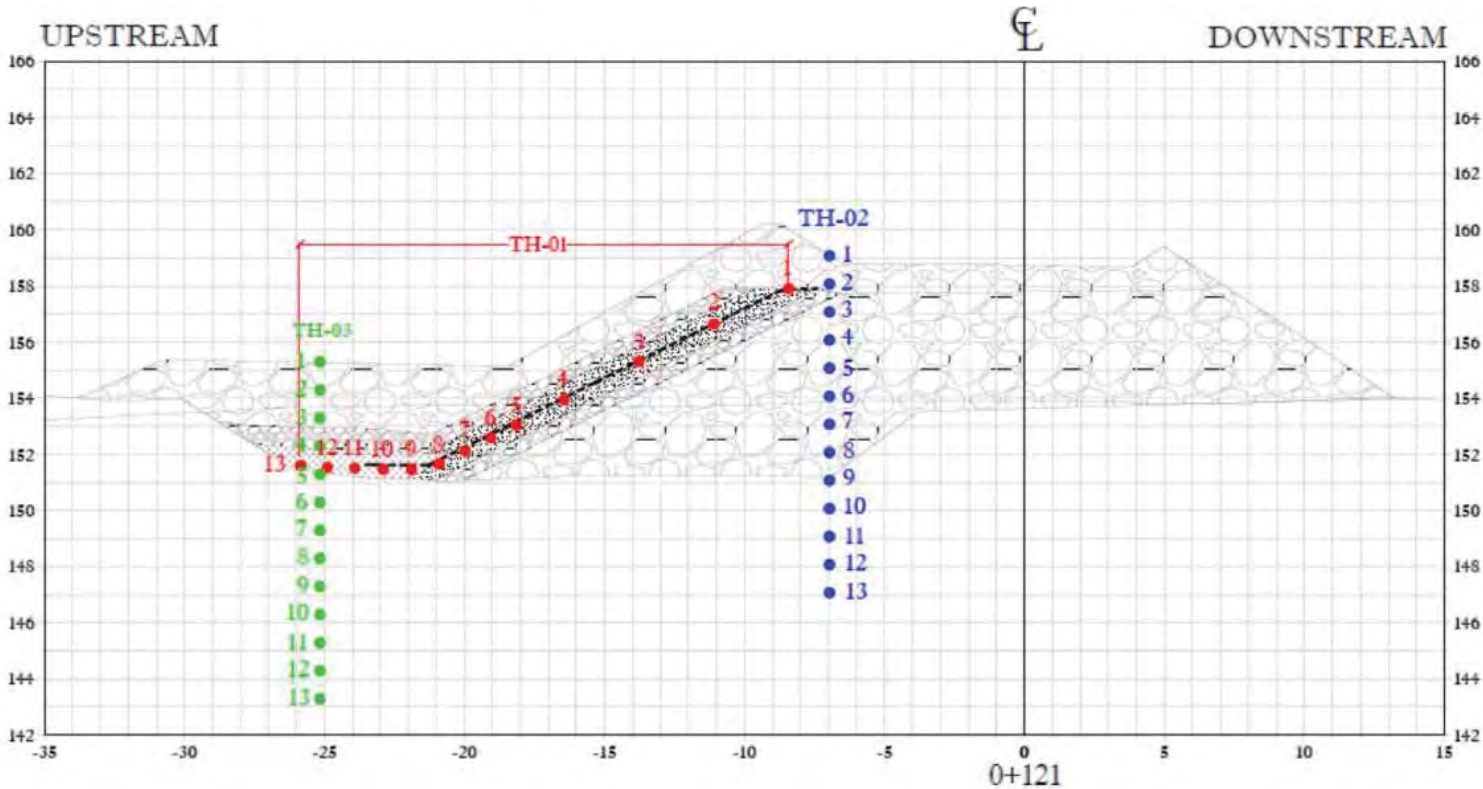
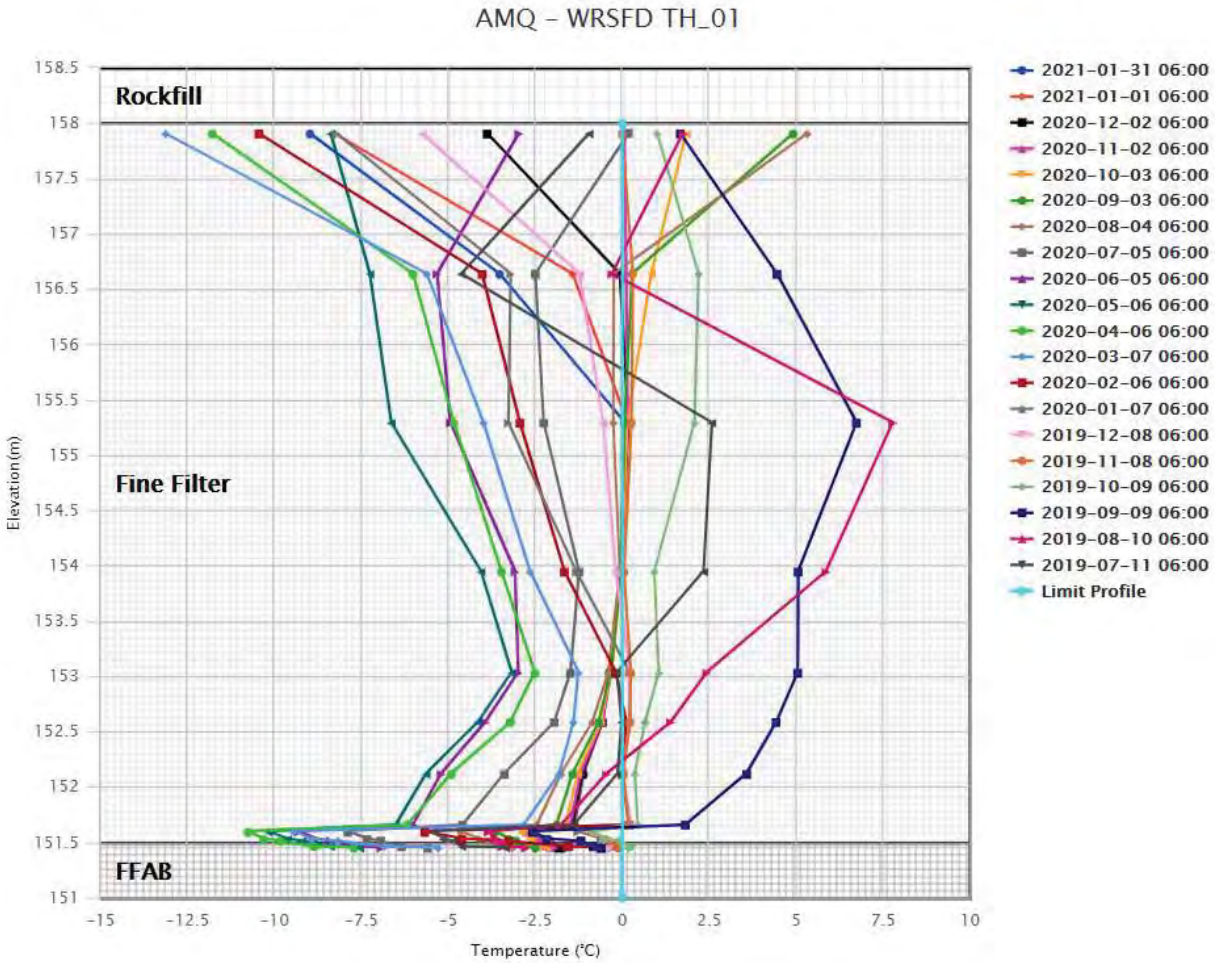
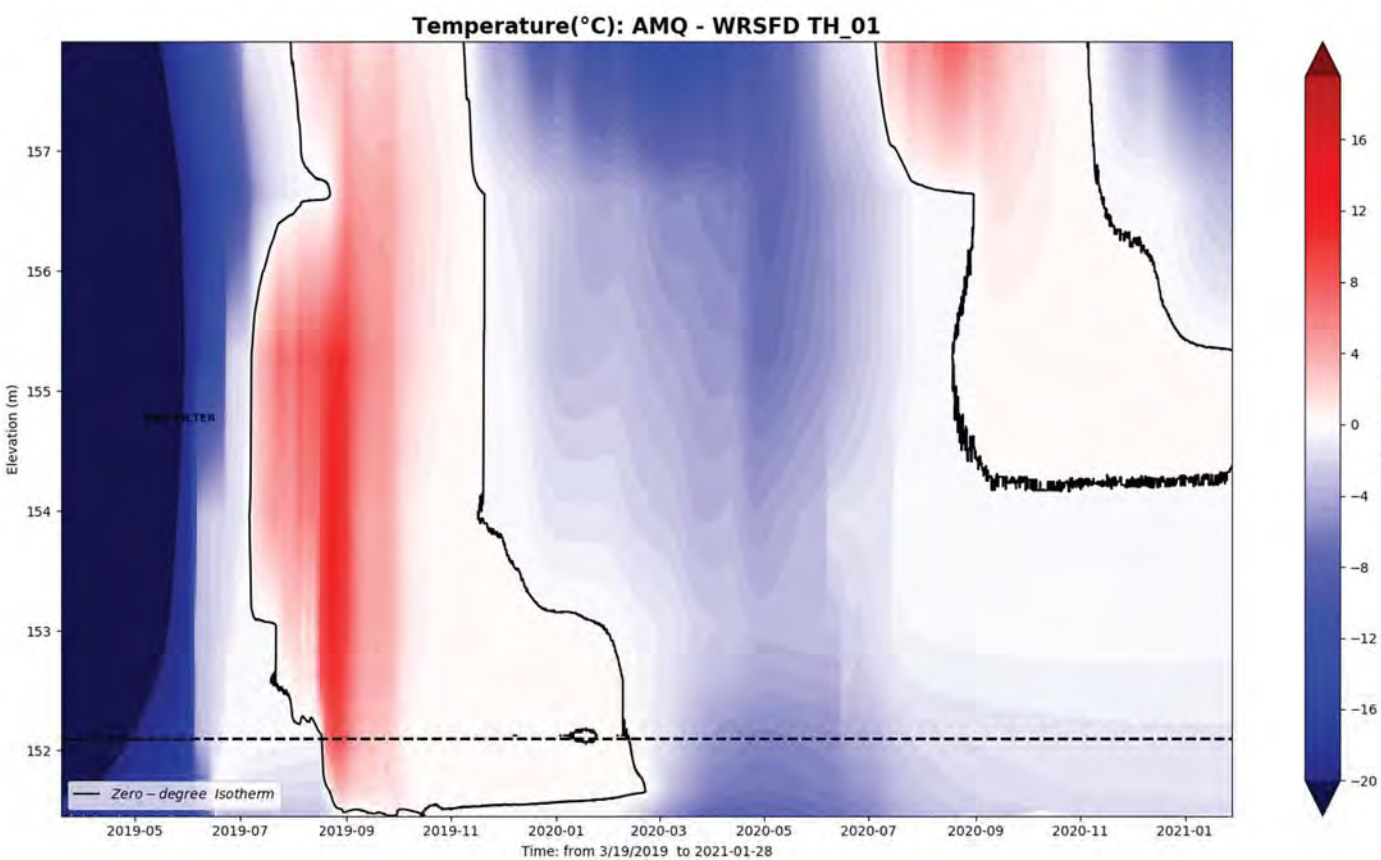


AMQ – MD TH\_03



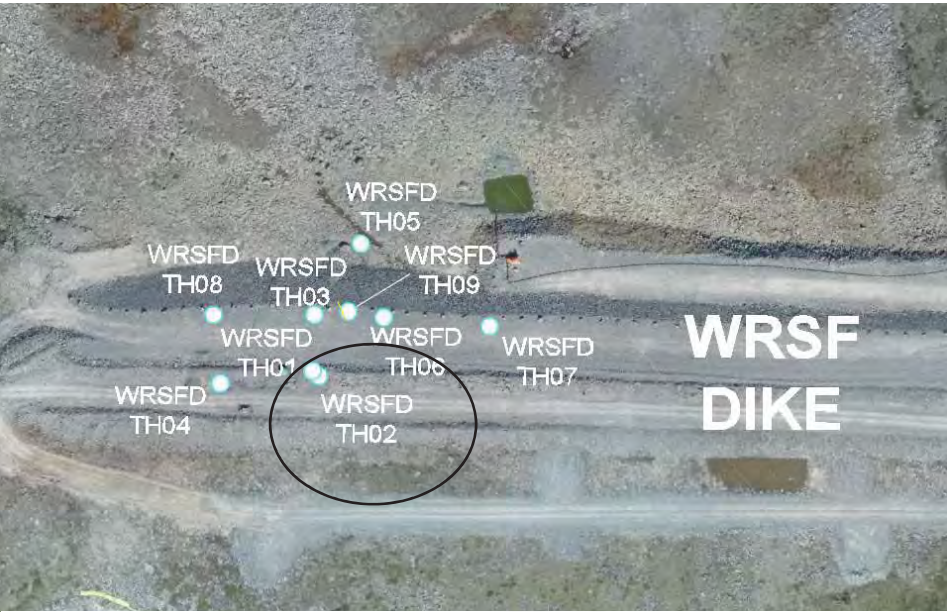


WRSFD TH01

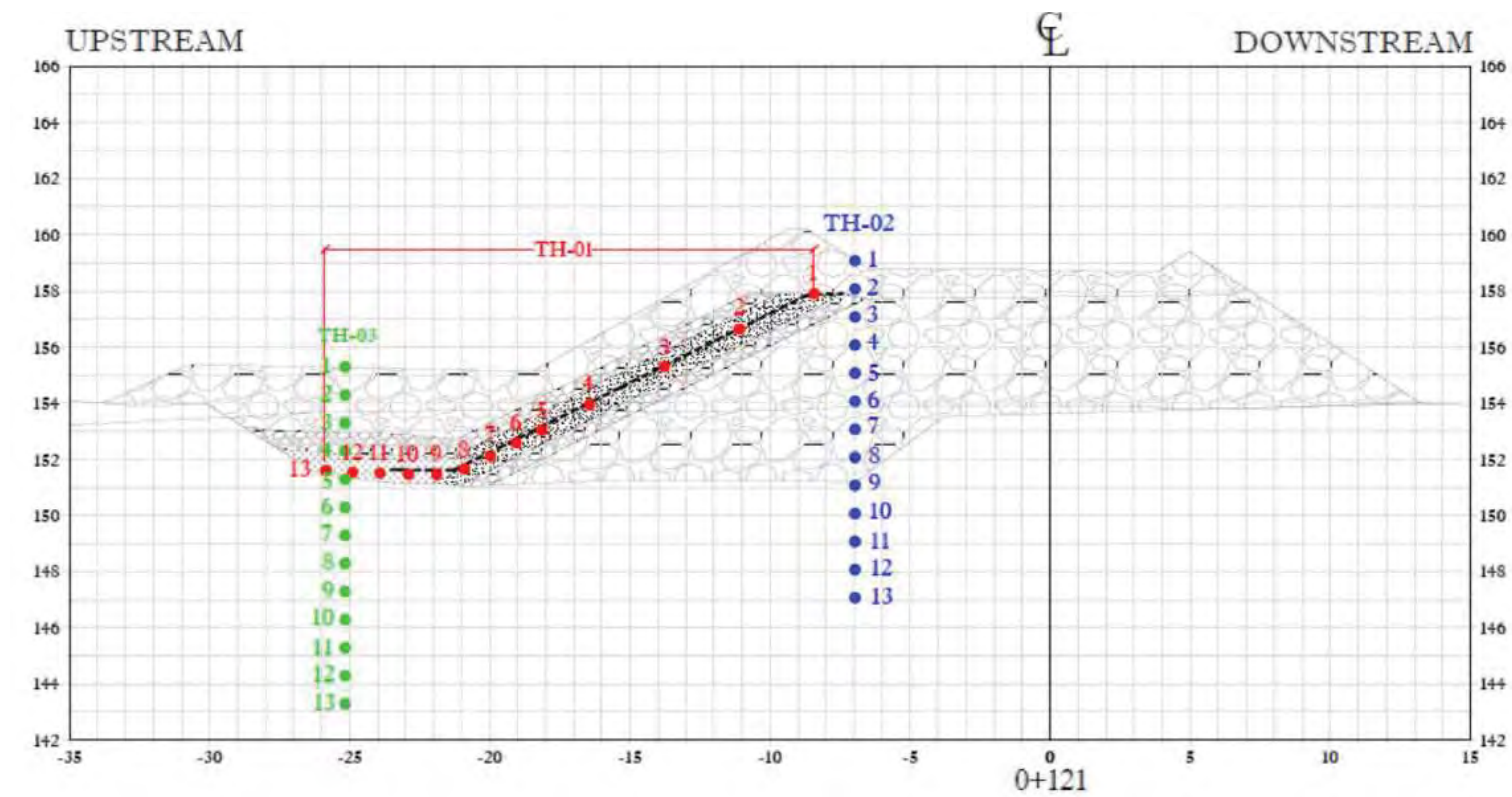
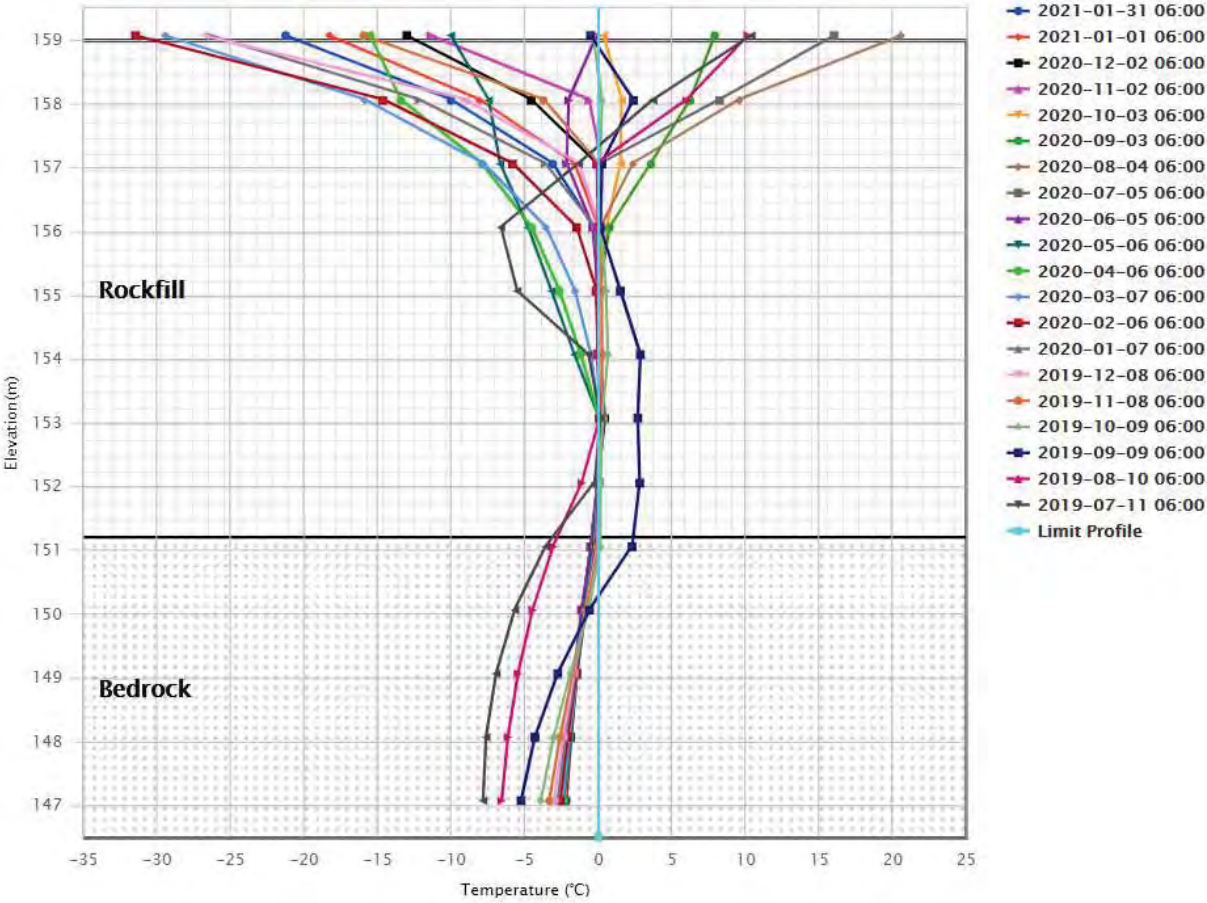
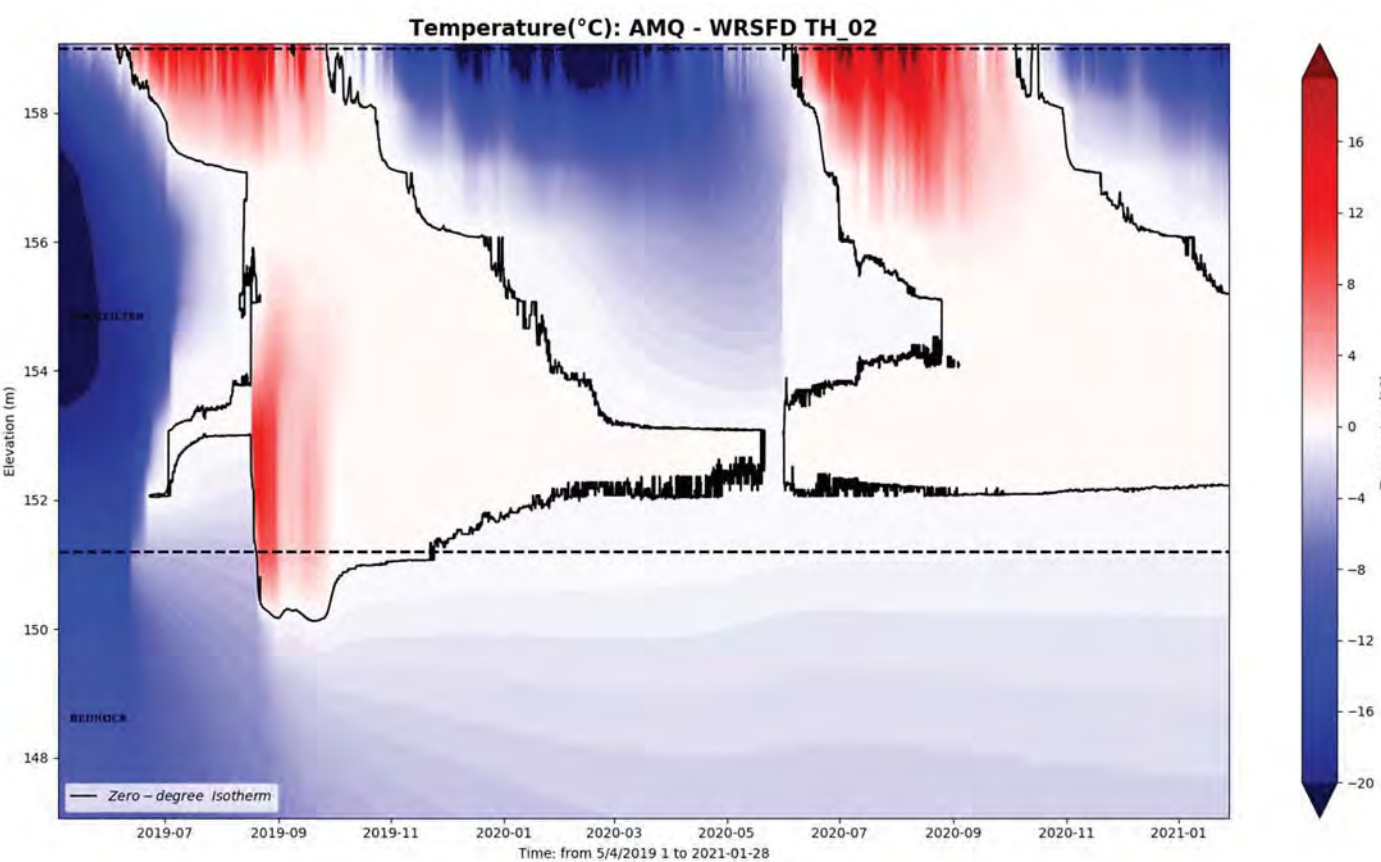




WRSFD TH02

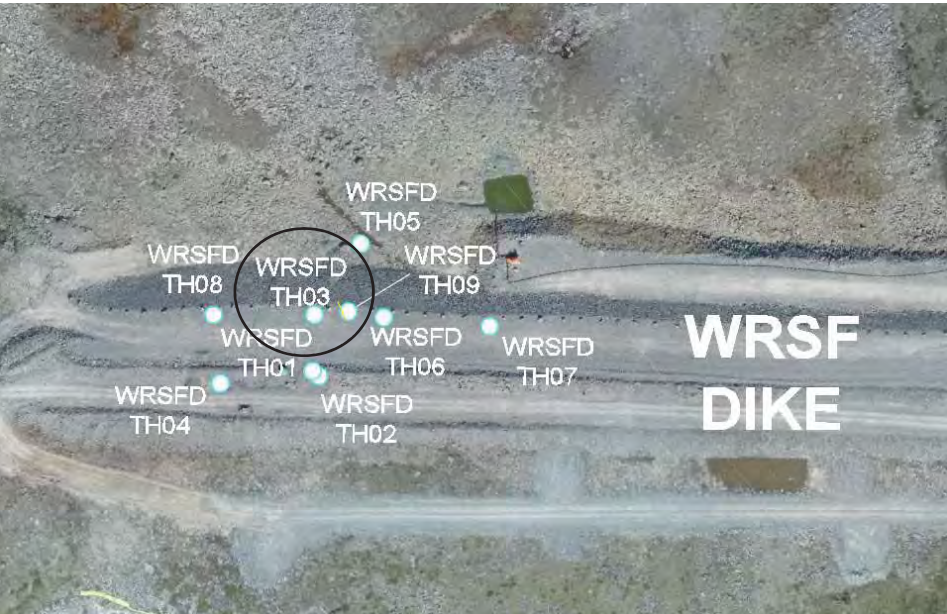


AMQ - WRSFD TH\_02

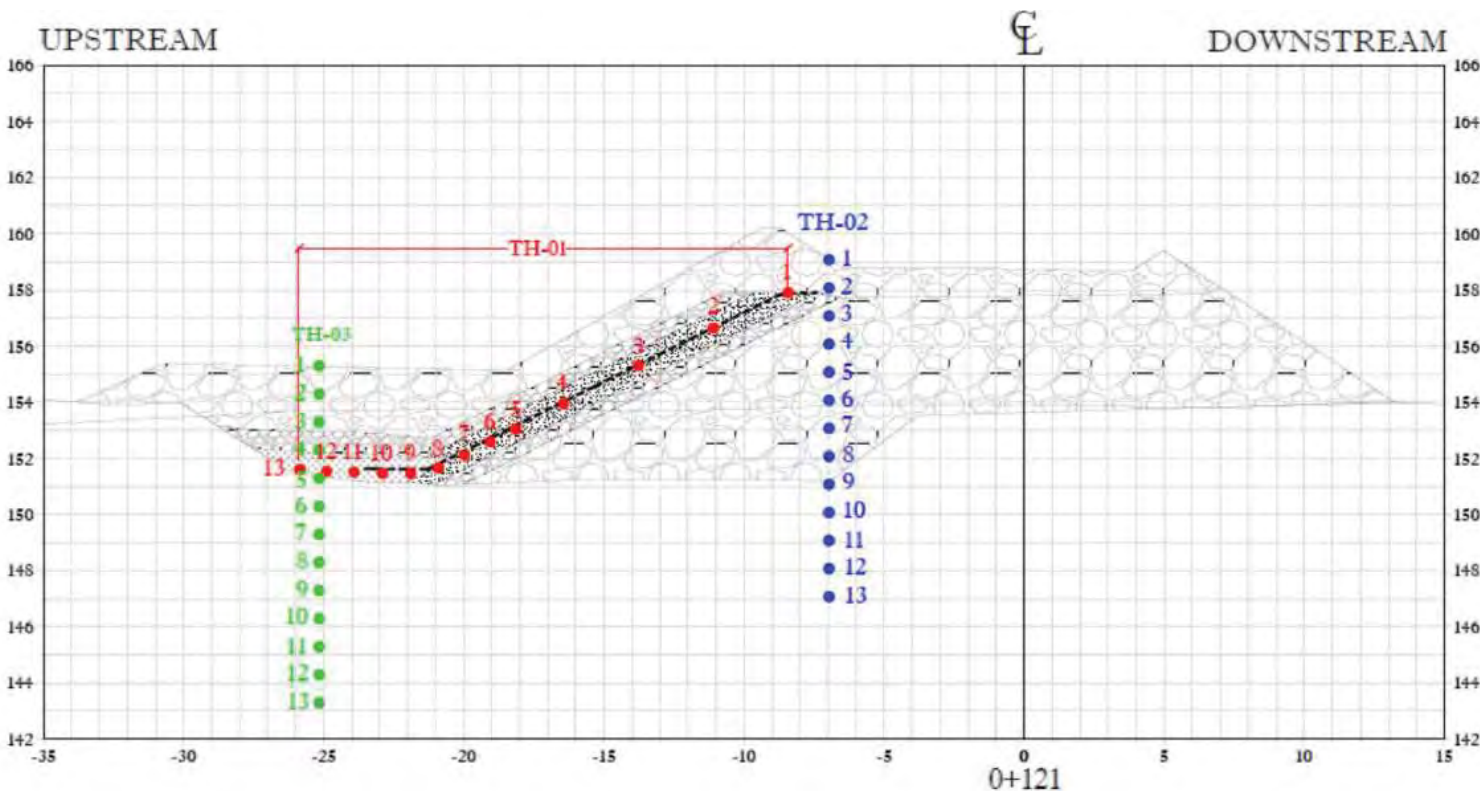
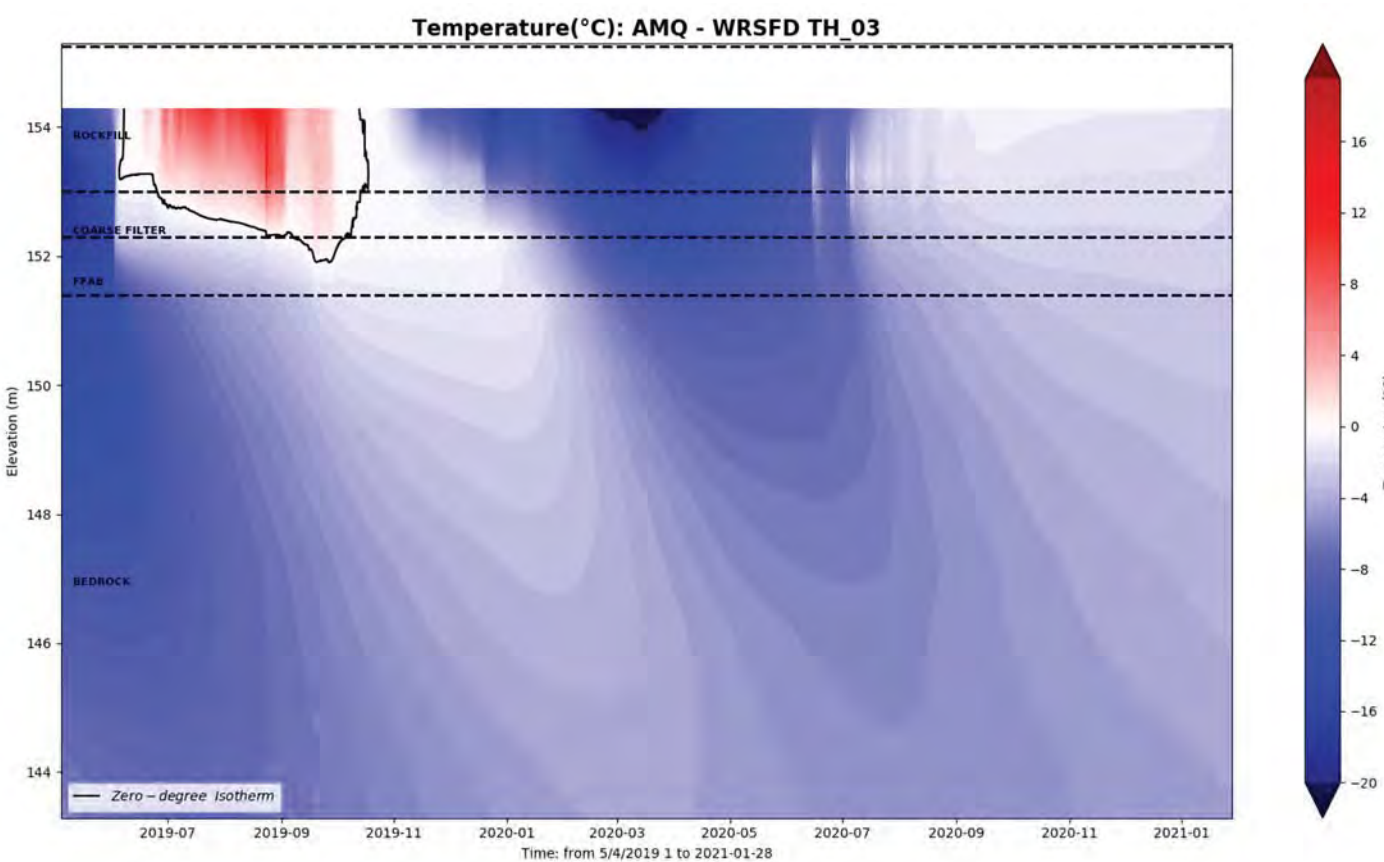
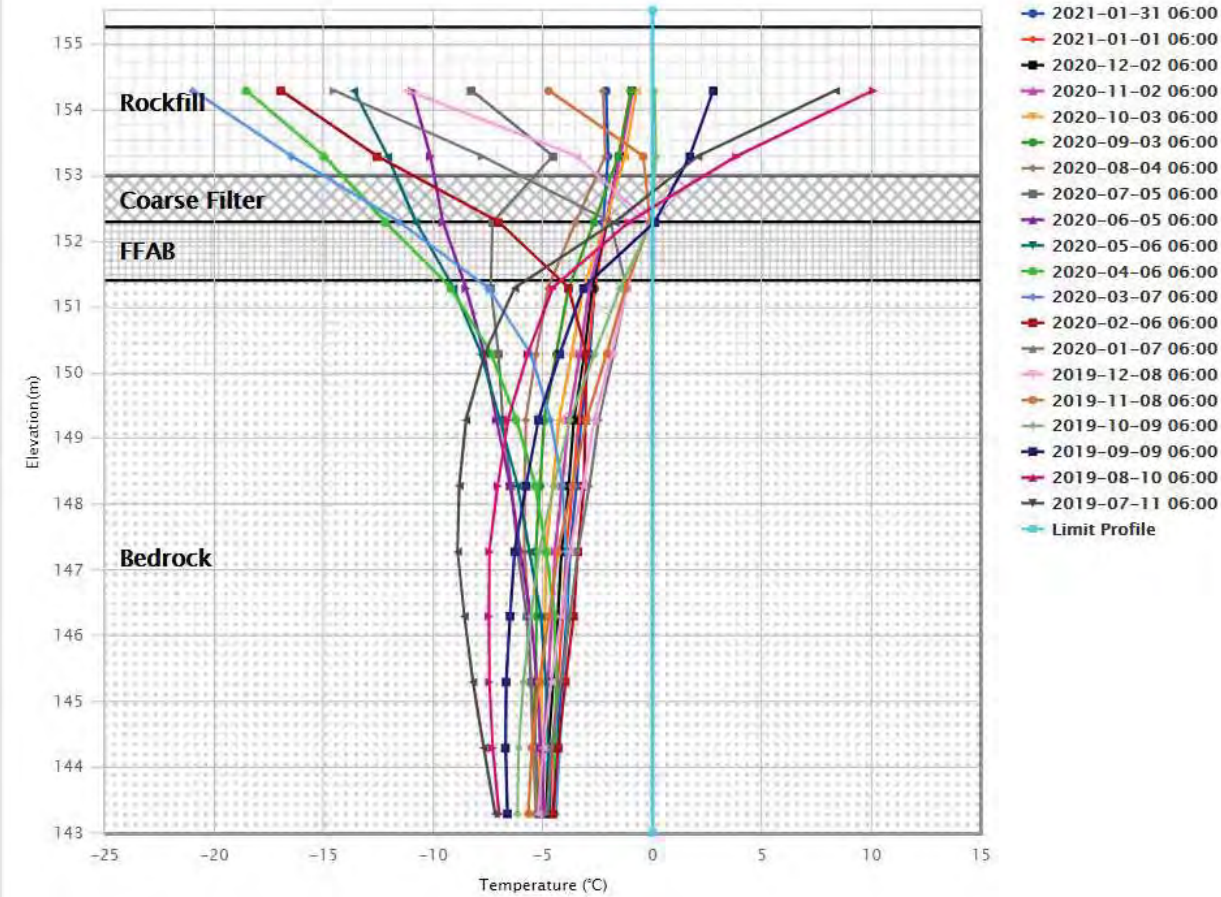




WRSFD TH03



AMQ - WRSFD TH\_03

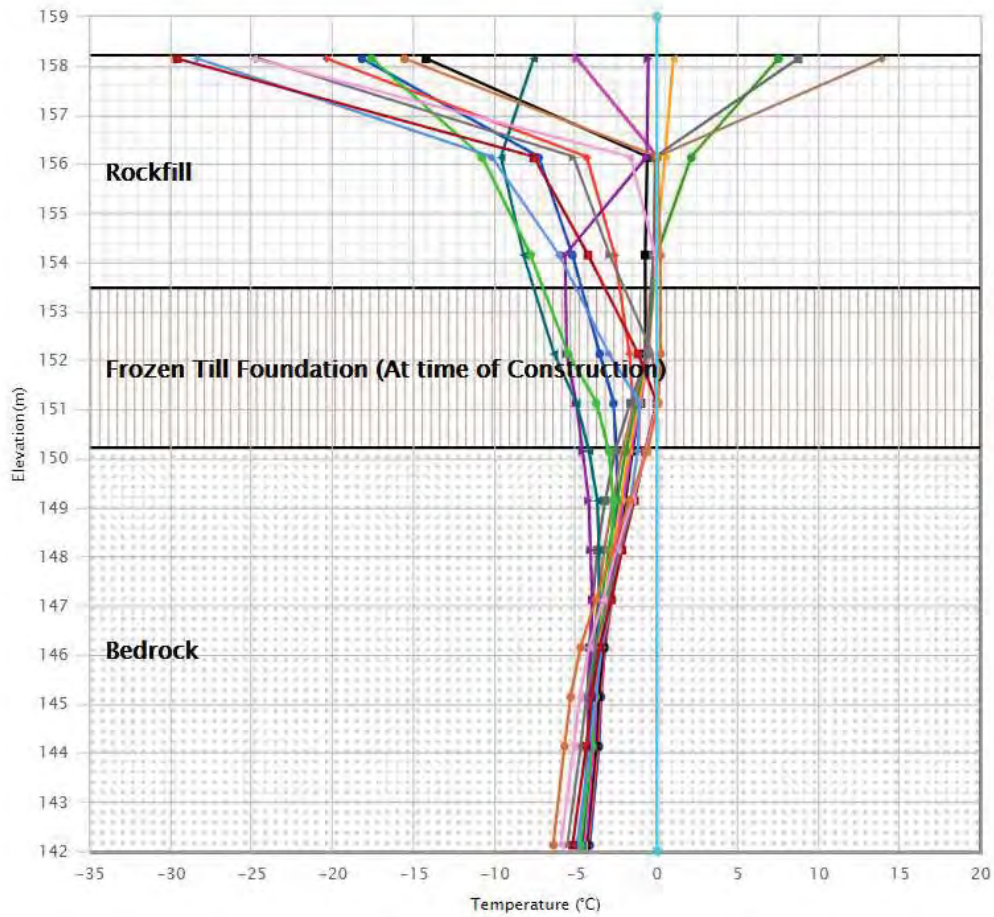




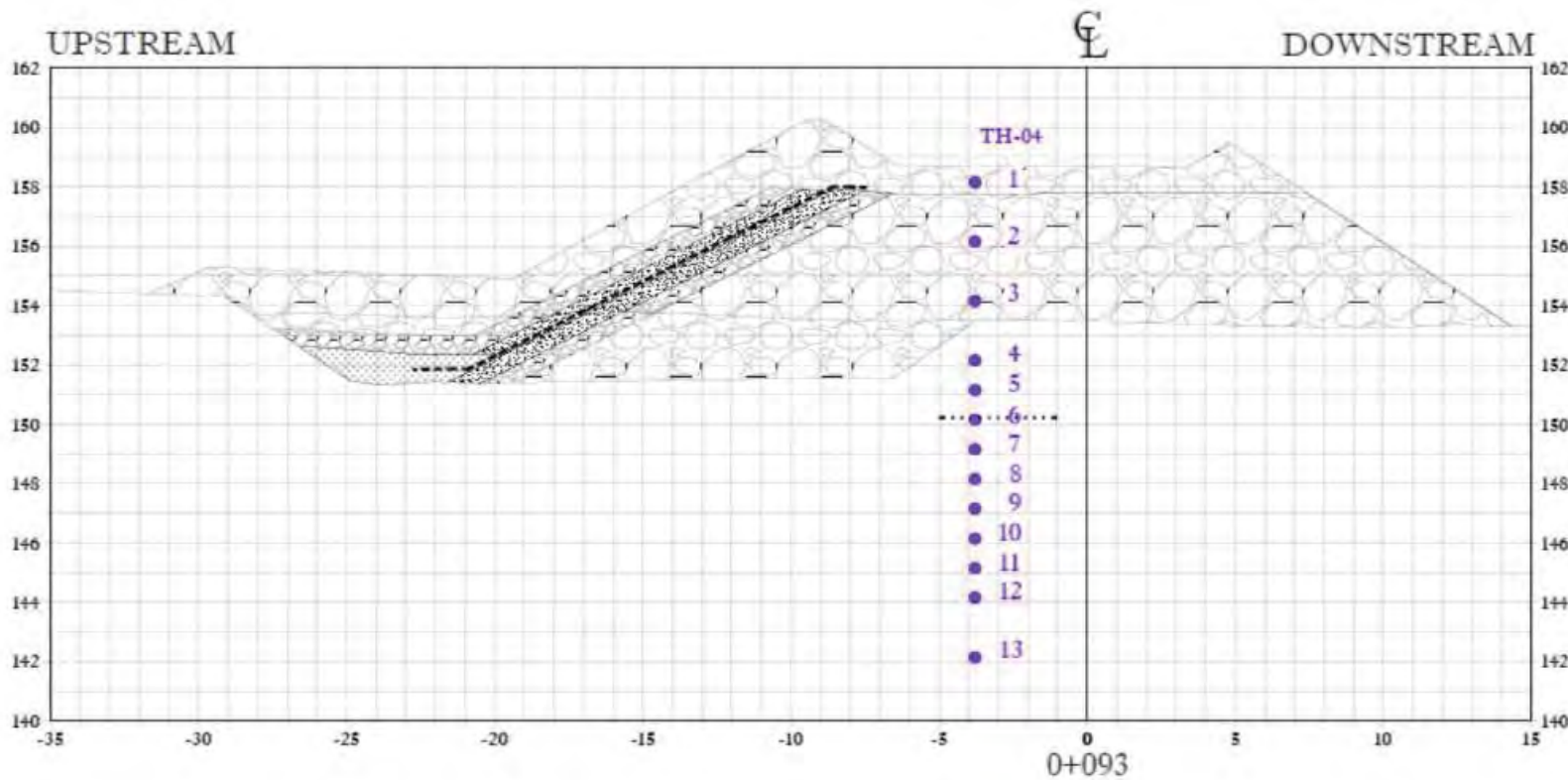
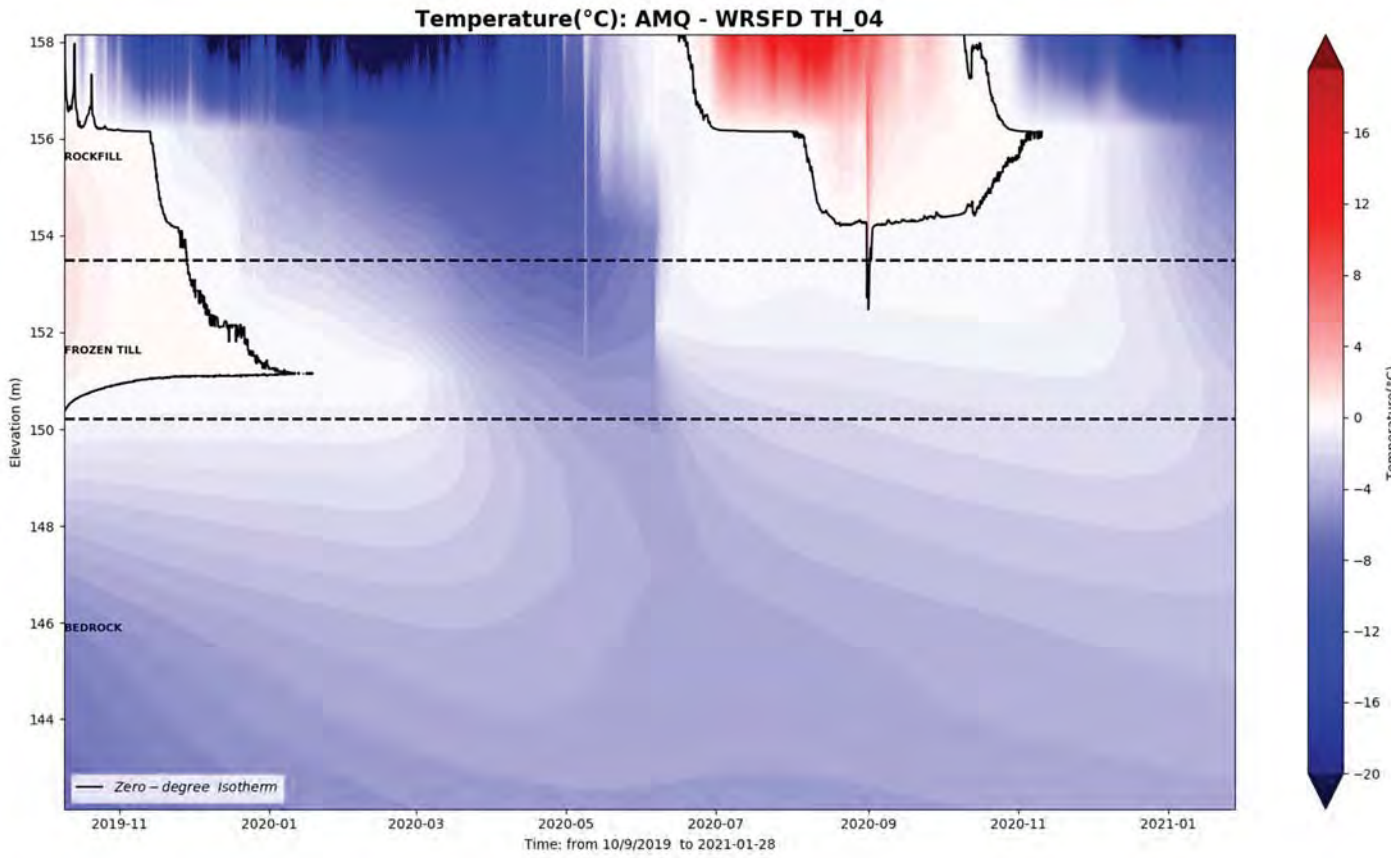
WRSFD TH04



AMQ - WRSFD TH\_04

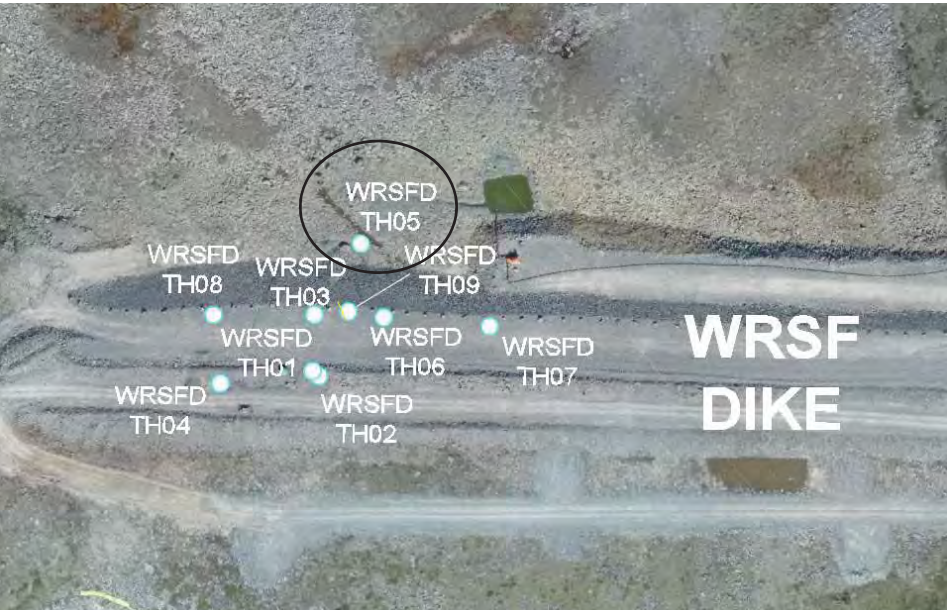


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- 2021-01-01 06:00
- 2020-12-02 06:00
- 2020-11-02 06:00
- 2020-10-03 06:00
- 2020-09-03 06:00
- 2020-08-04 06:00
- 2020-07-05 06:00
- 2020-06-05 06:00
- 2020-05-06 06:00
- 2020-04-06 06:00
- 2020-03-07 06:00
- 2020-02-06 06:00
- 2020-01-07 06:00
- 2019-12-08 06:00
- 2019-11-08 06:00
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- 2019-08-10 06:00
- 2019-07-11 06:00
- Limit Profile

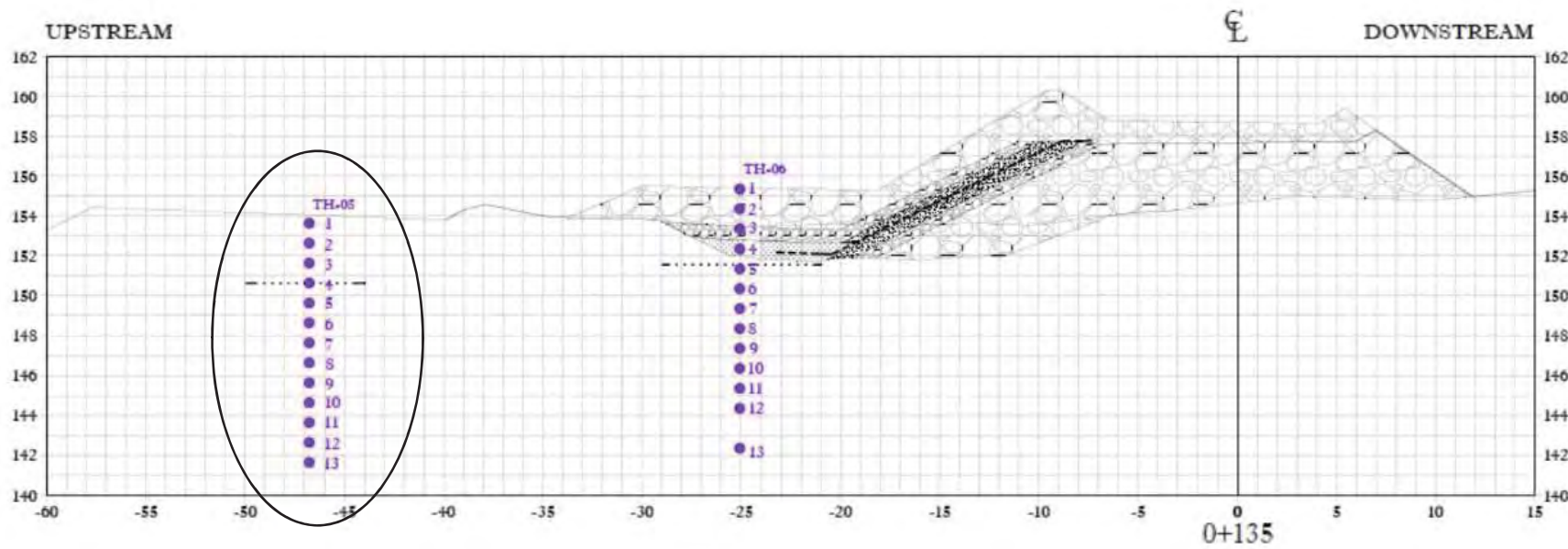
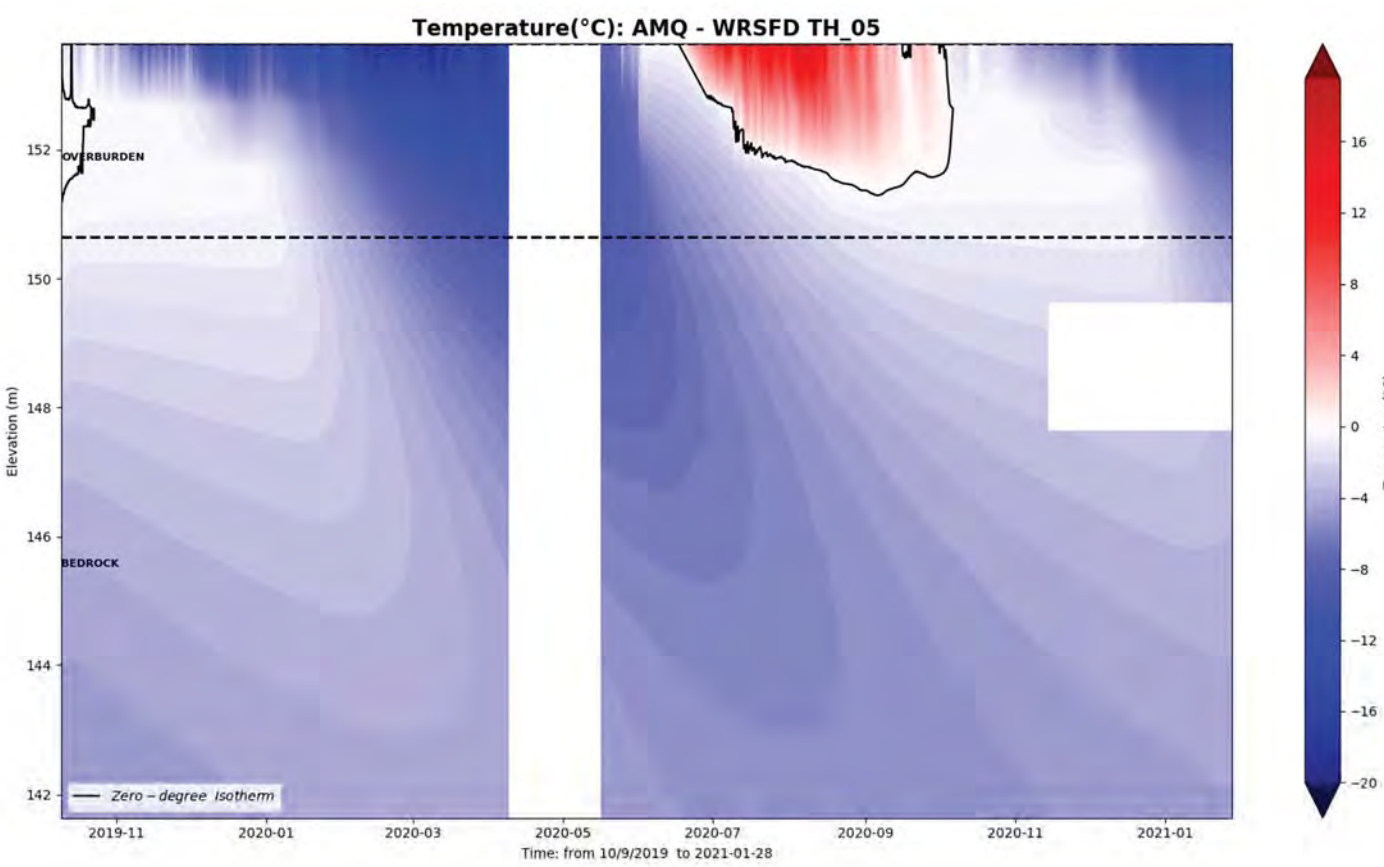
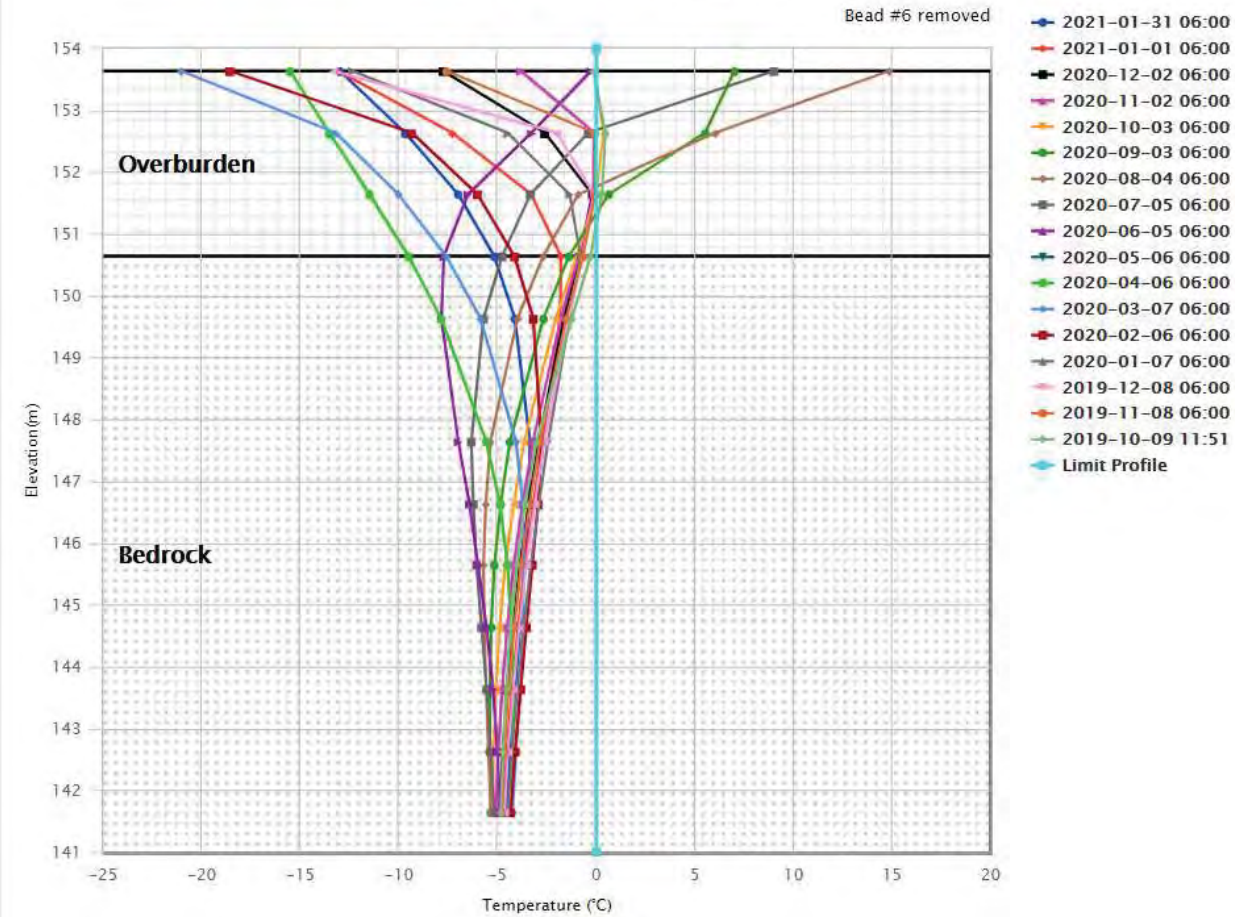




WRSFD TH05

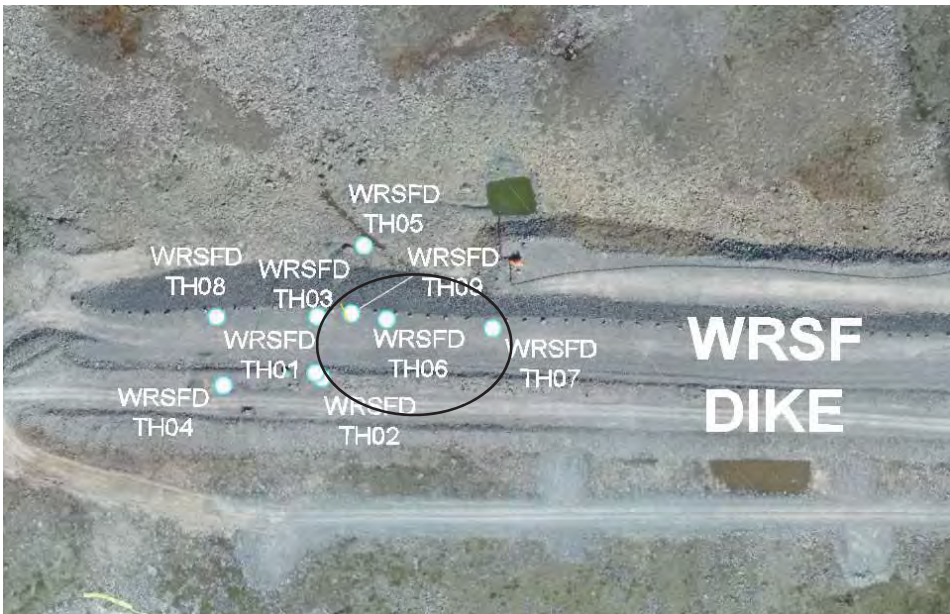


AMQ - WRSFD TH\_05

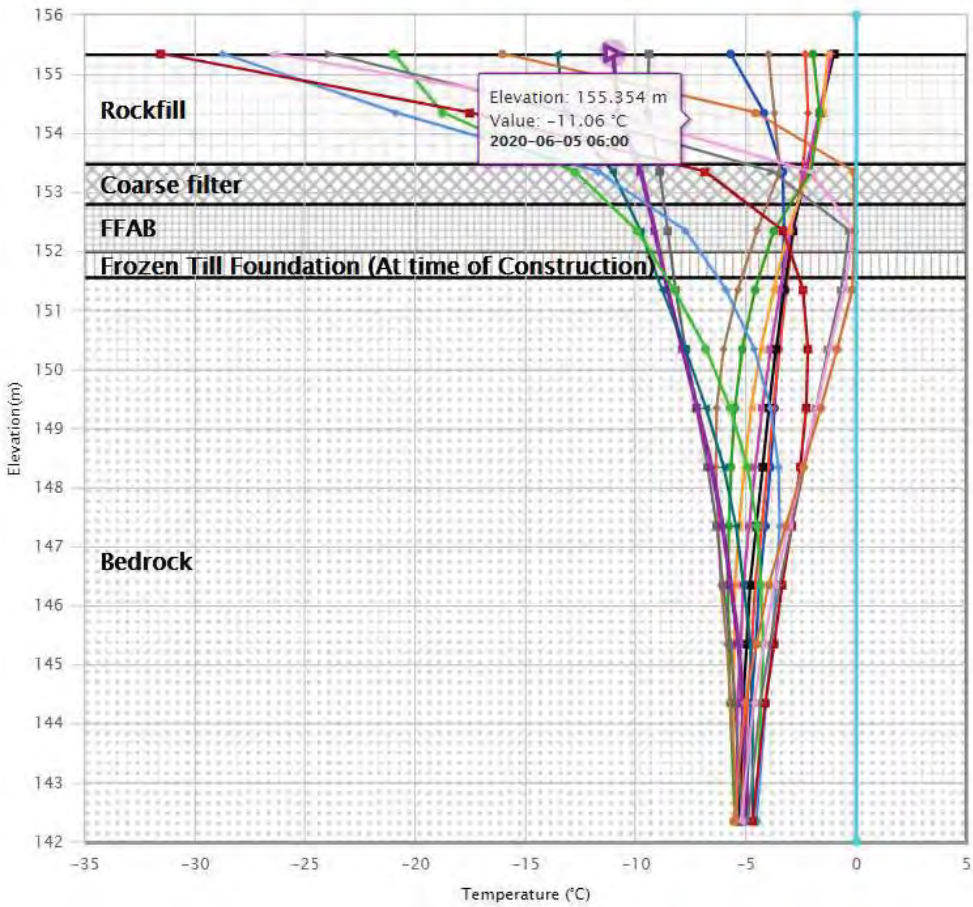




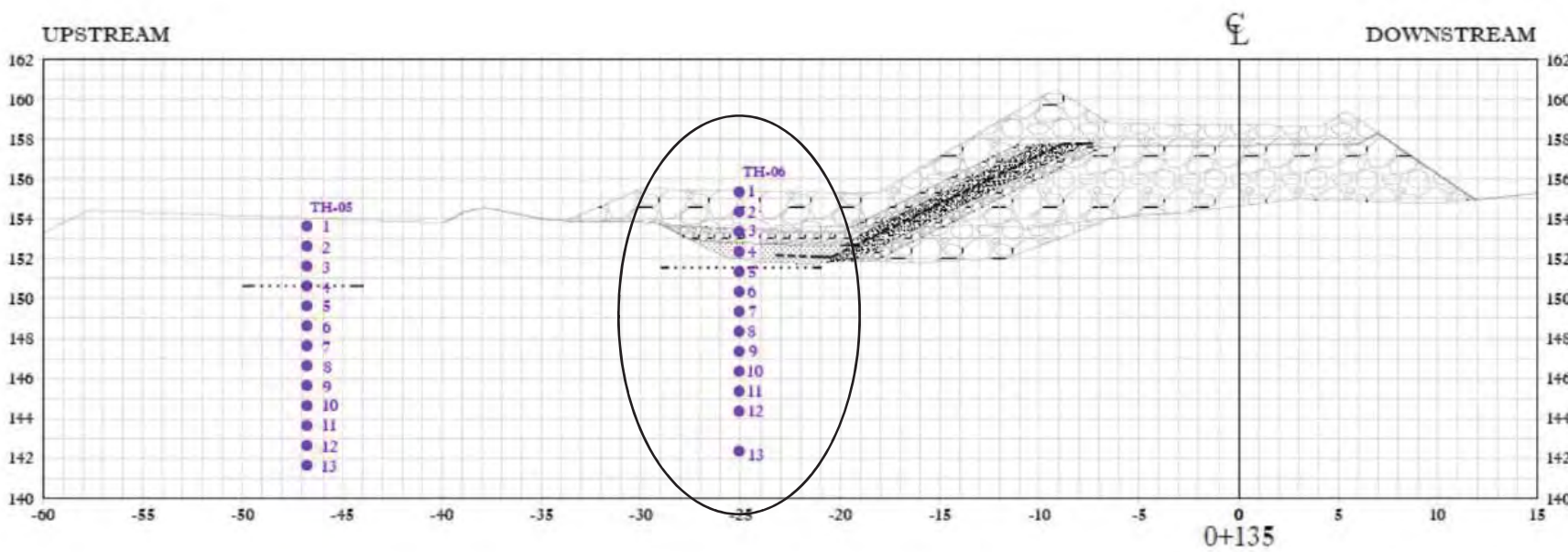
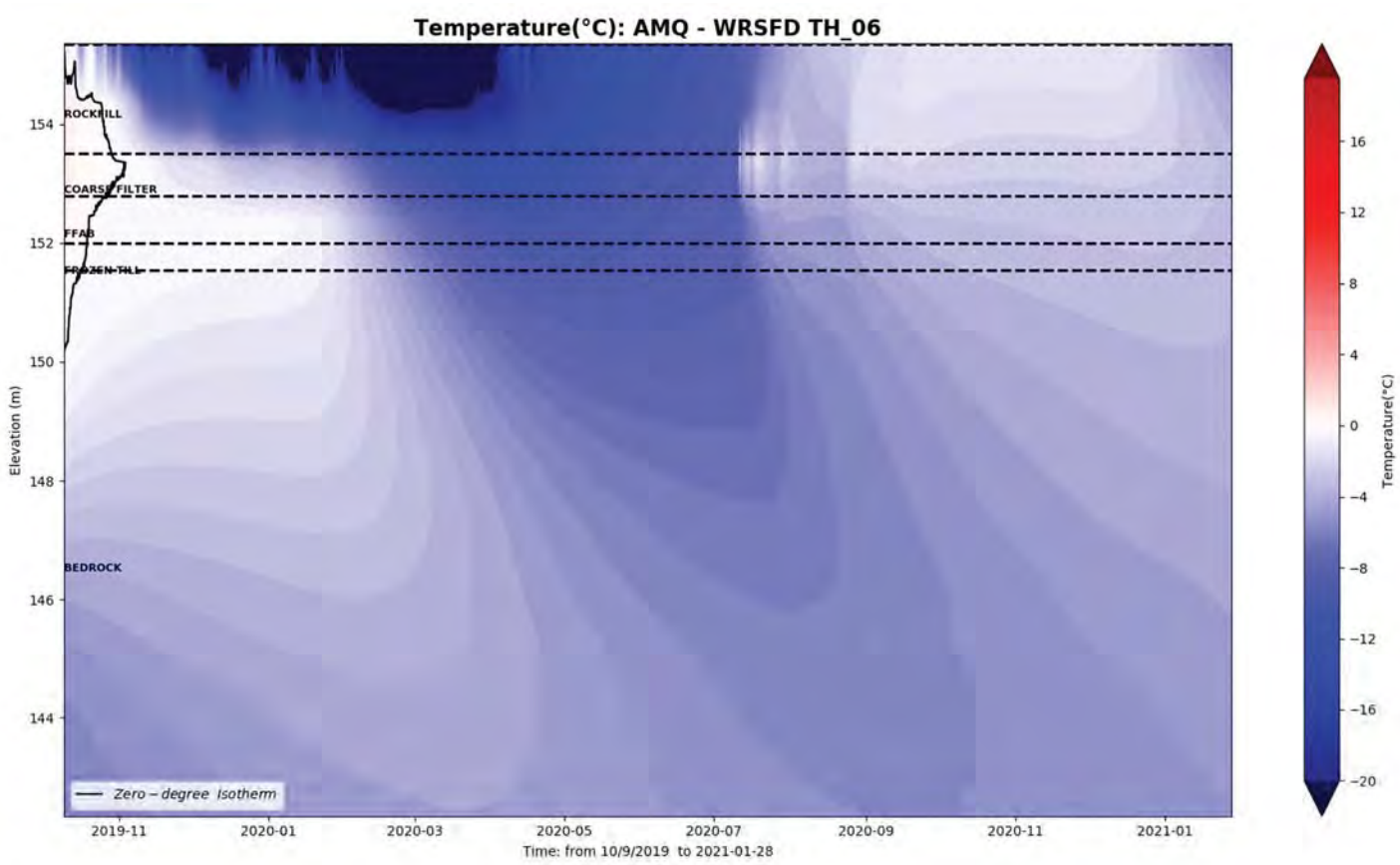
WRSFD TH06



AMQ – WRSFD TH\_06

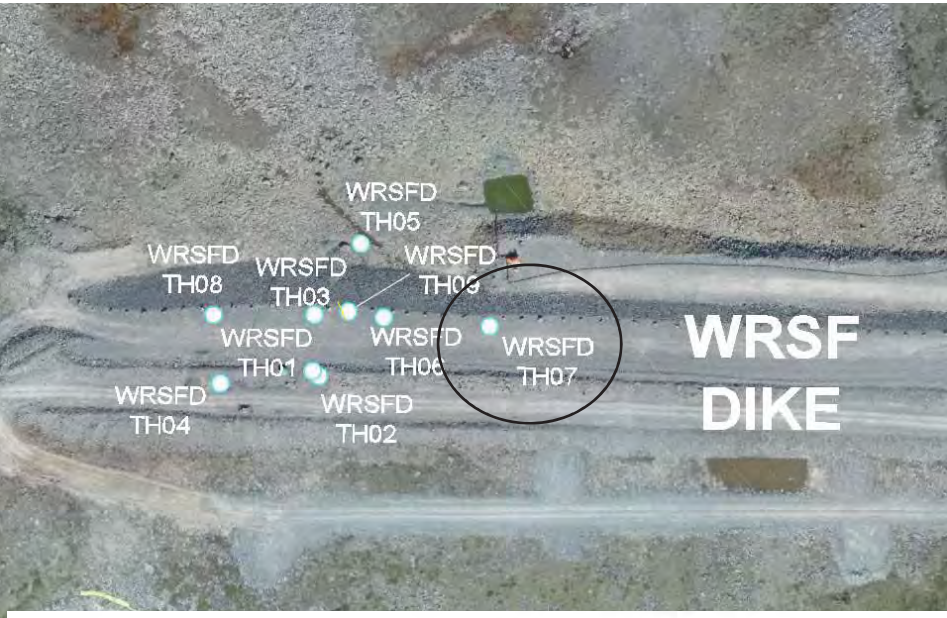


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- 2019-12-08 06:00
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- 2019-09-09 06:00
- 2019-08-10 06:00
- 2019-07-11 06:00
- Limit Profile

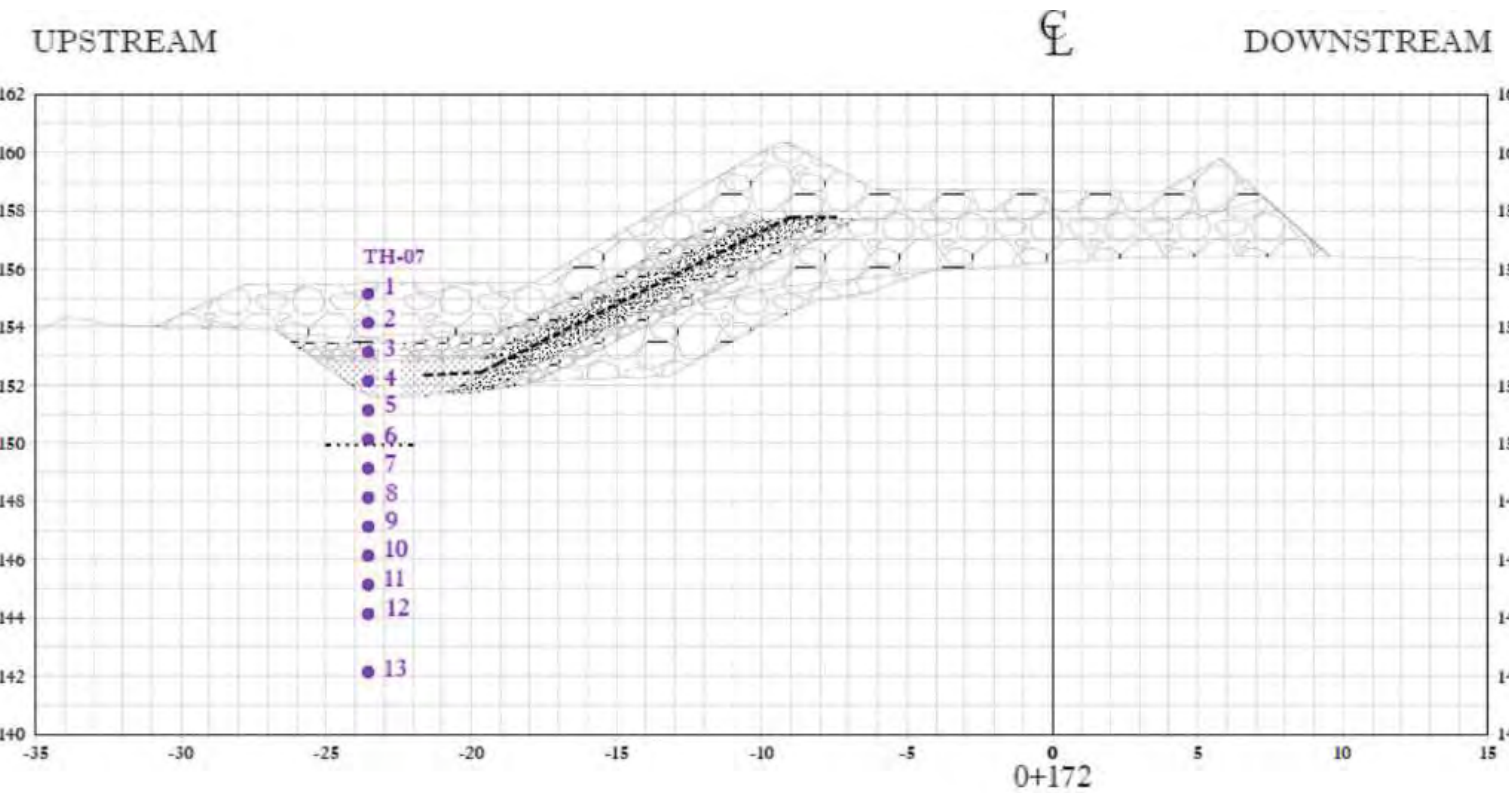
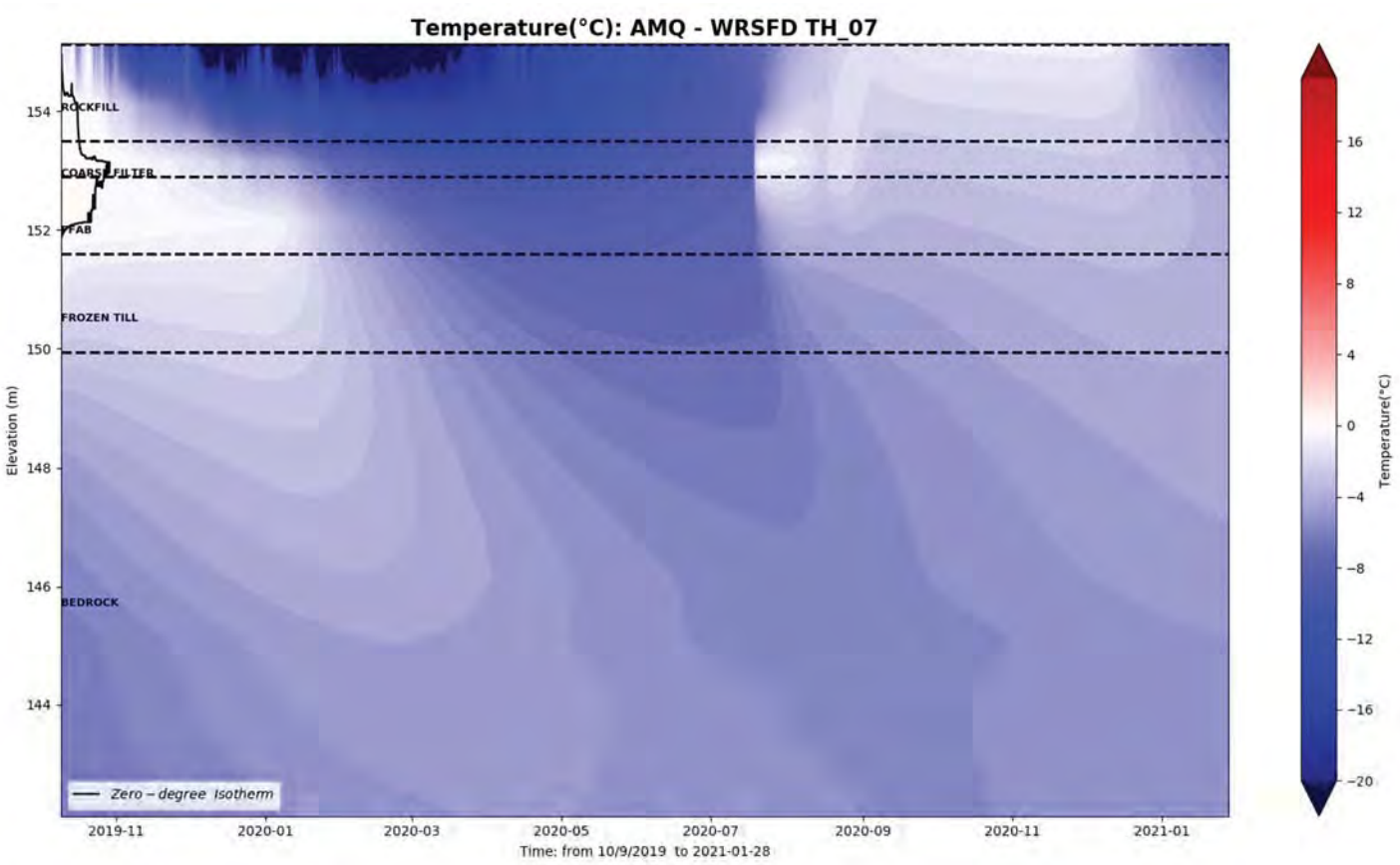
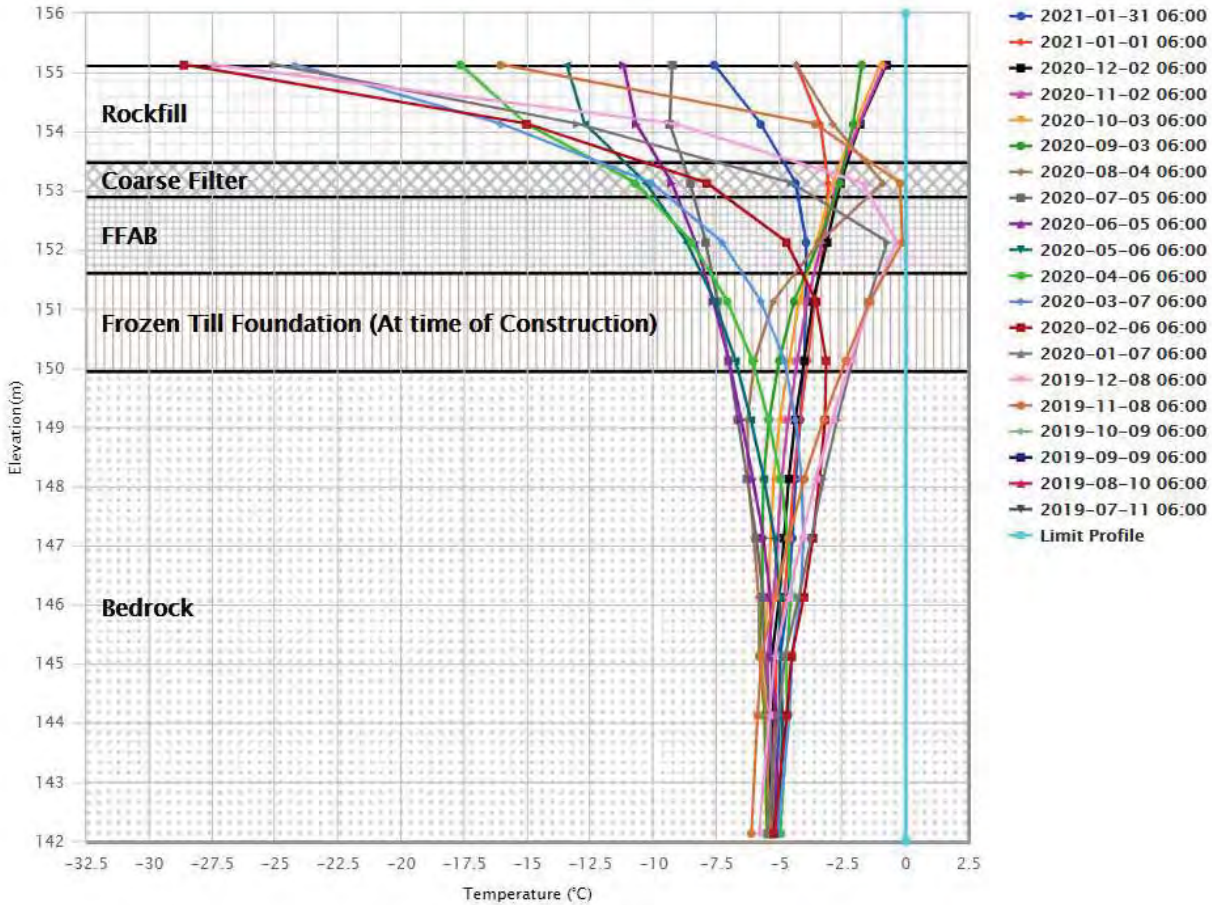




WRSFD TH07

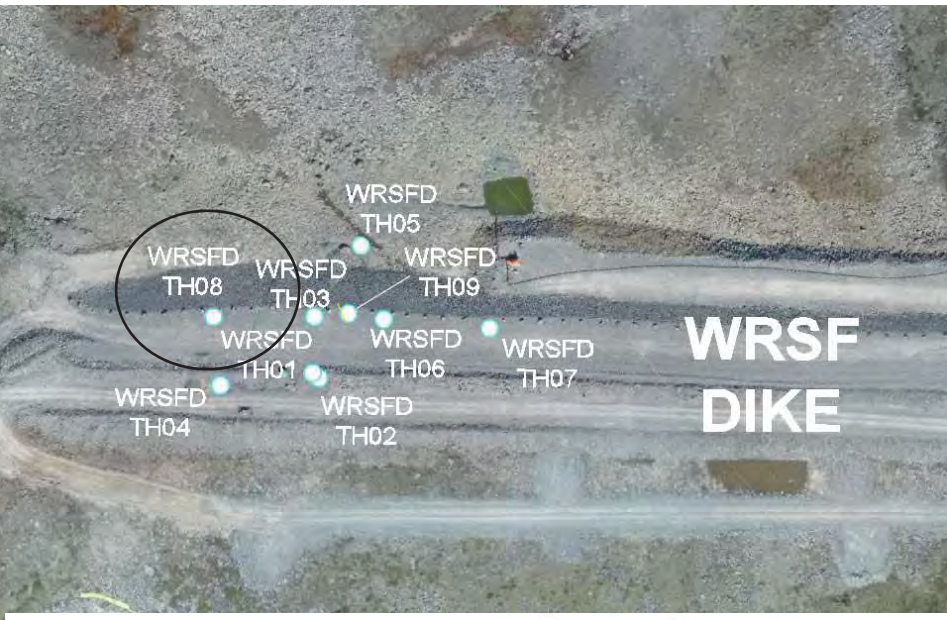


AMQ - WRSFD TH\_07

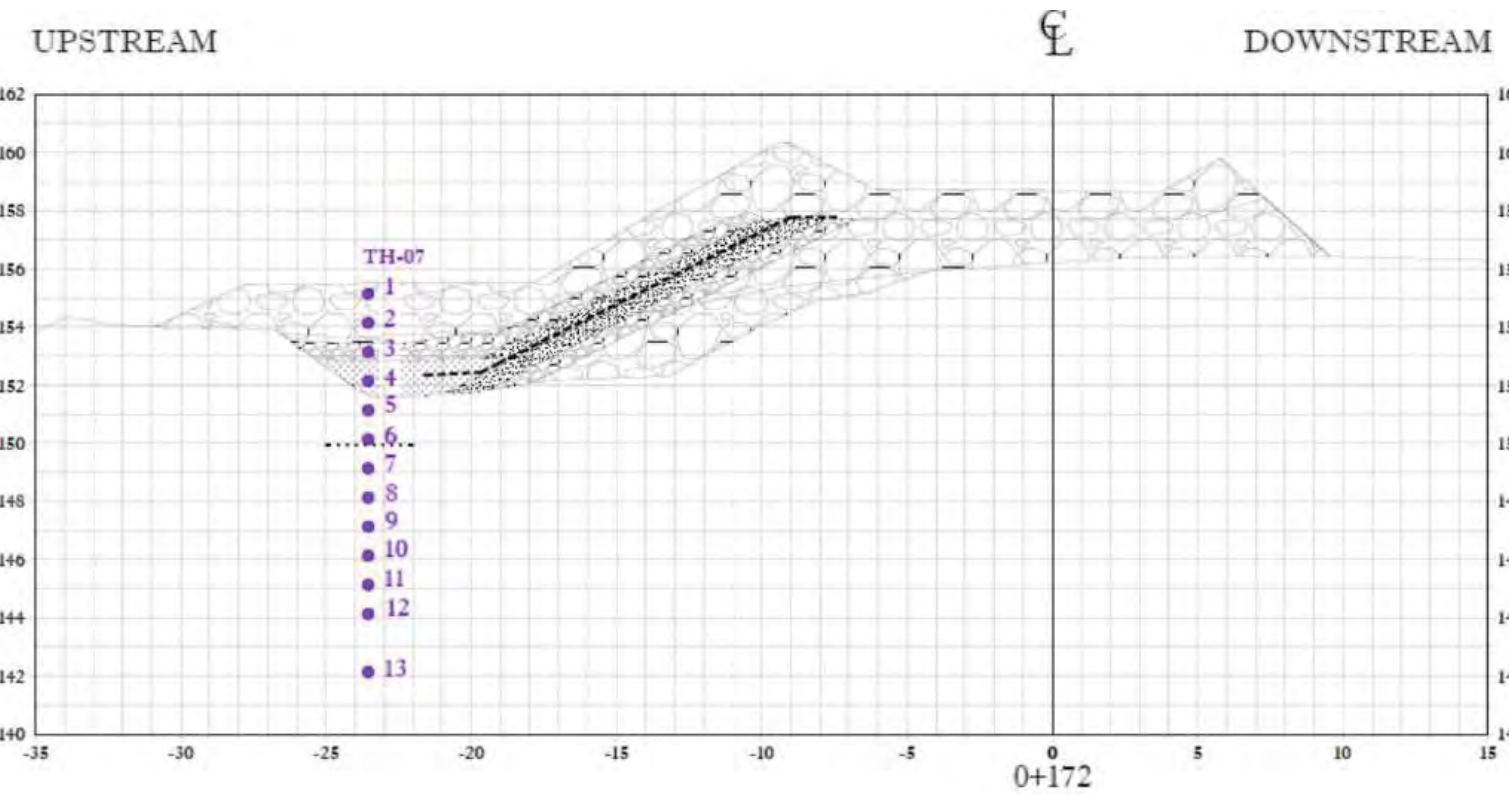
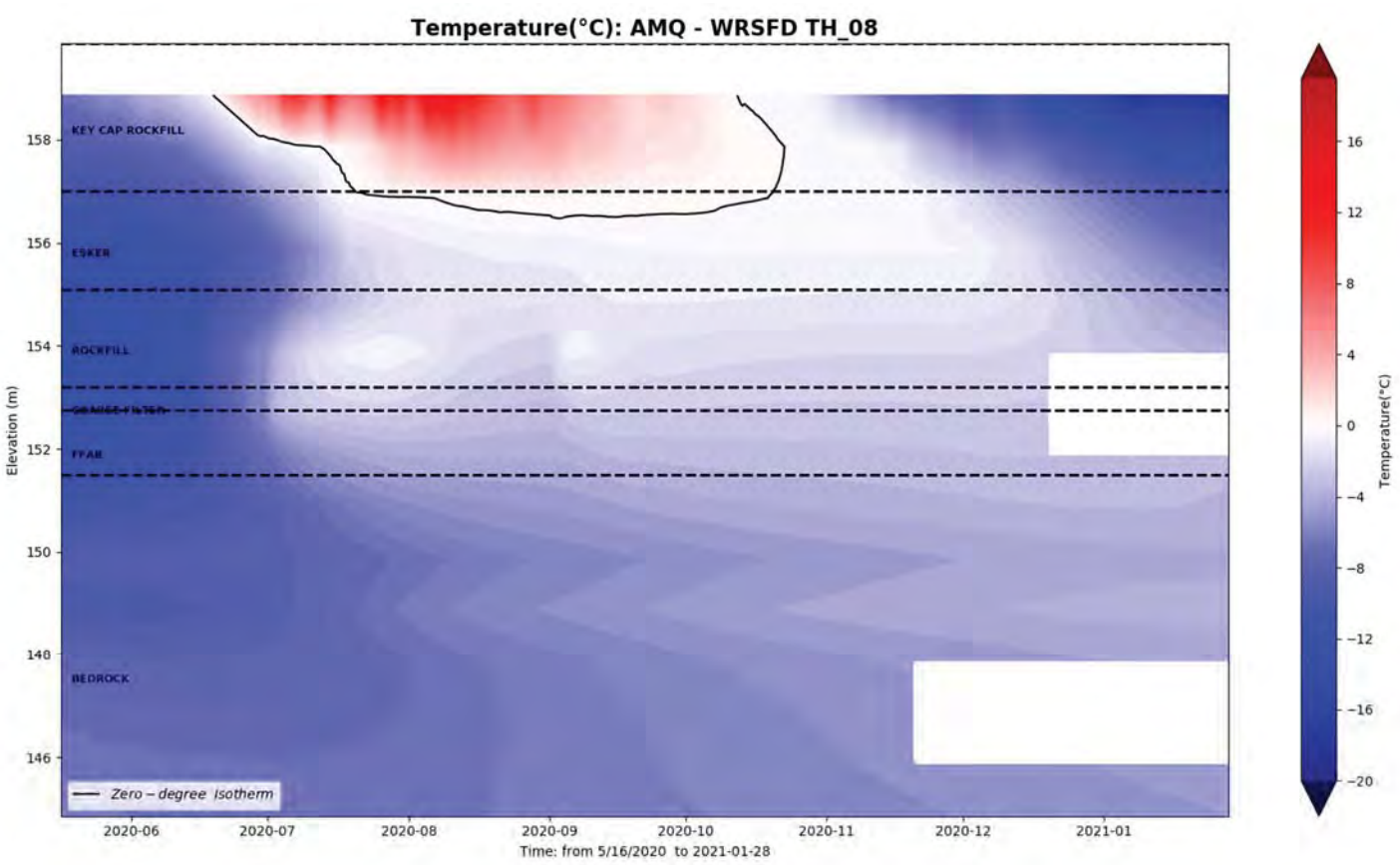
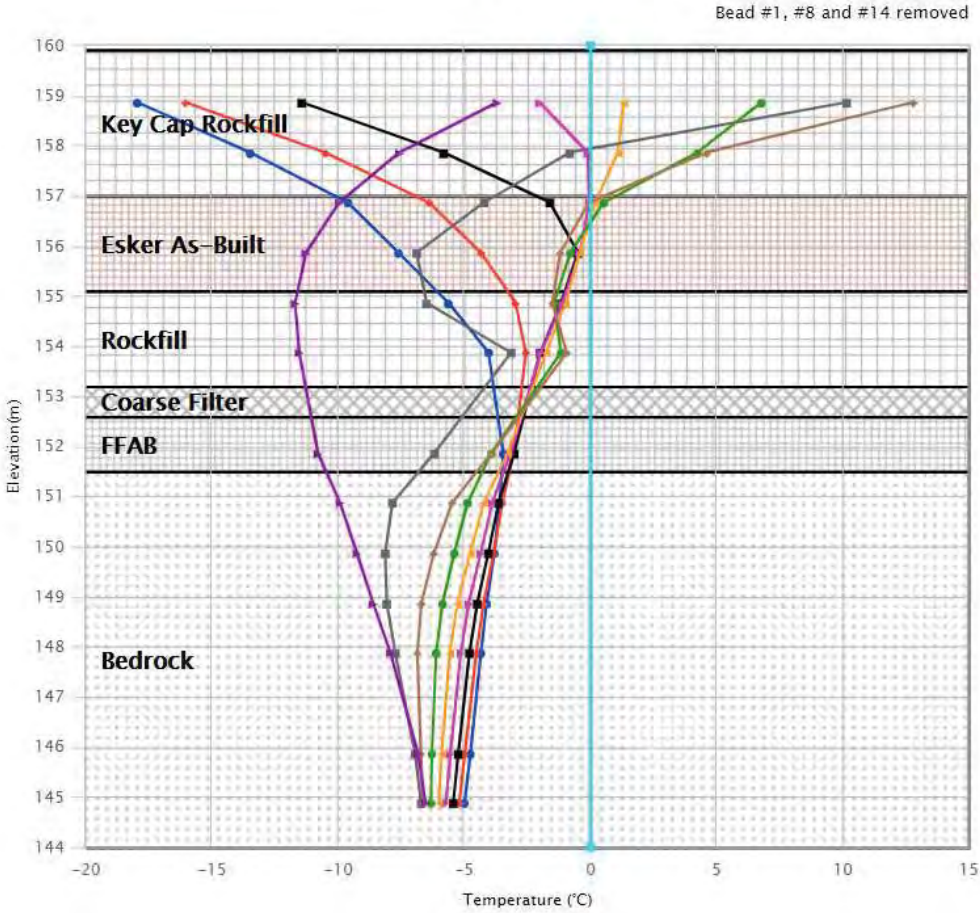




WRSFD TH08

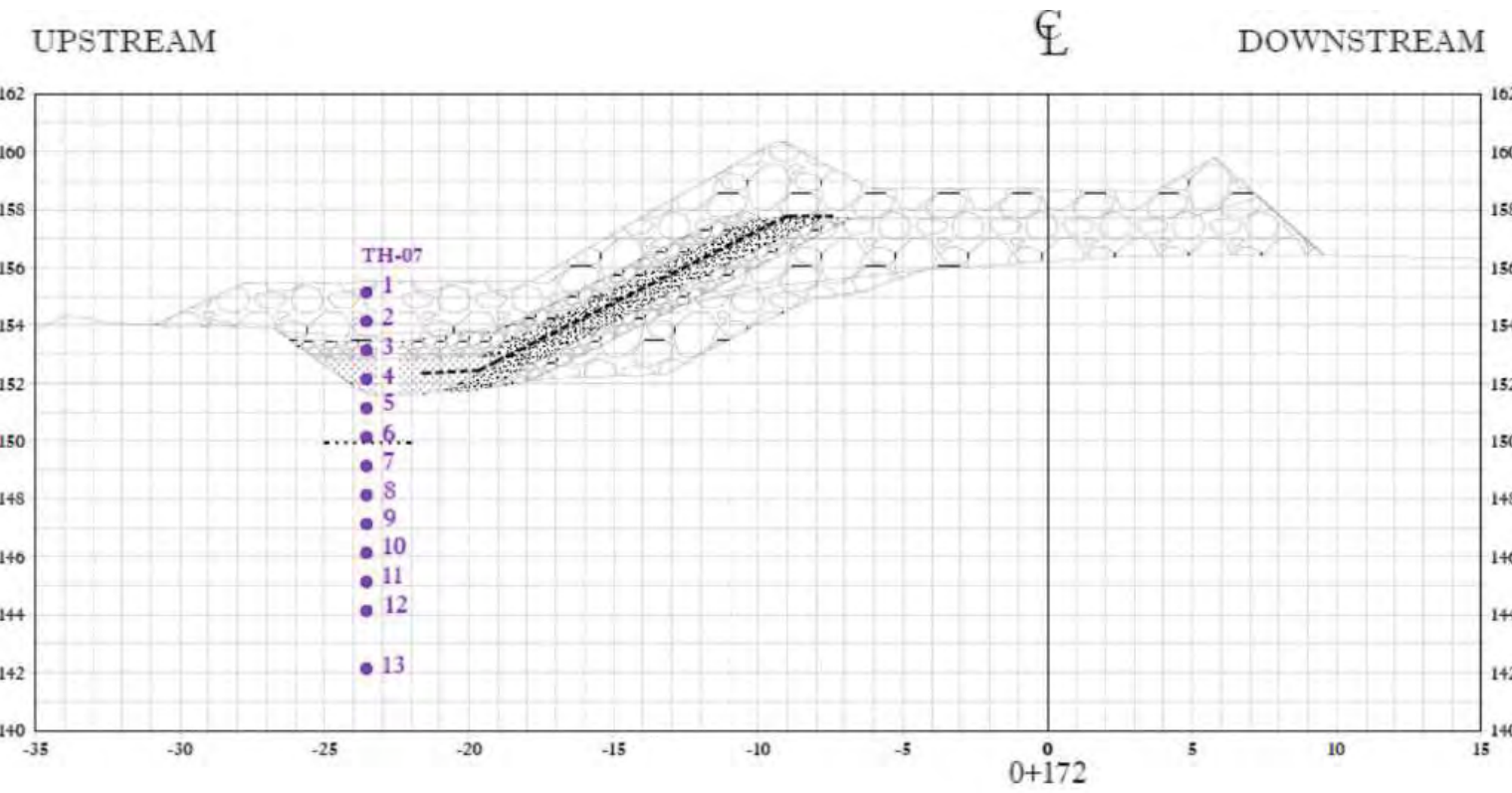
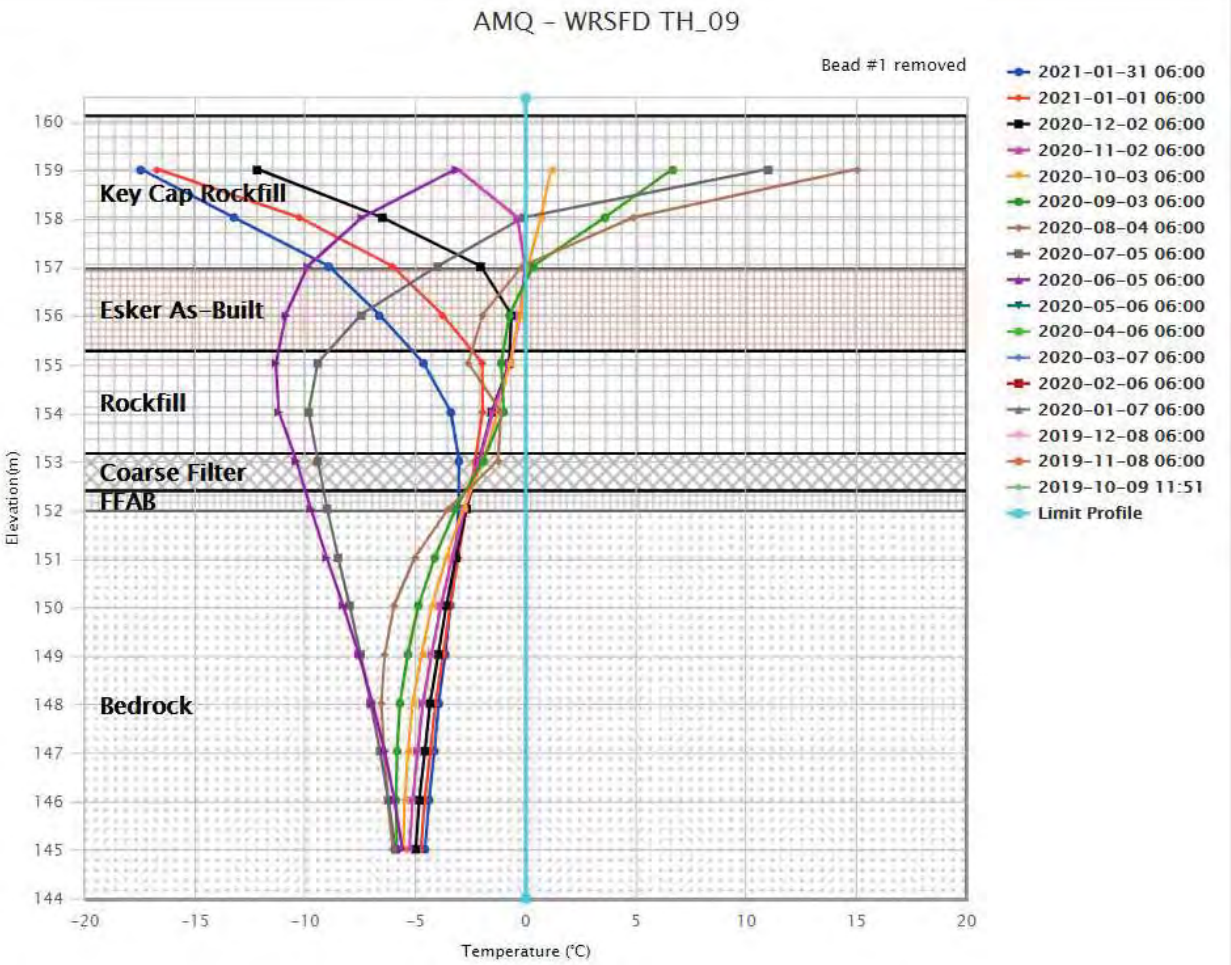
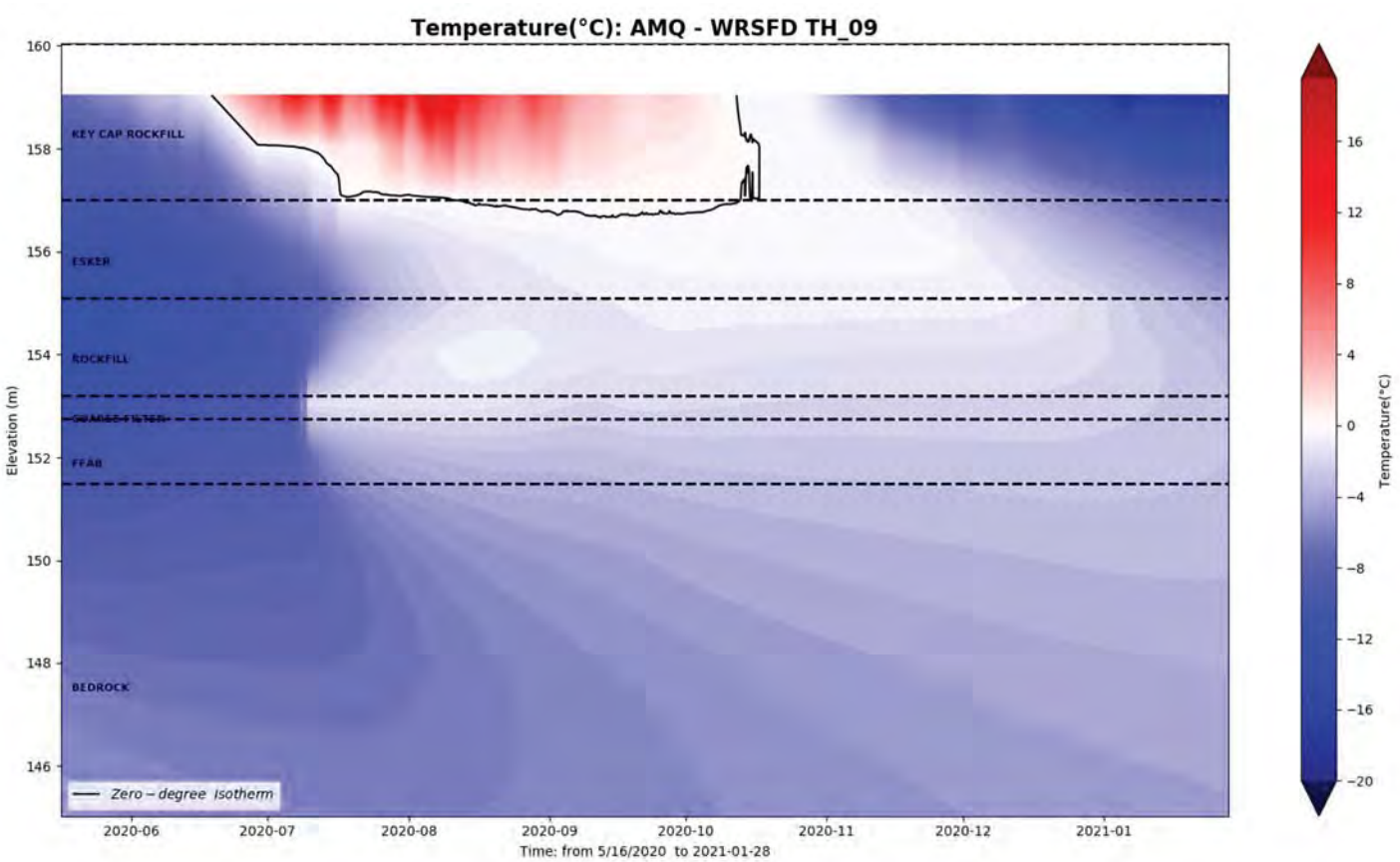
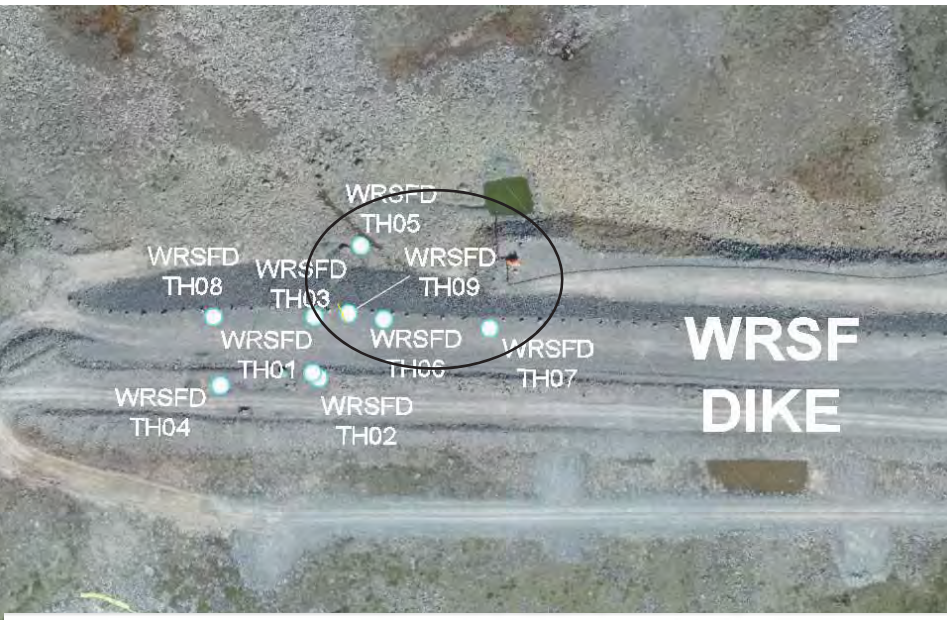


AMQ - WRSFD TH\_08



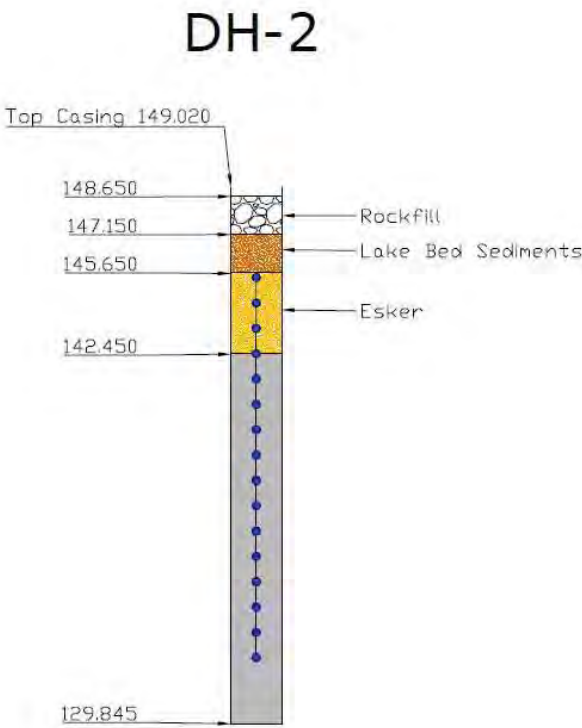
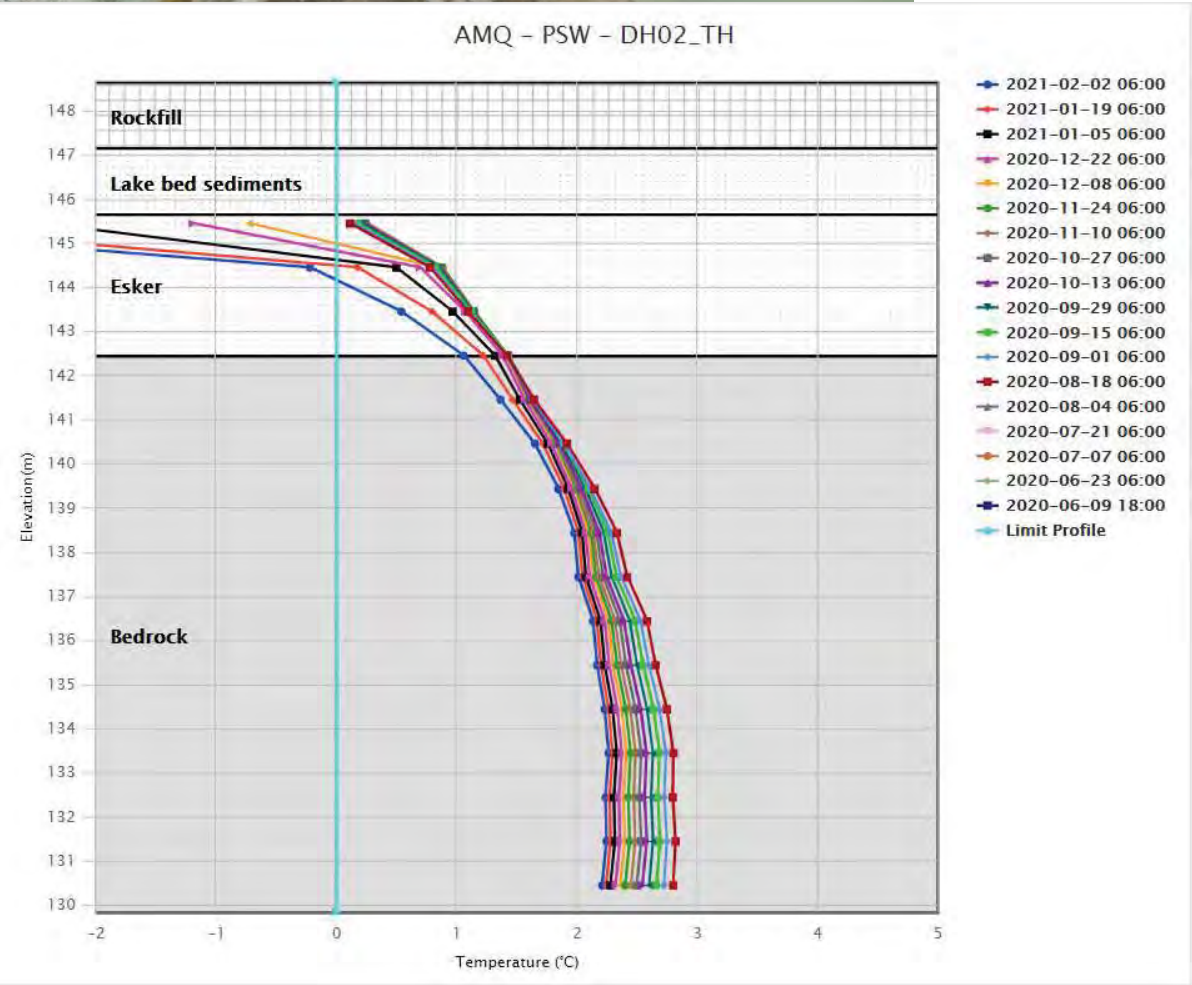
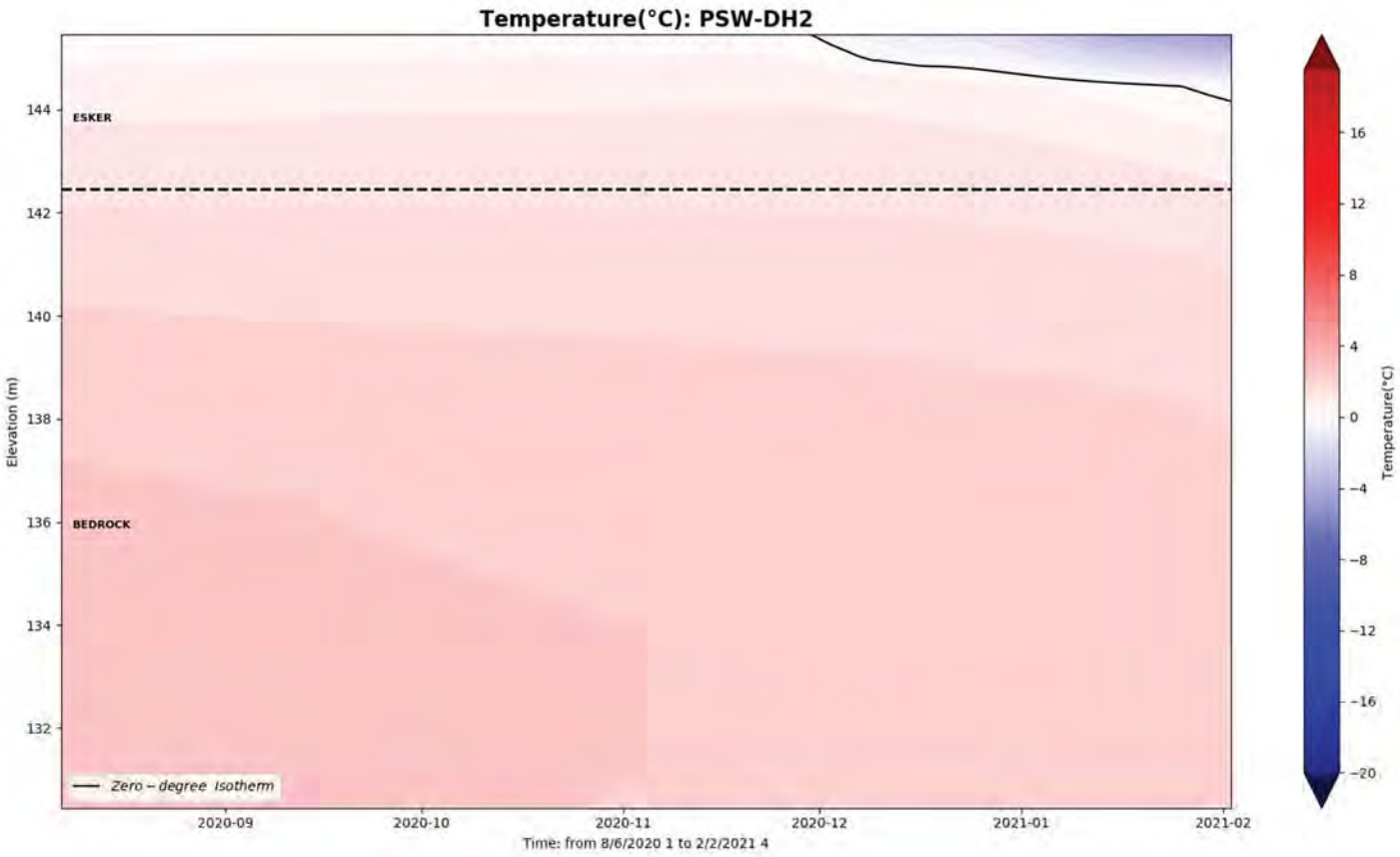


WRSFD TH09





PSW – DH 2 TH

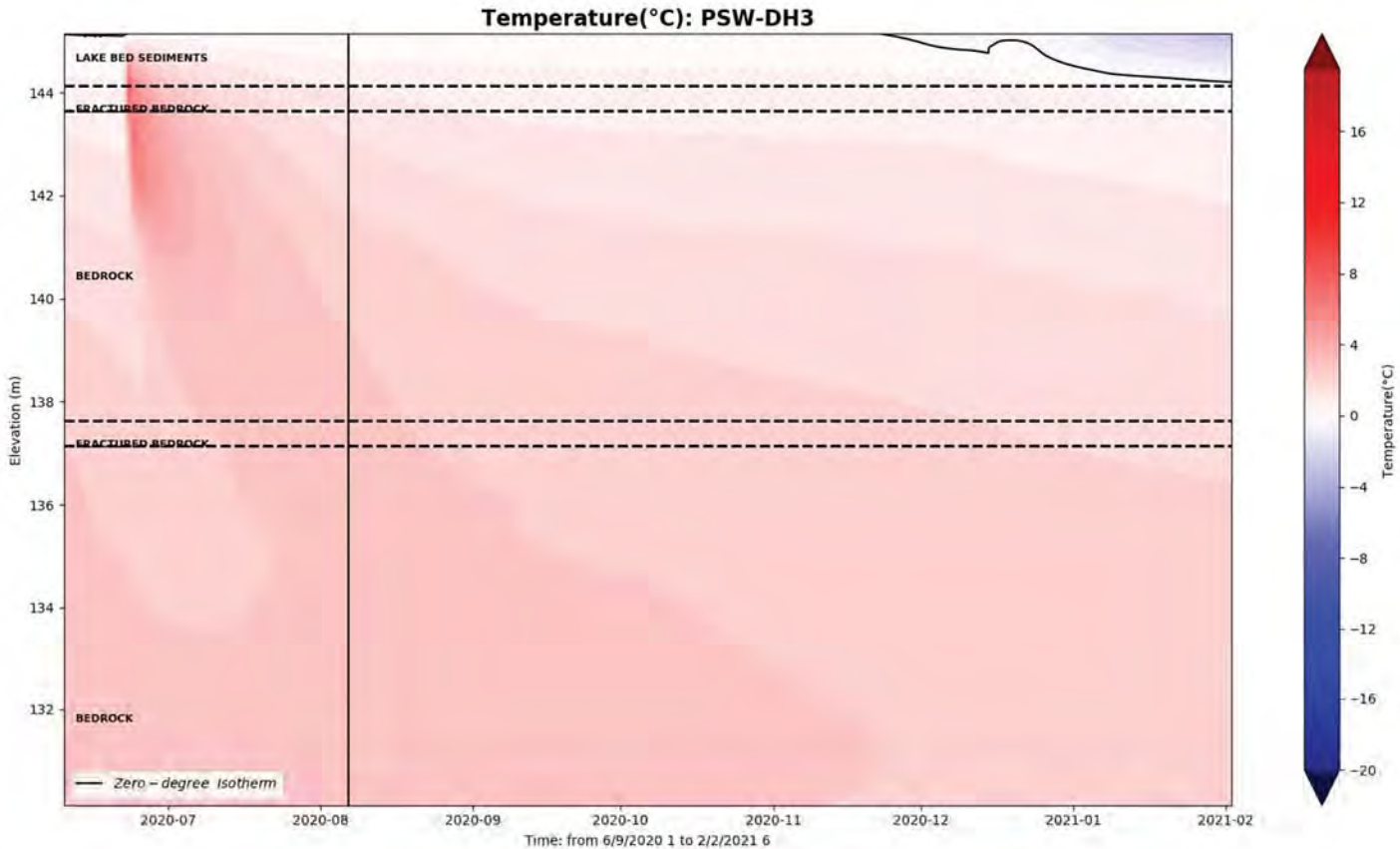




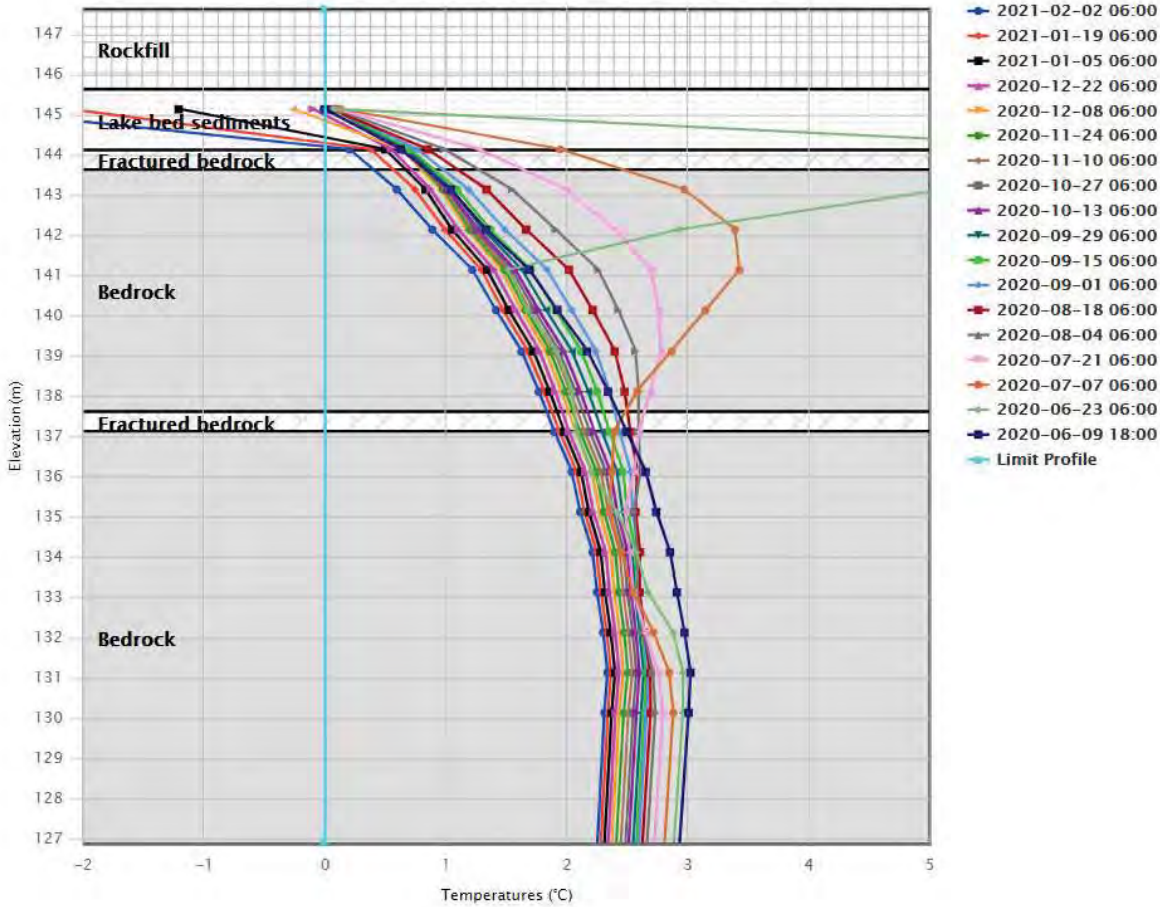
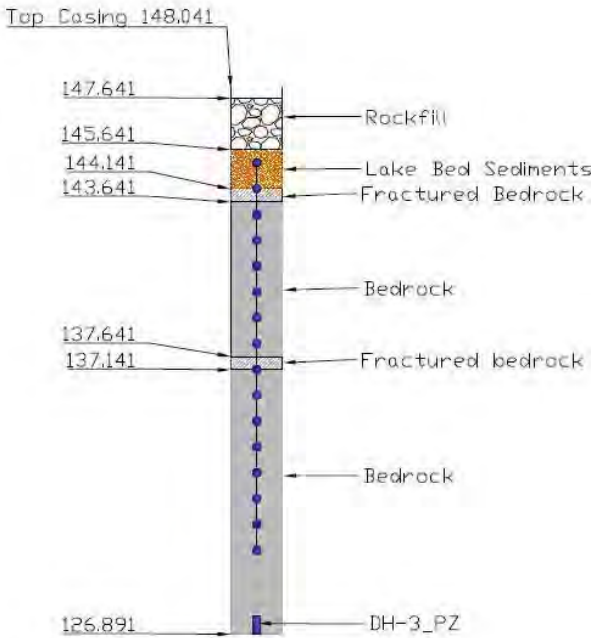
PSW – DH 3 TH



AMQ – PSW – DH03\_TH



DH-3

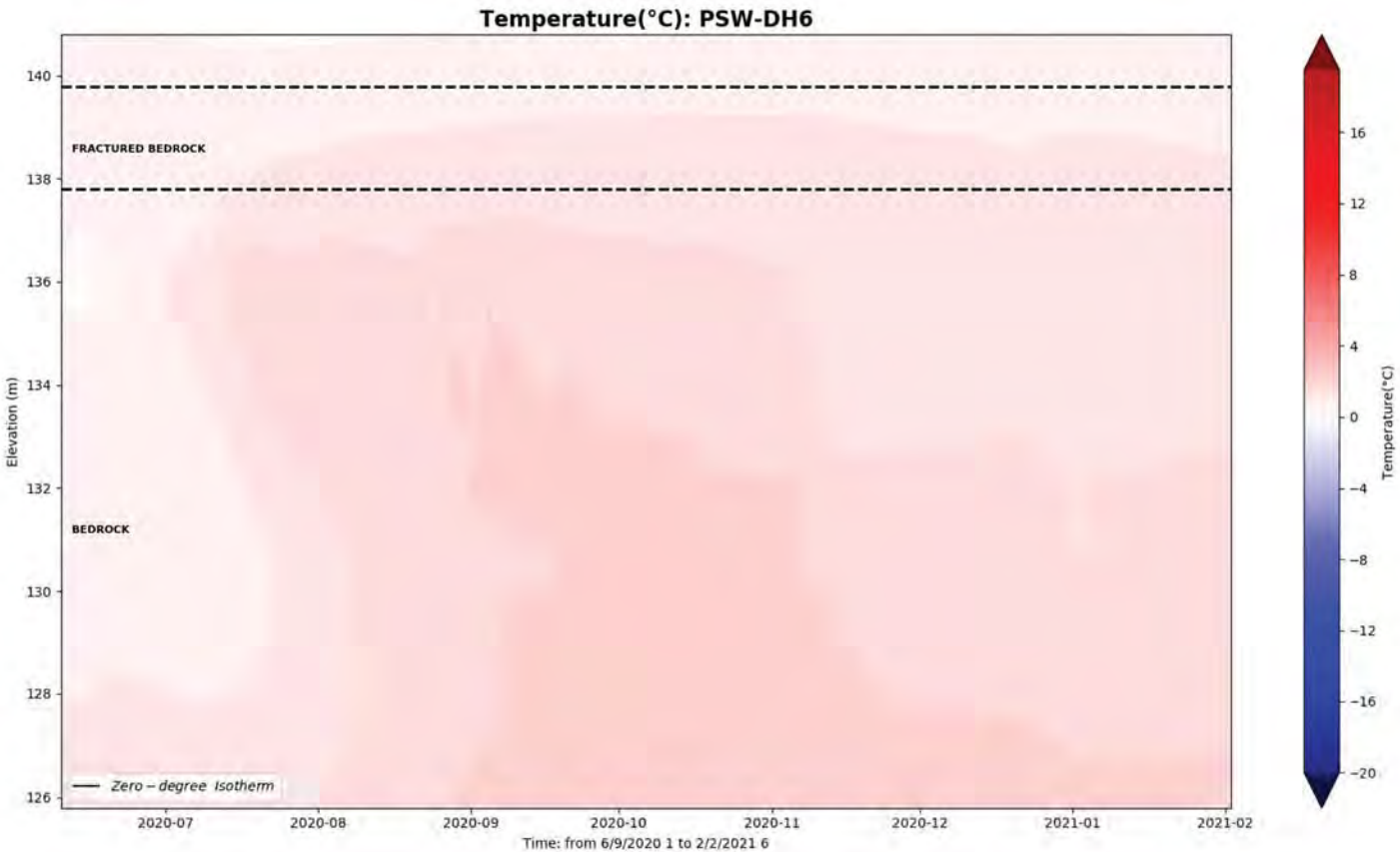




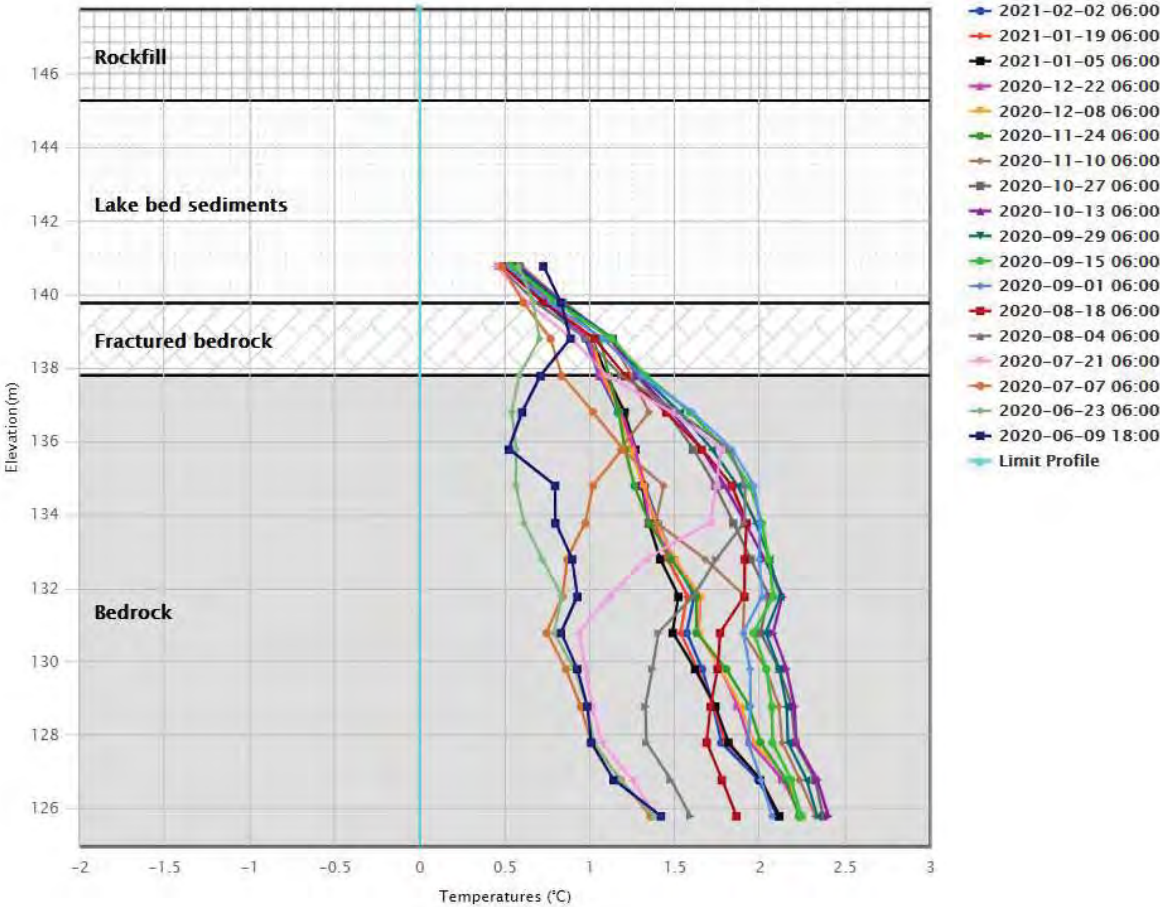
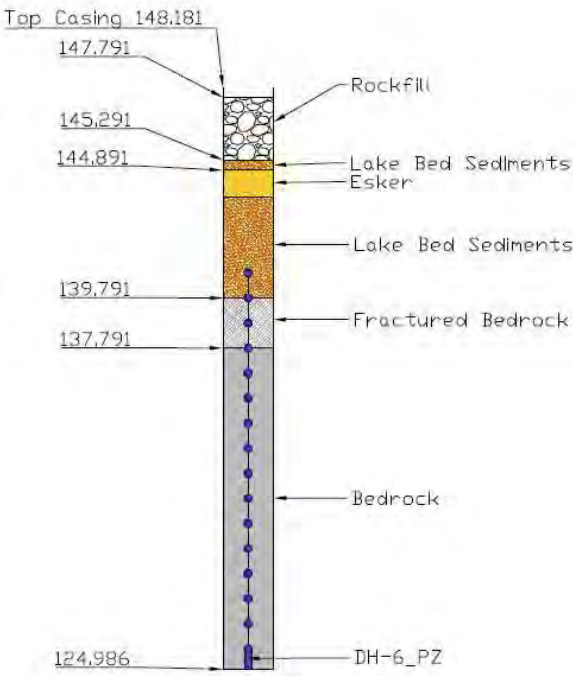
PSW – DH 6 TH



AMQ – PSW – DH06\_TH

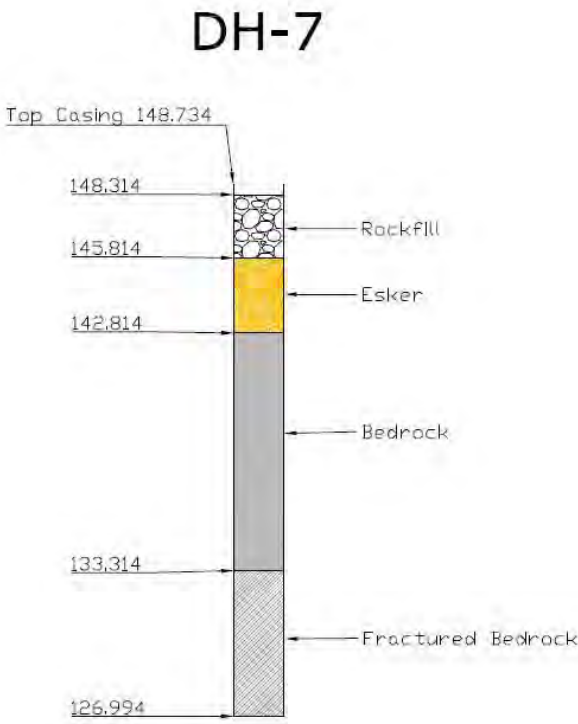
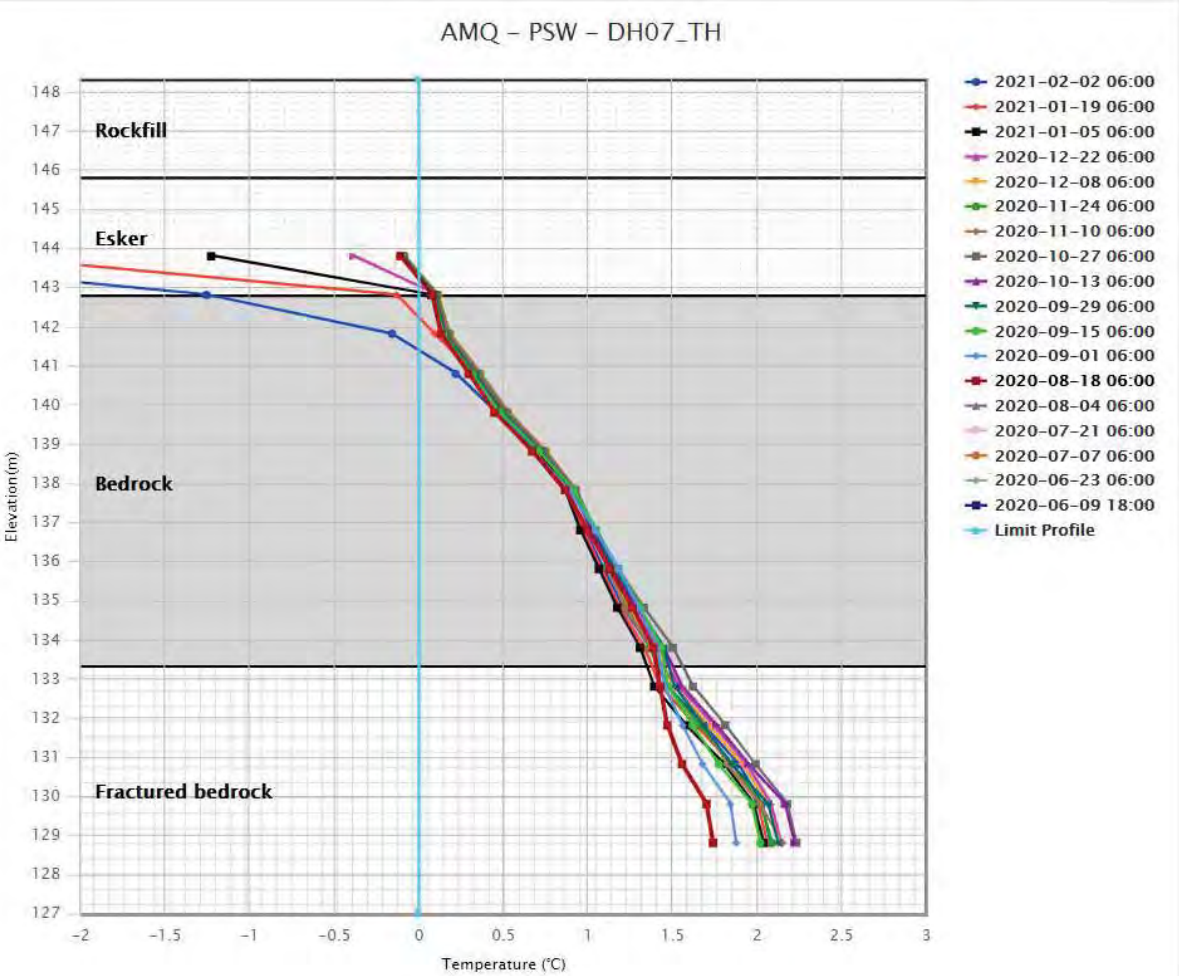
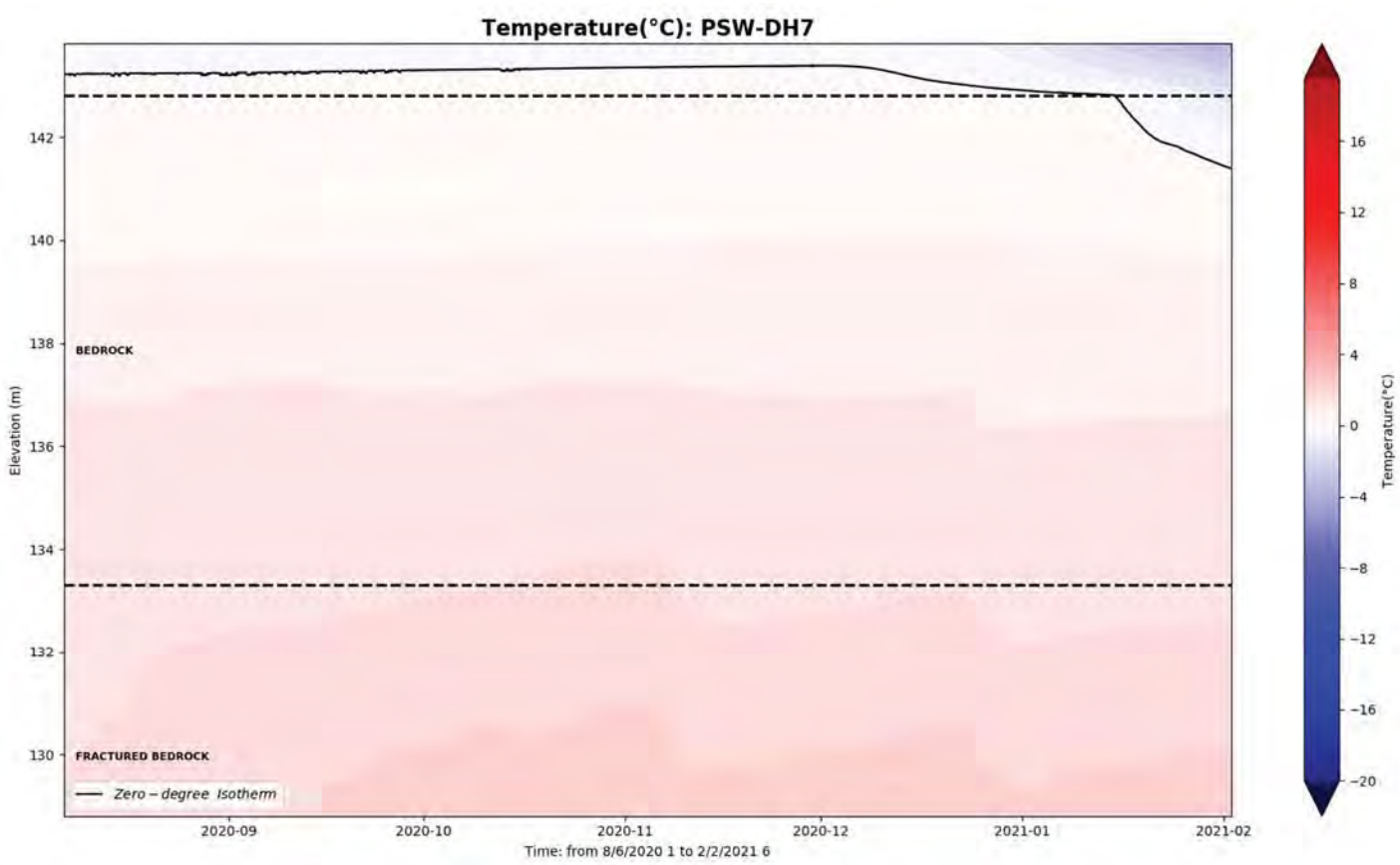


DH-6





PSW – DH 7 TH

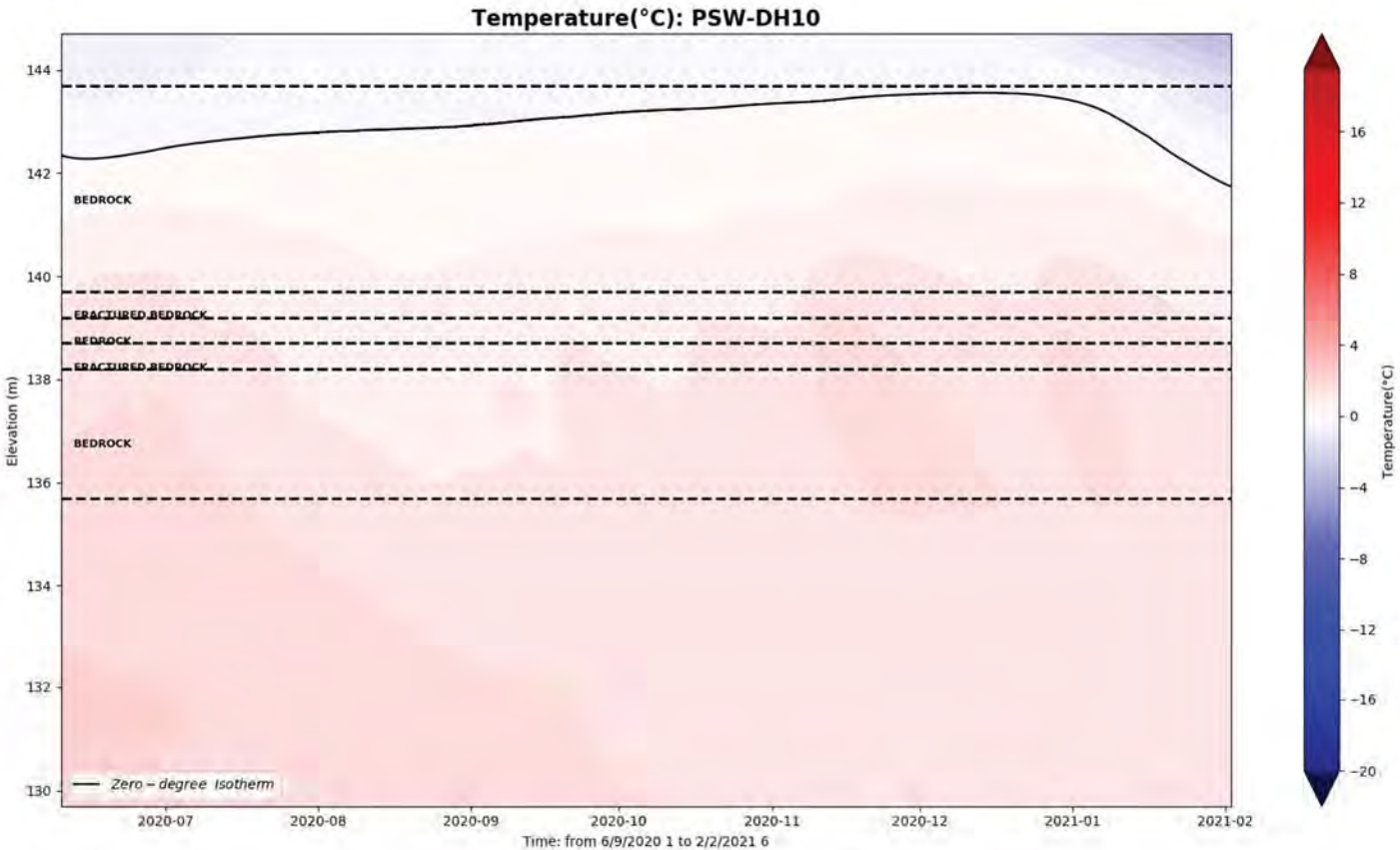
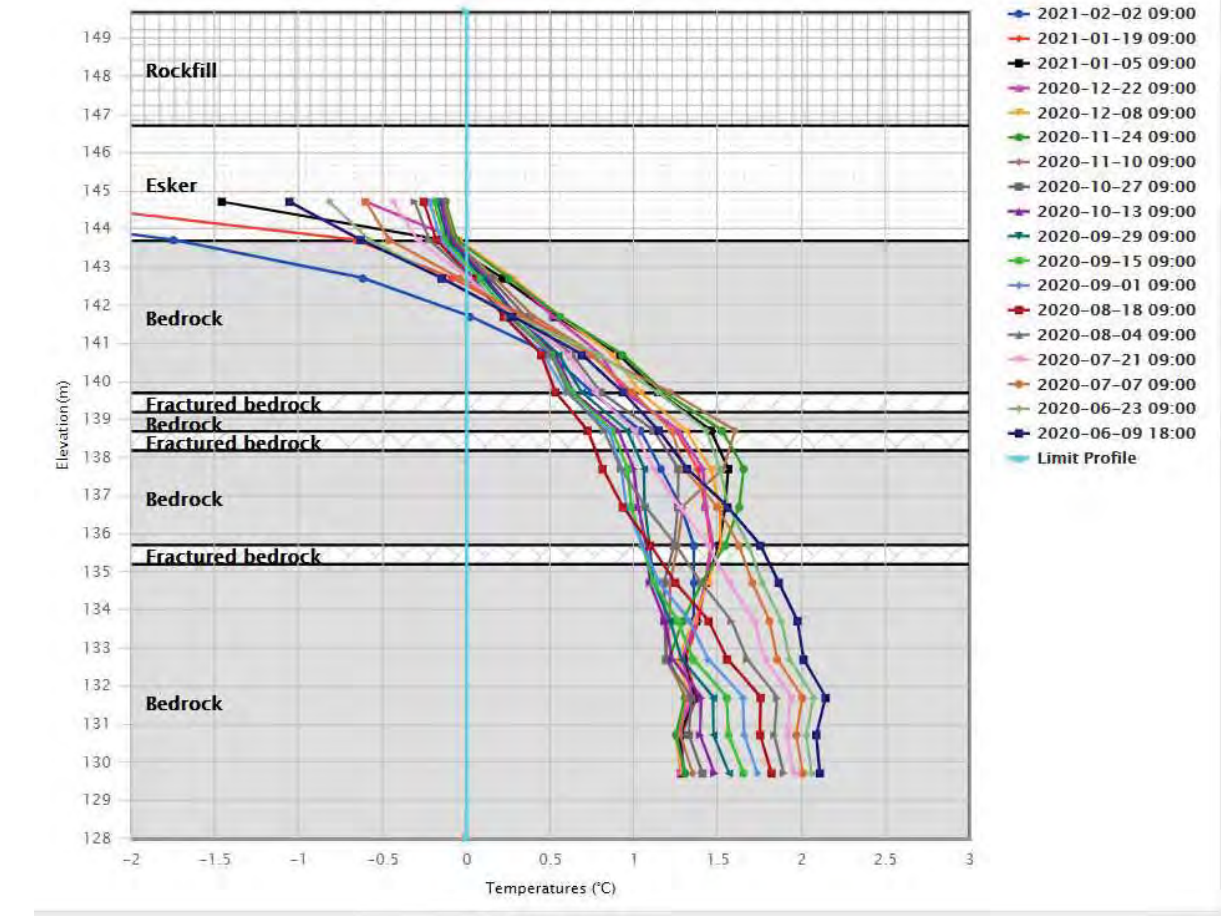




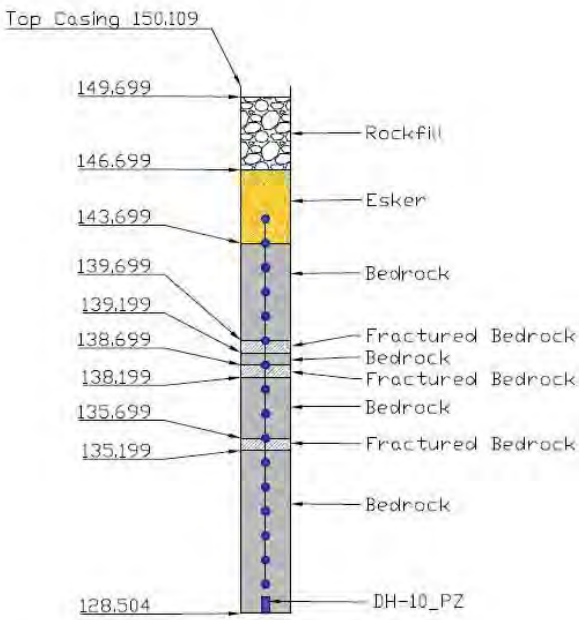
PSW – DH 10 TH



AMQ – PSW – DH10\_TH



DH-10

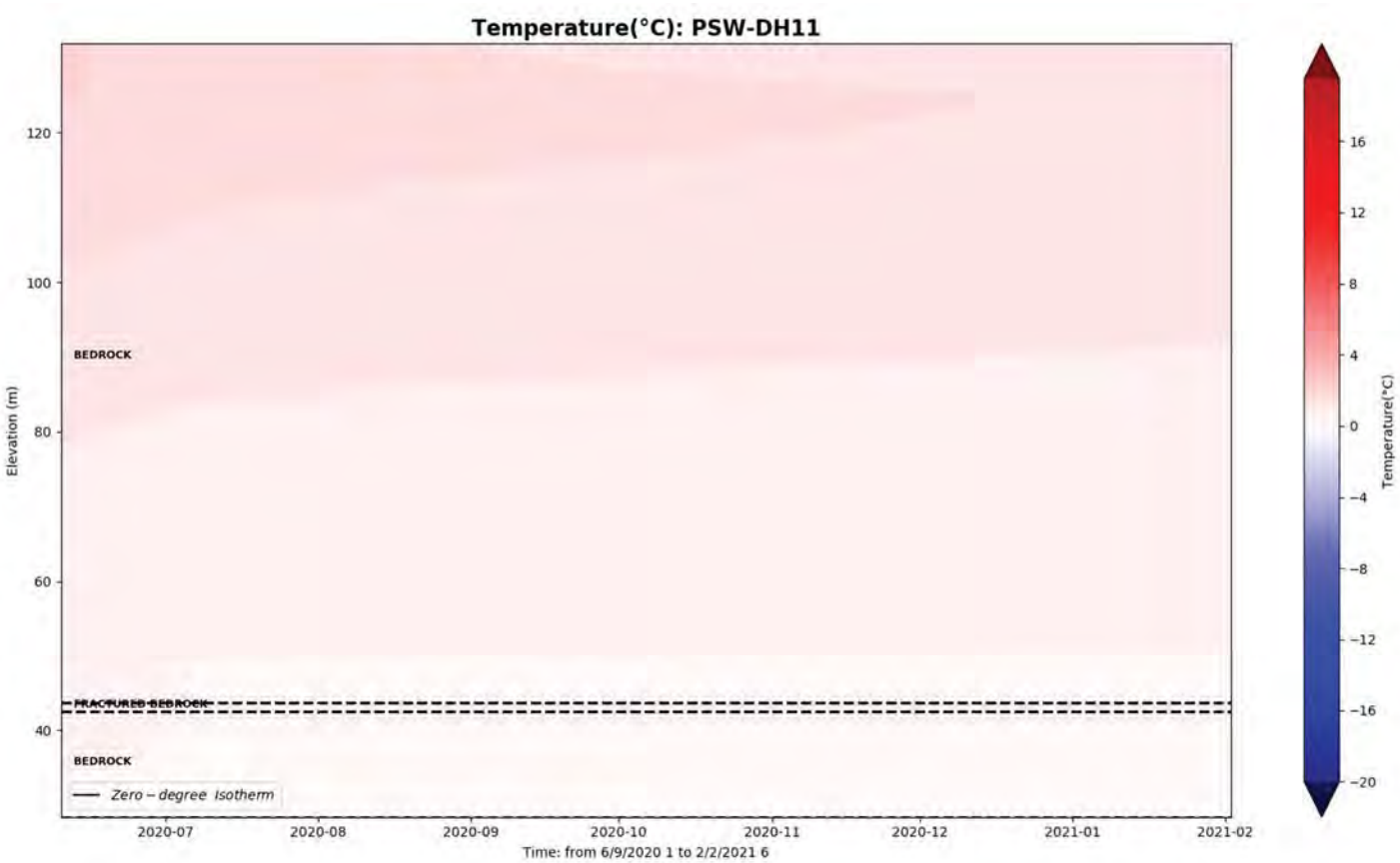




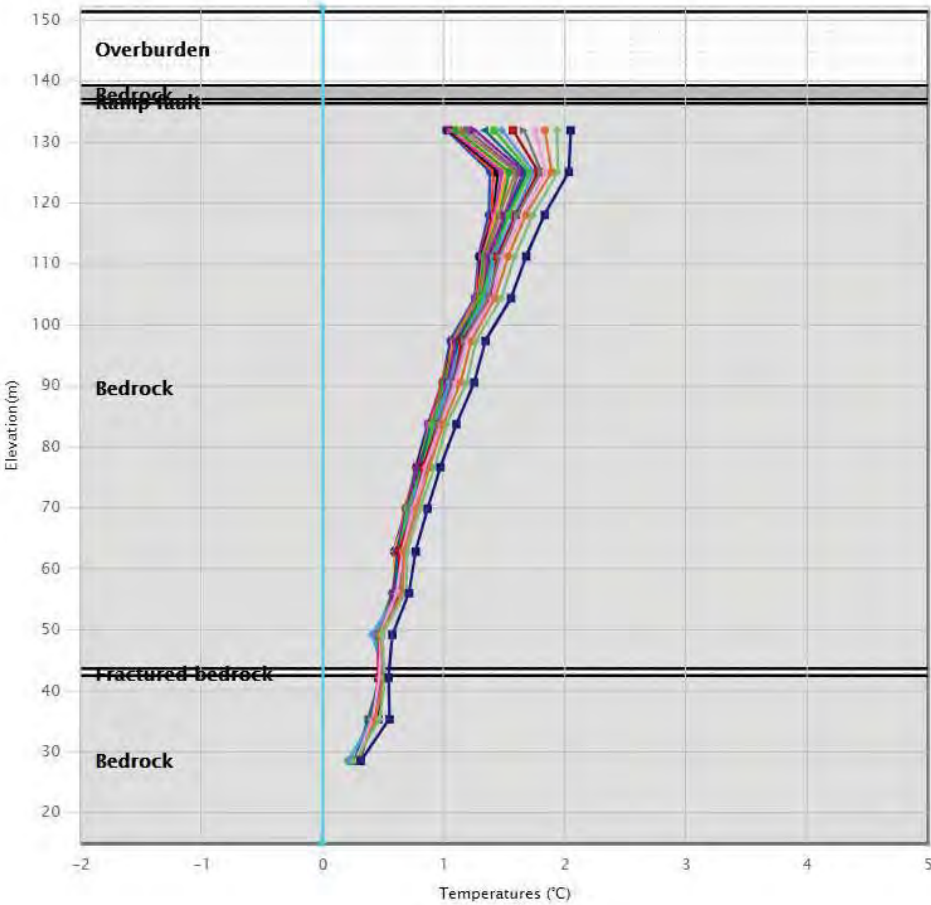
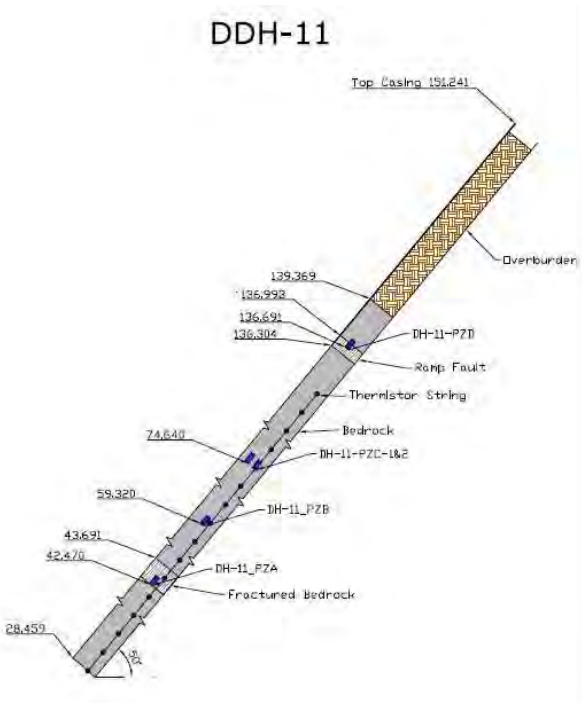
PSW – DH 11 TH



AMQ – PSW – DH11\_TH



DDH-11

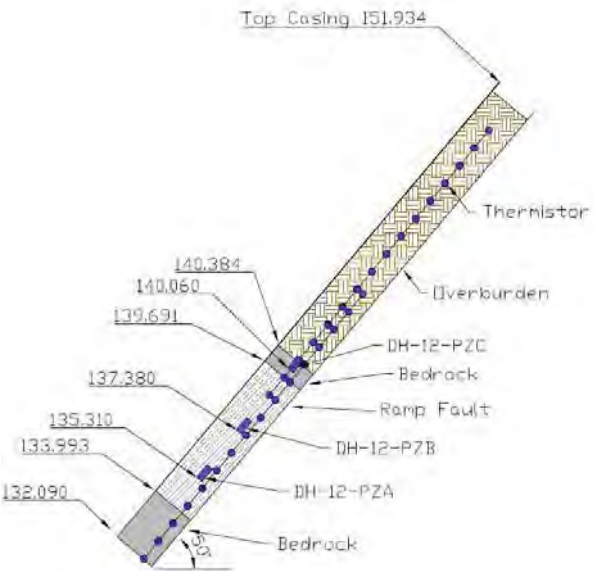
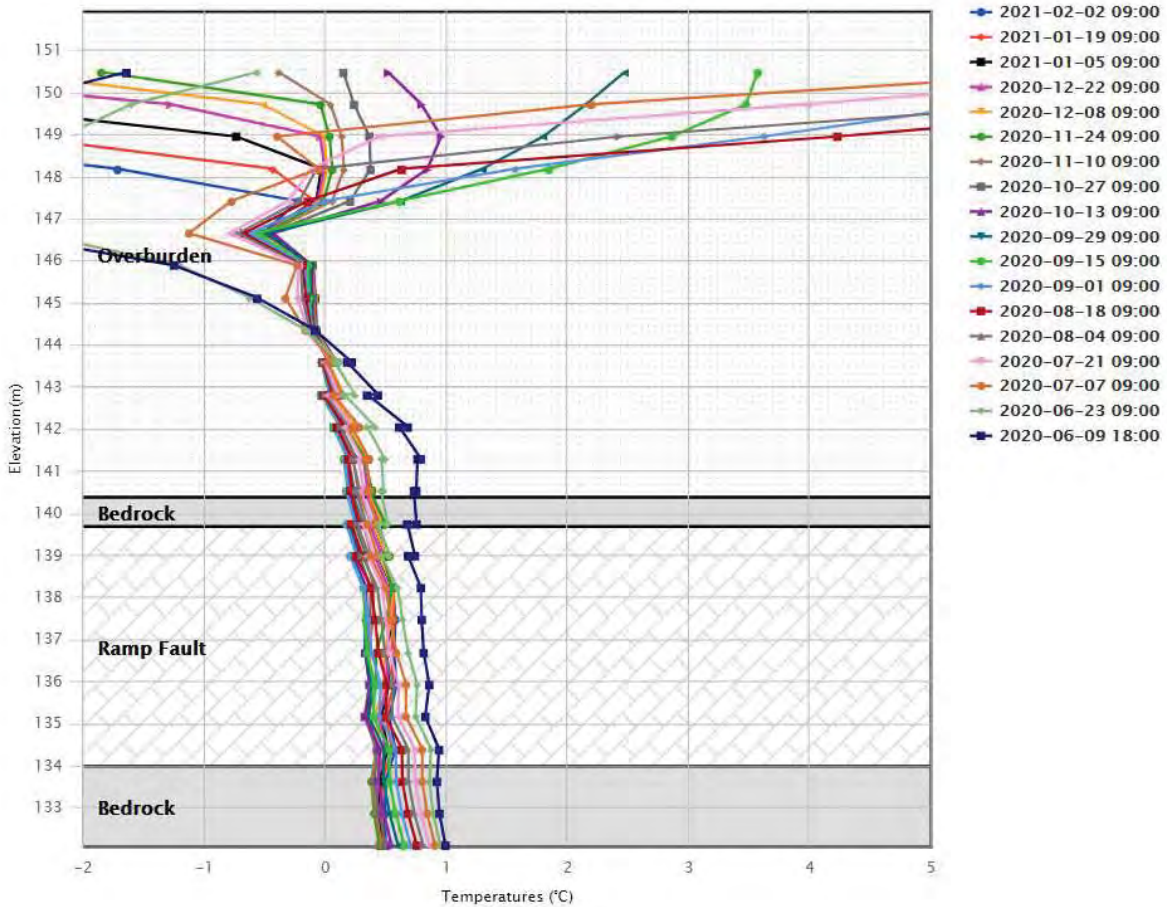
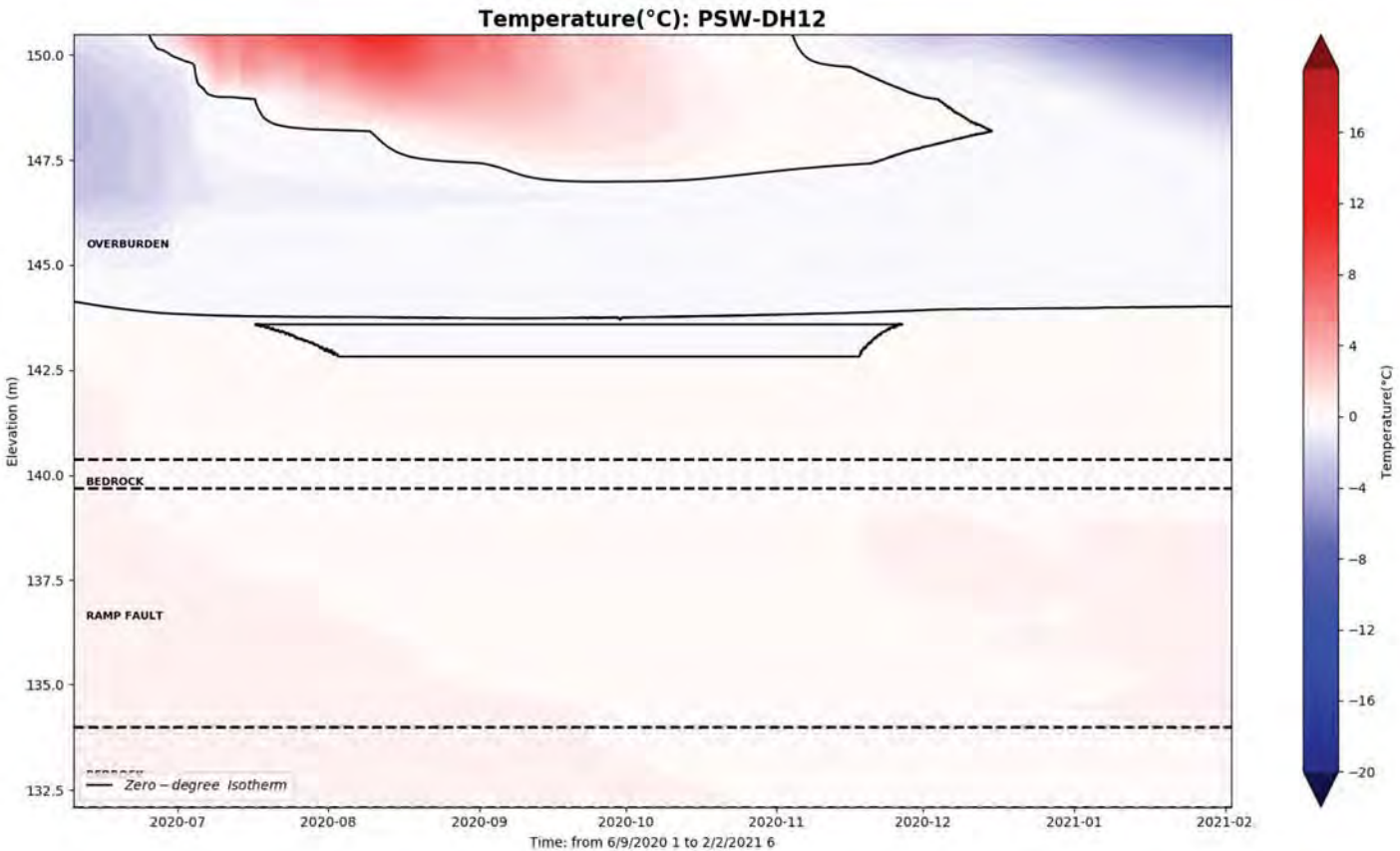




PSW – DH 12 TH

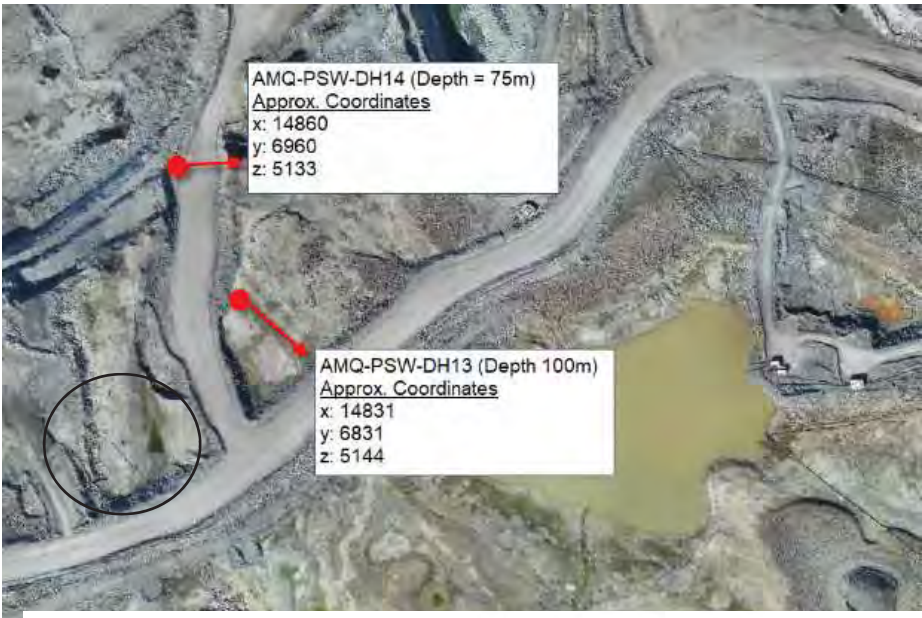


AMQ – PSW – DH12\_TH

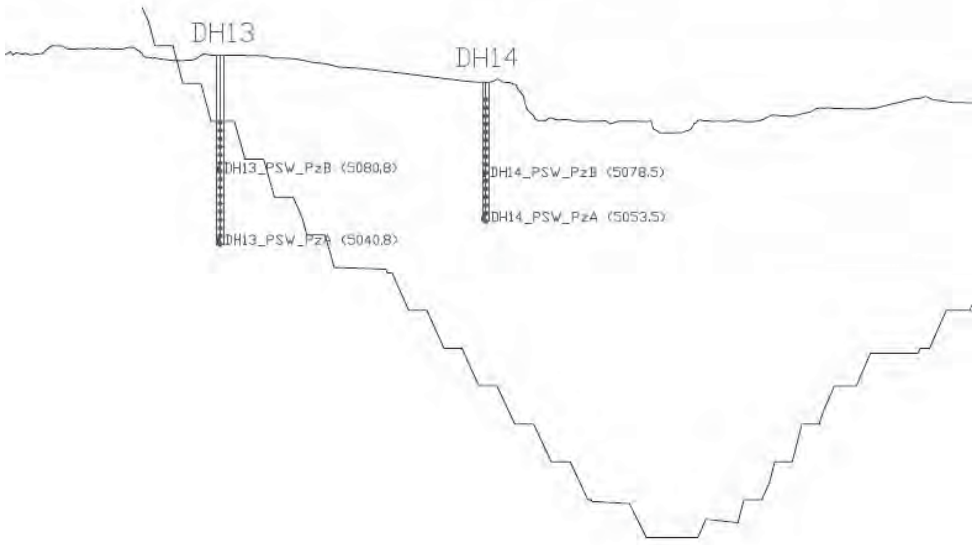
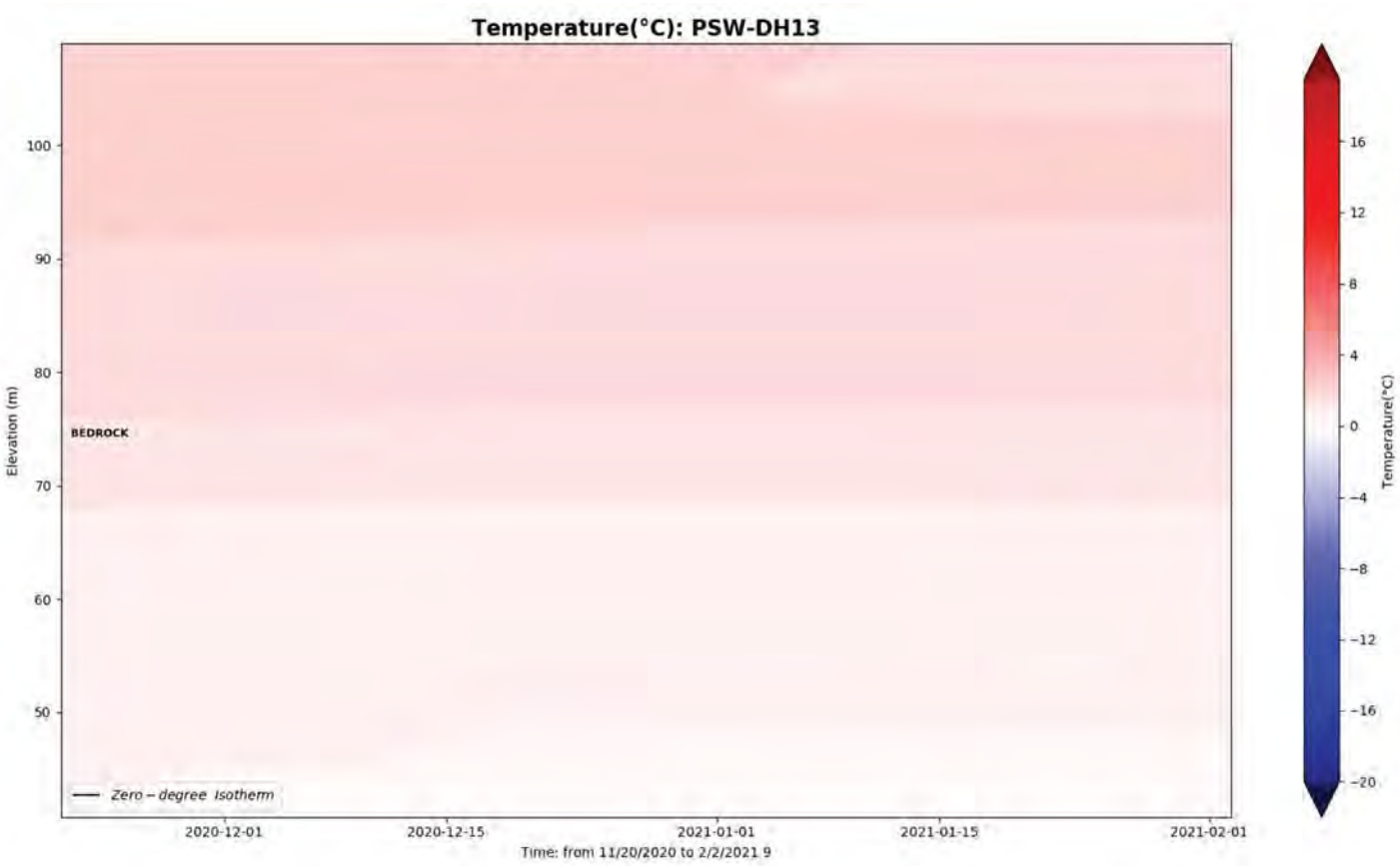
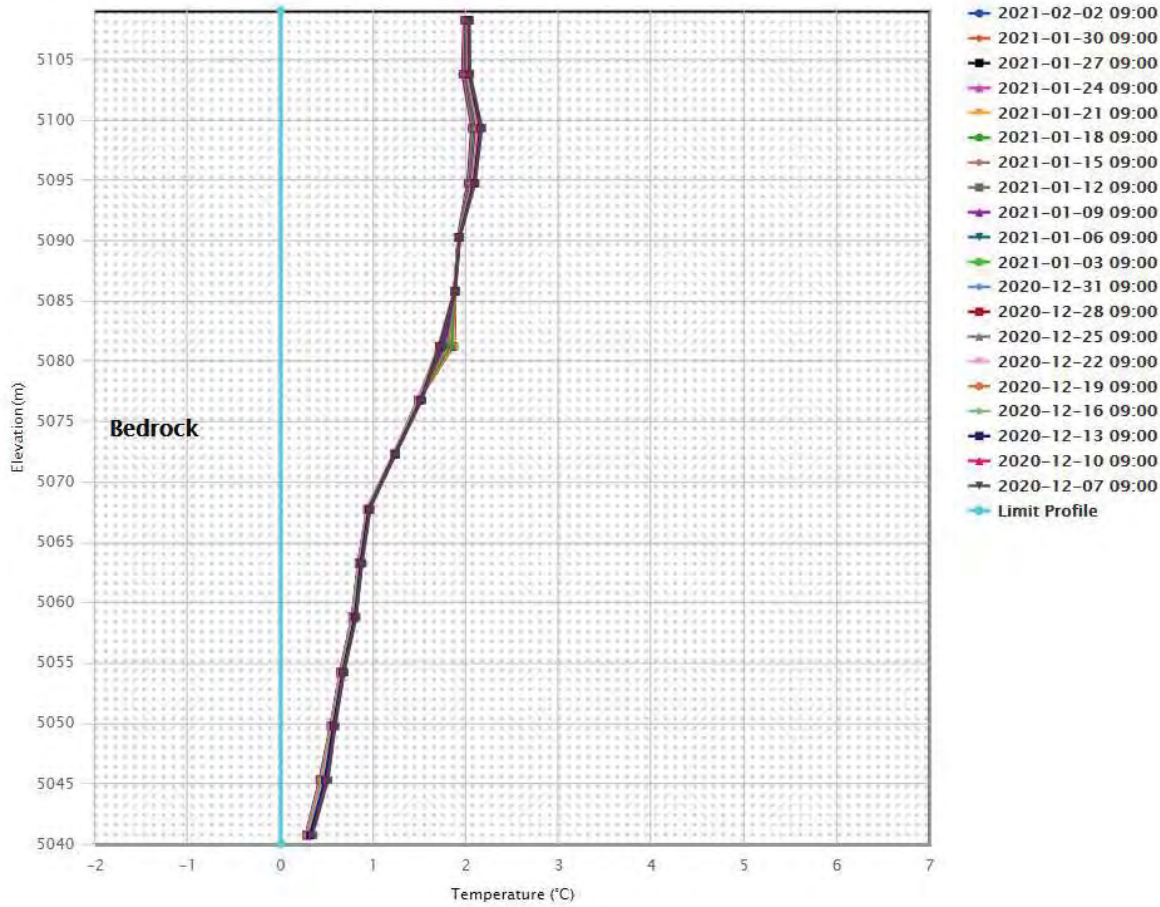




PSW – DH 13 TH



AMQ – PSW – DH13\_TH

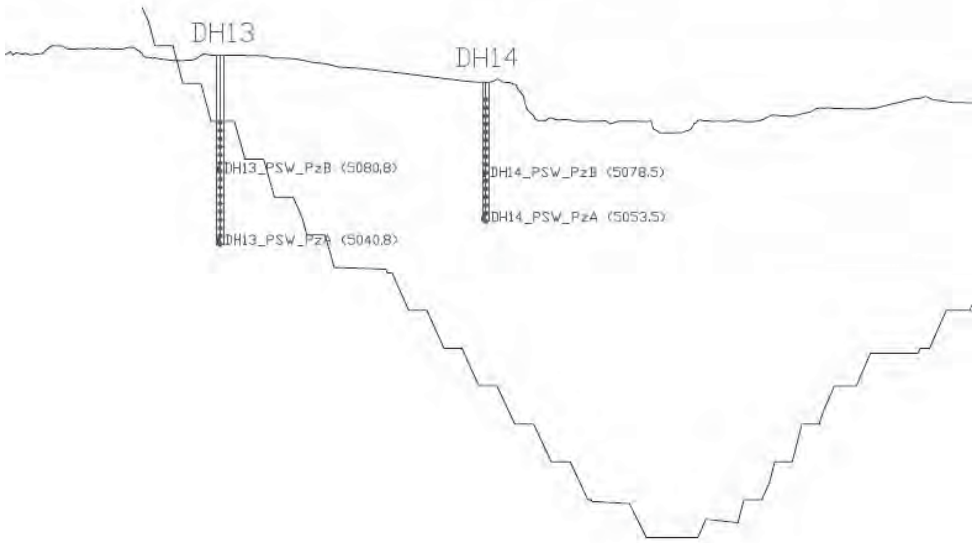
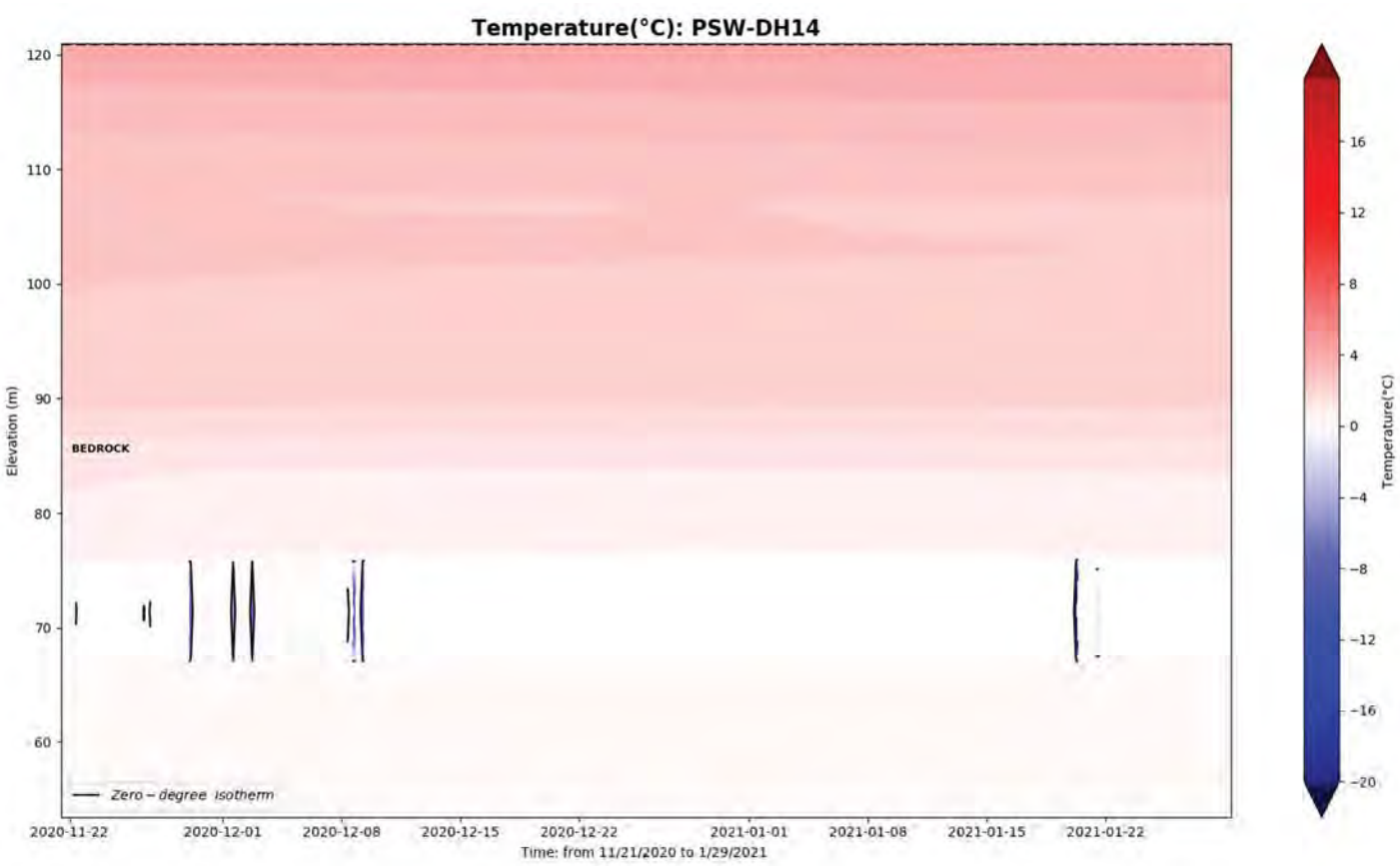
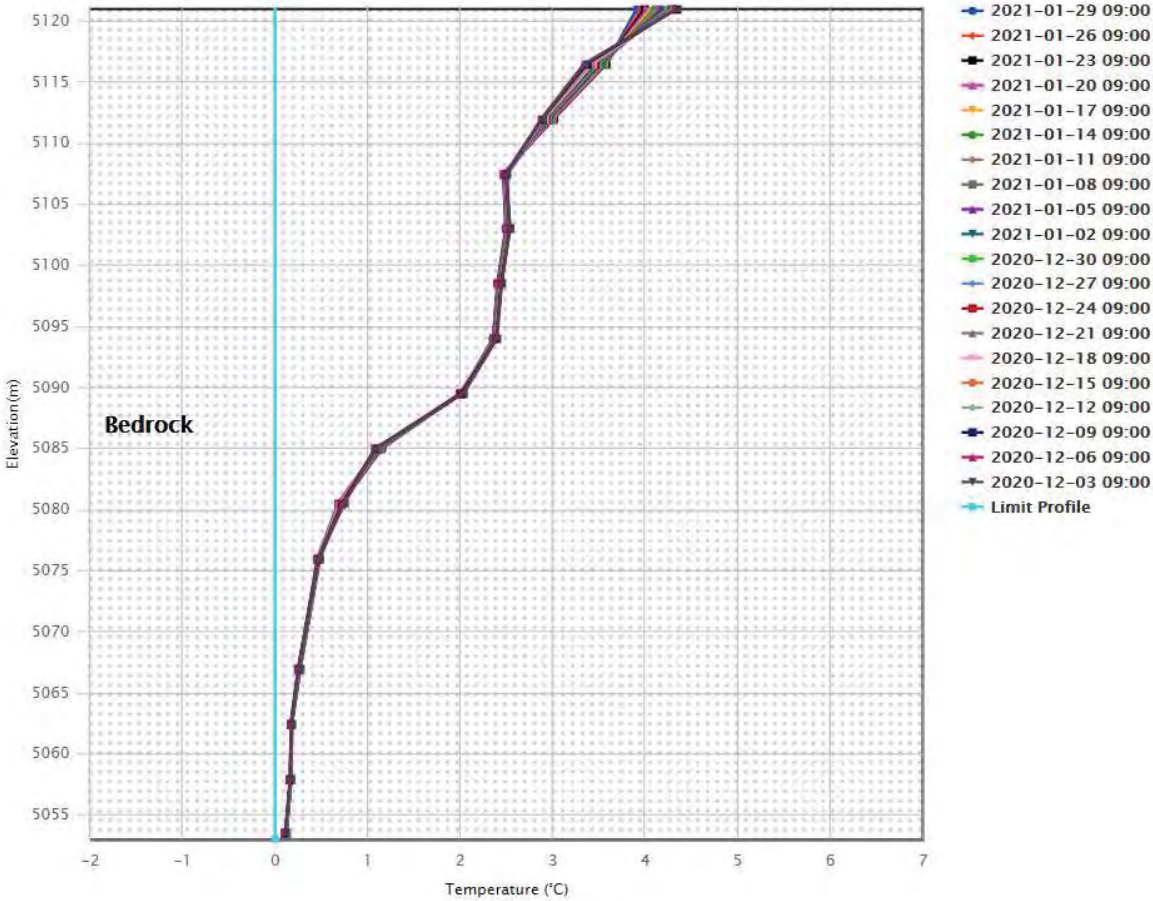




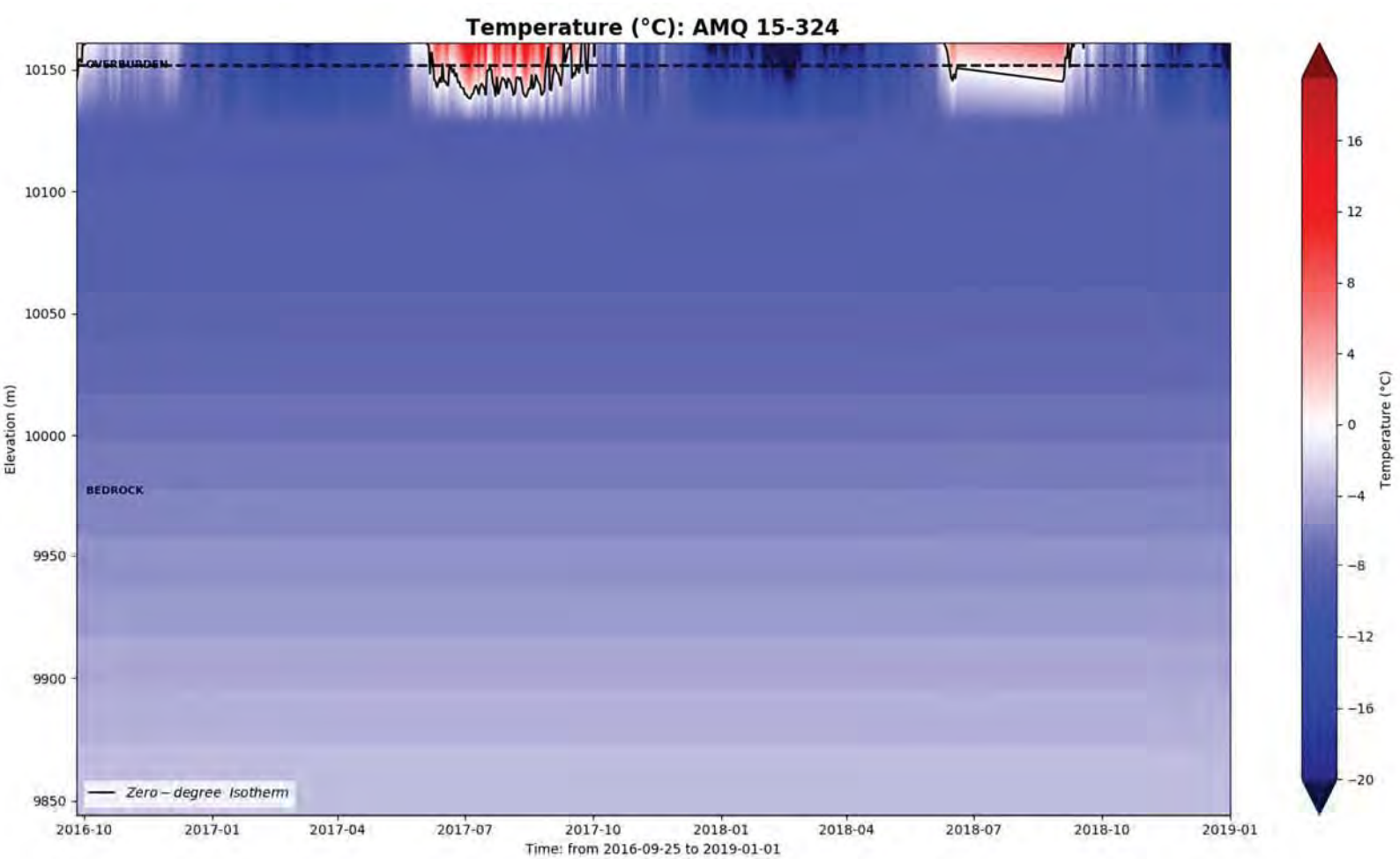
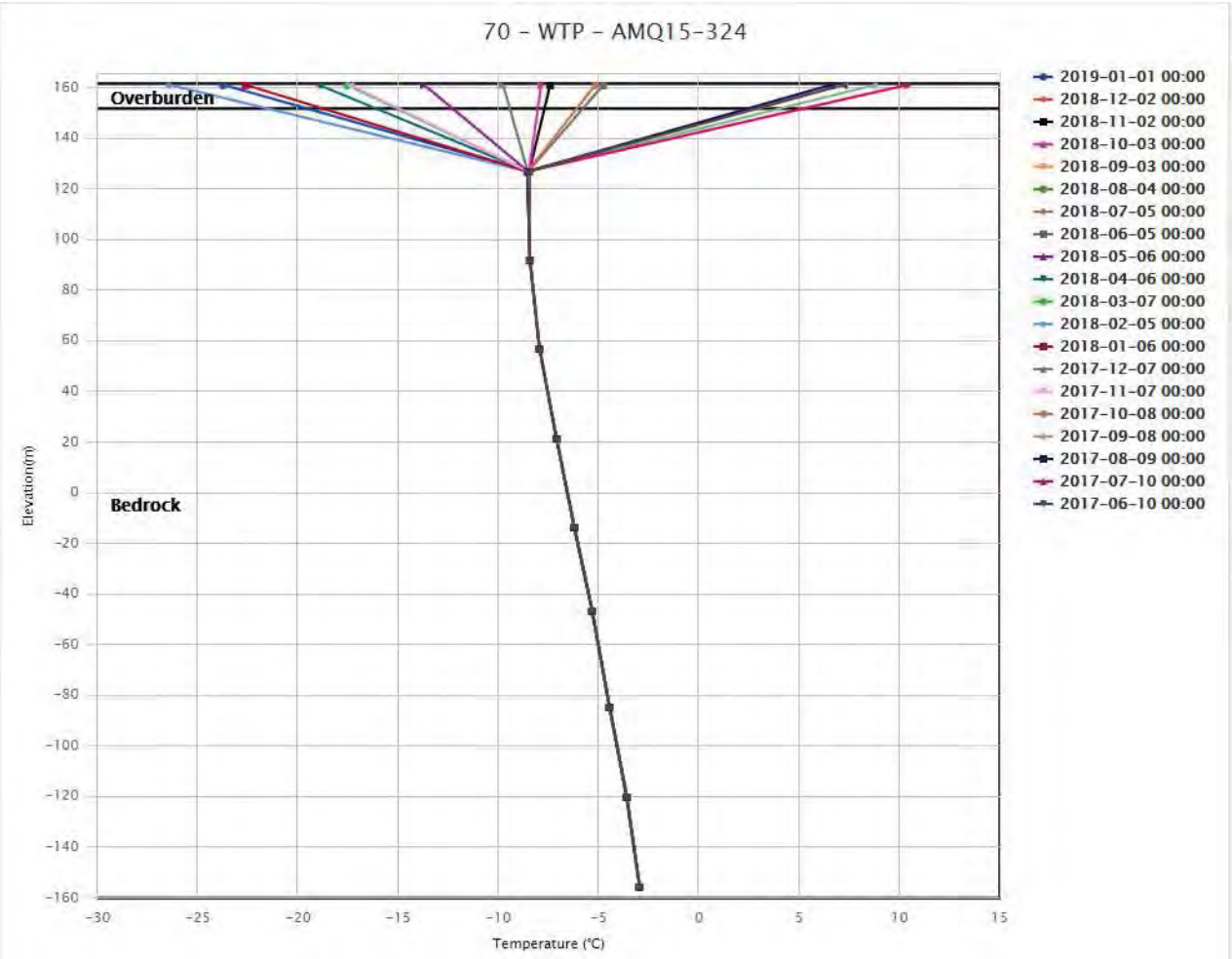
PSW – DH 14 TH



AMQ – PSW – DH14\_TH



AMQ 15-324

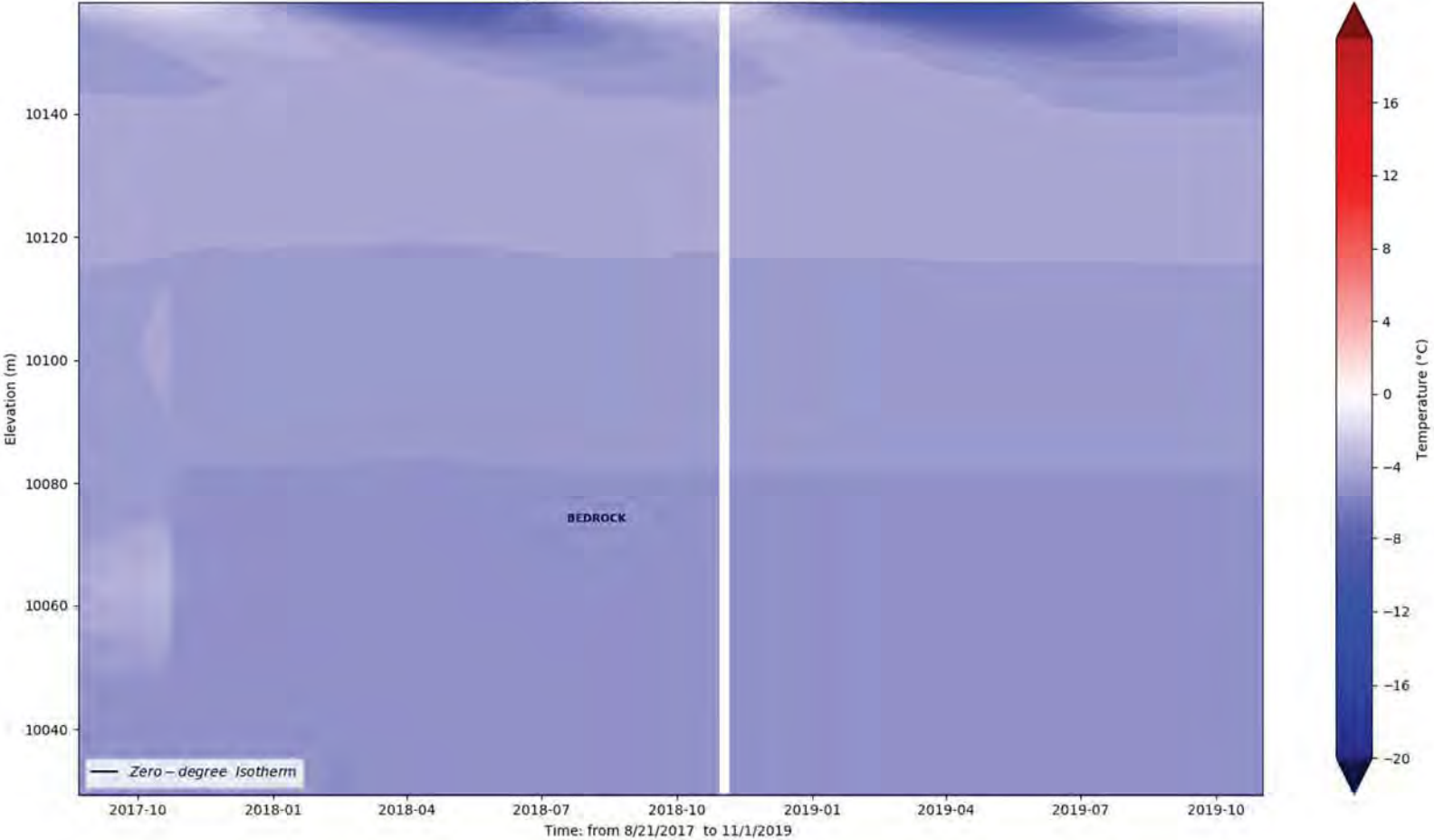




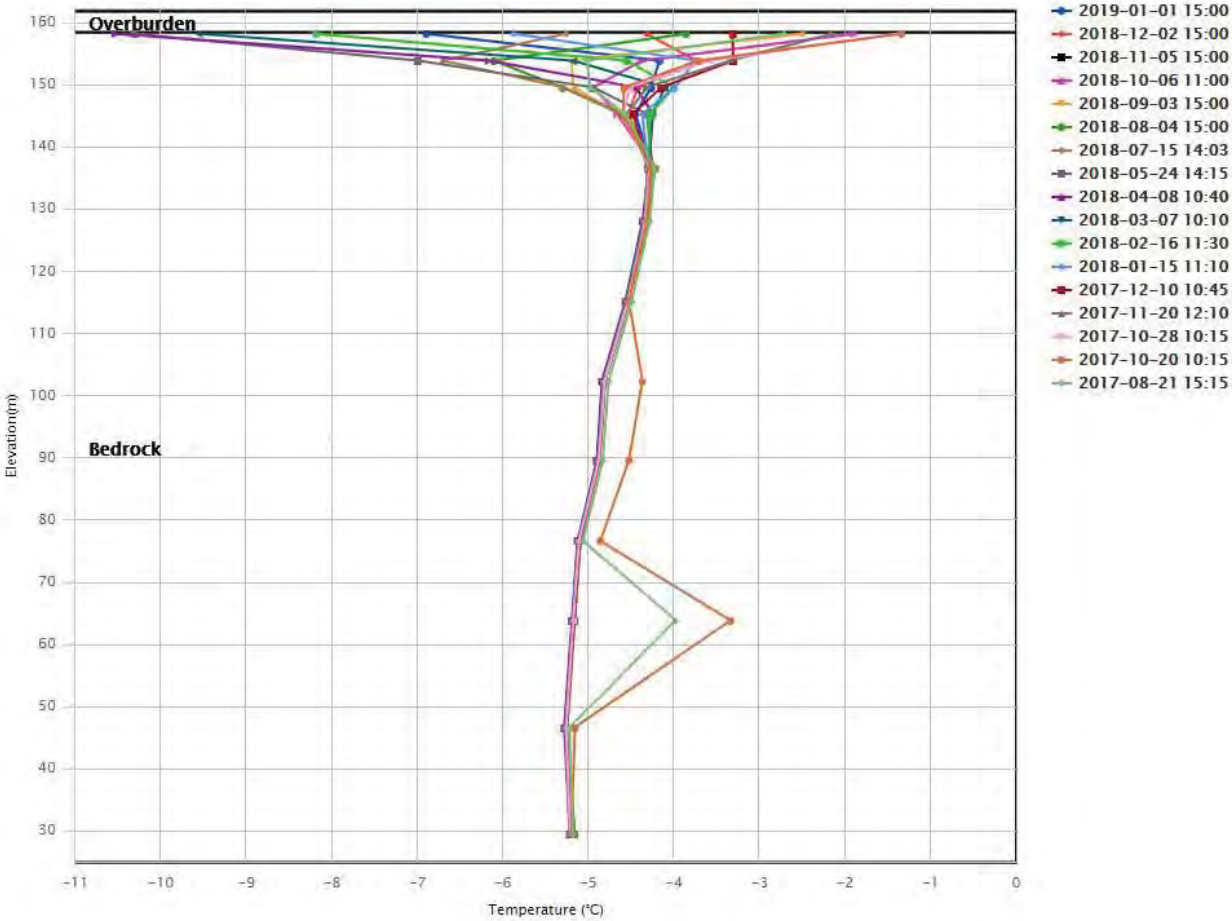
AMQ 17-1233



Temperature (°C): AMQ 17-1233

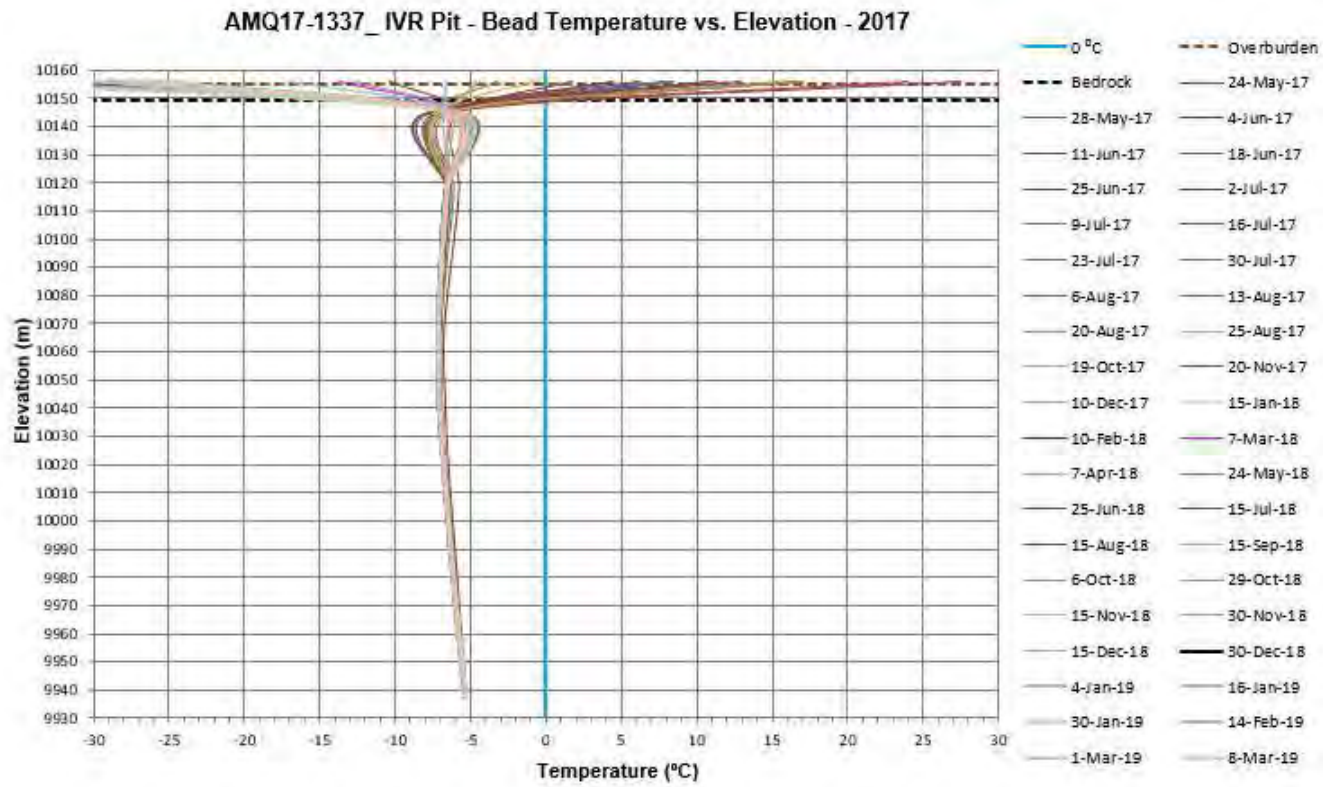
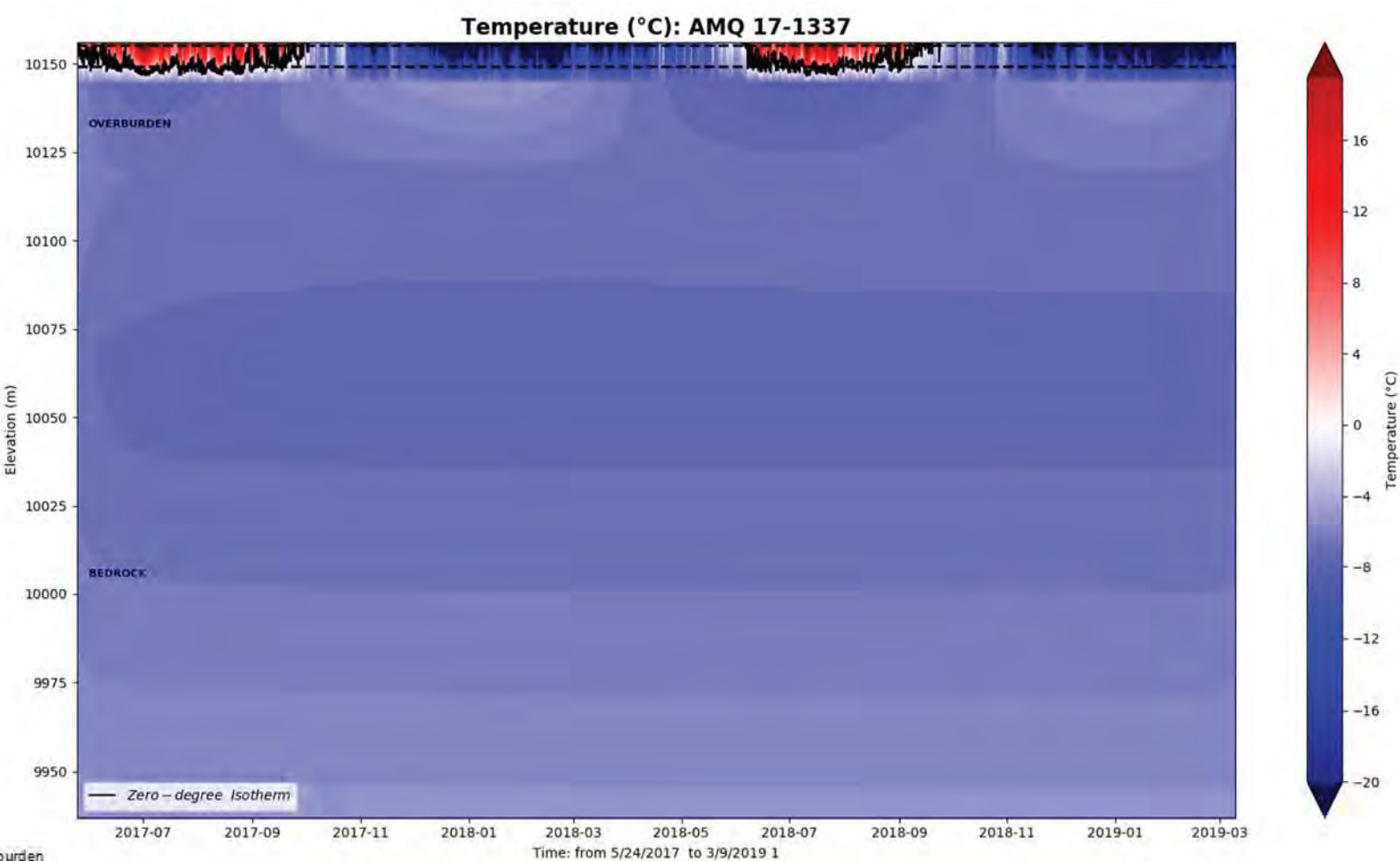
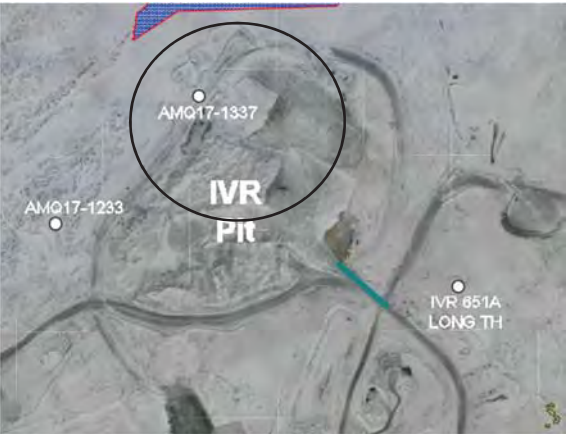


70 - IVR - AMQ17-1233

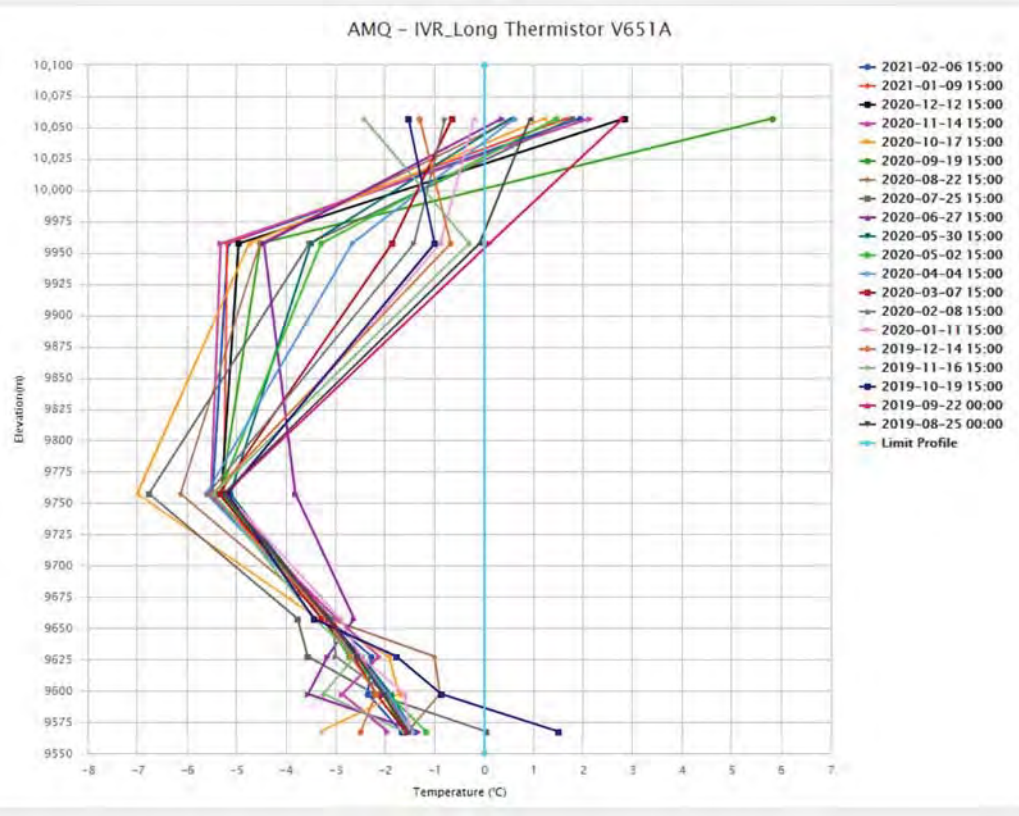
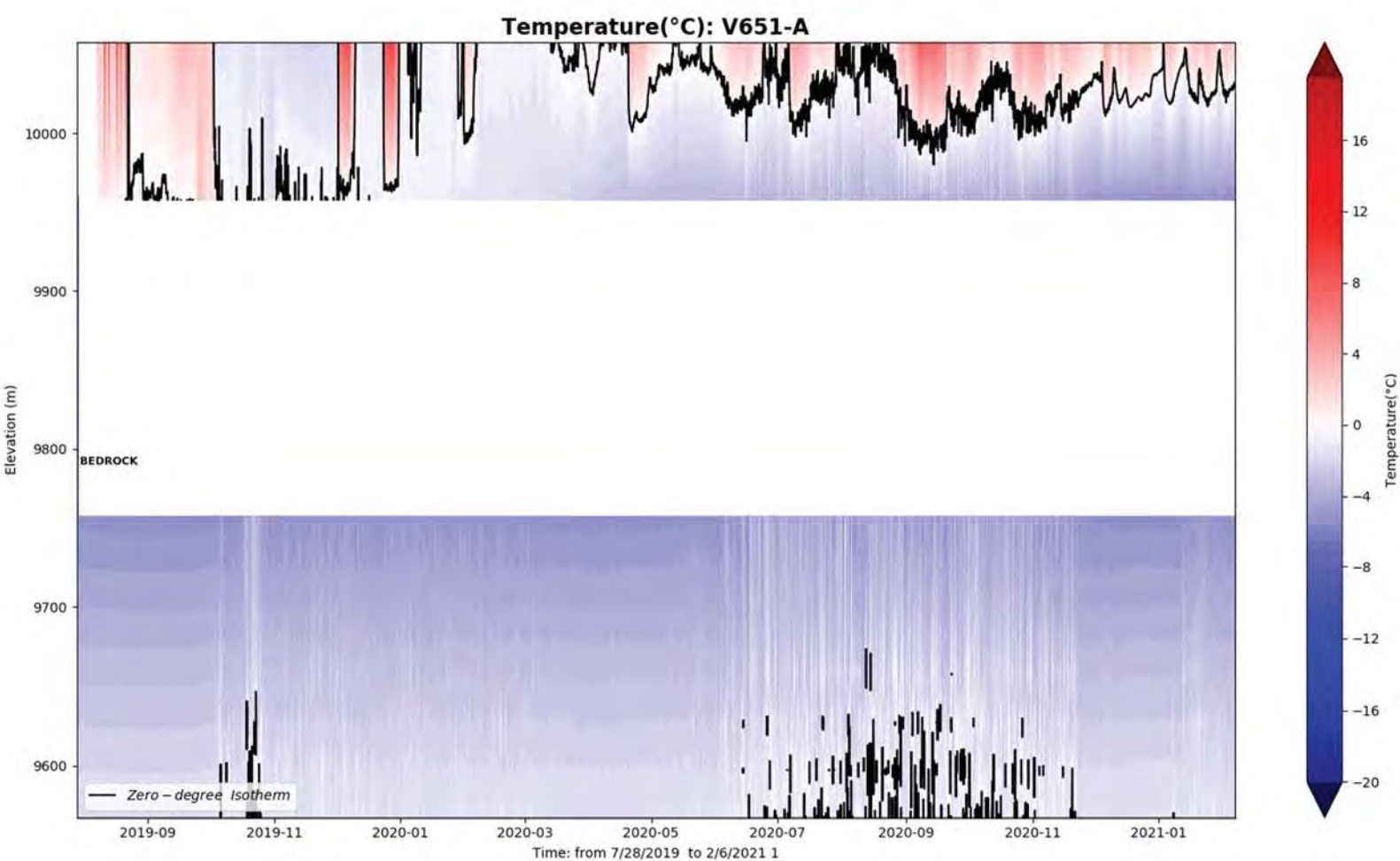
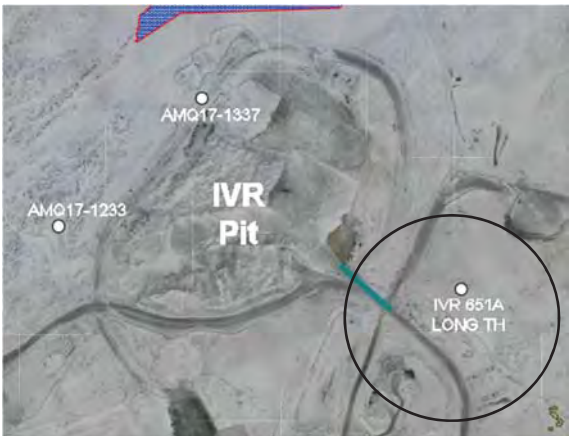




AMQ 17-1337

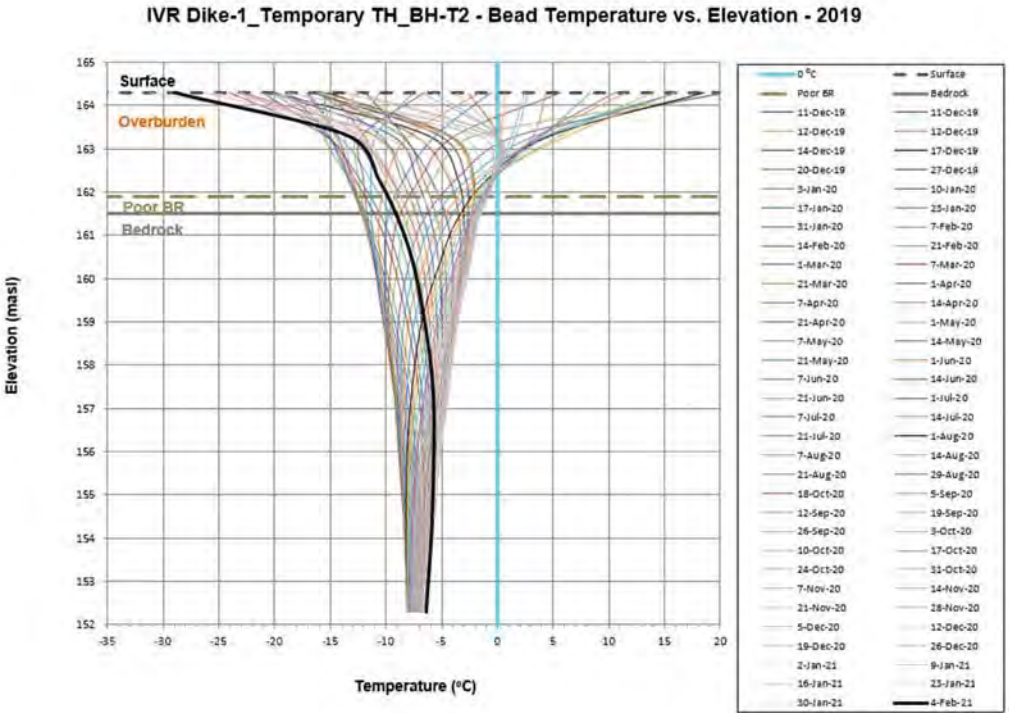
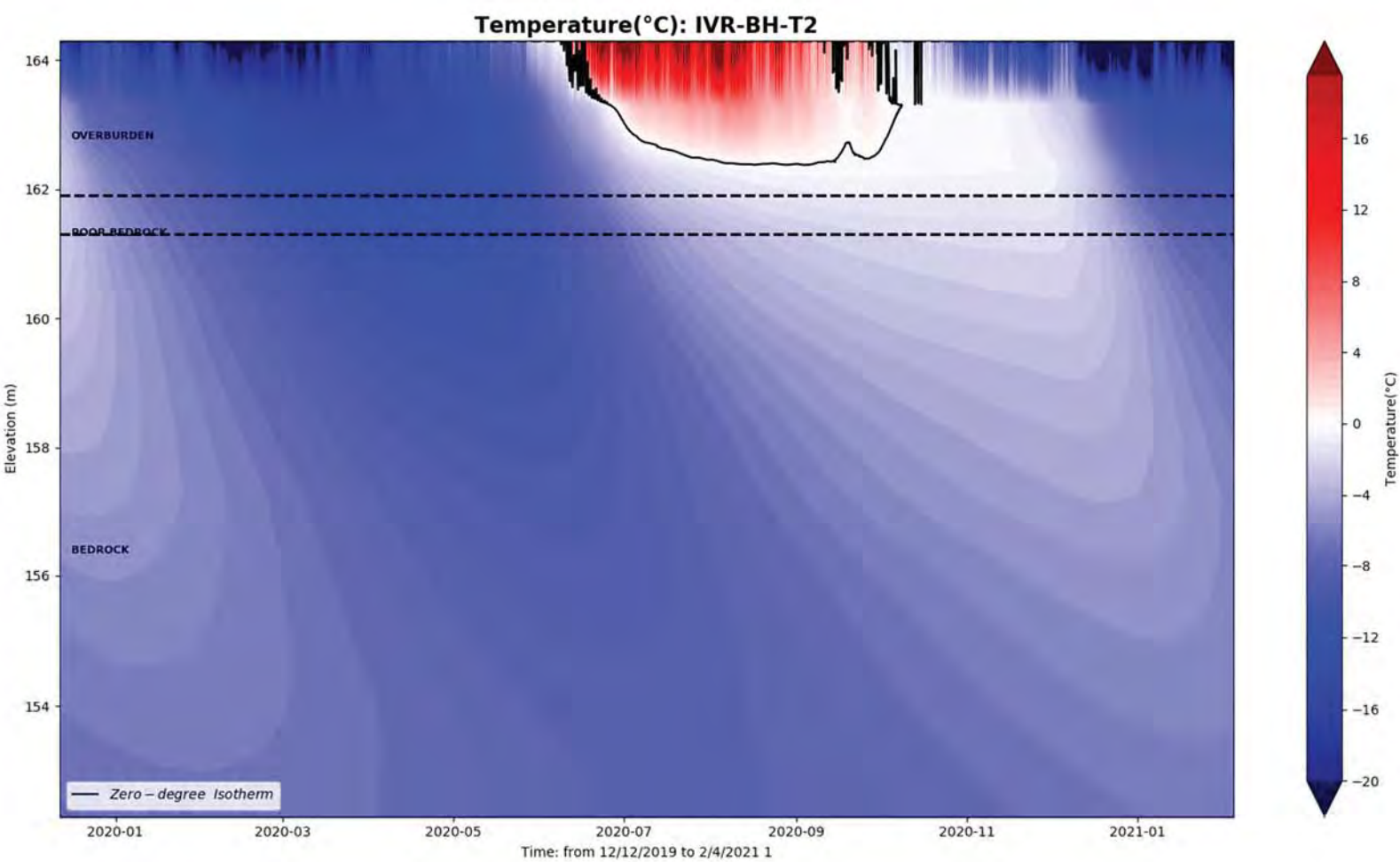
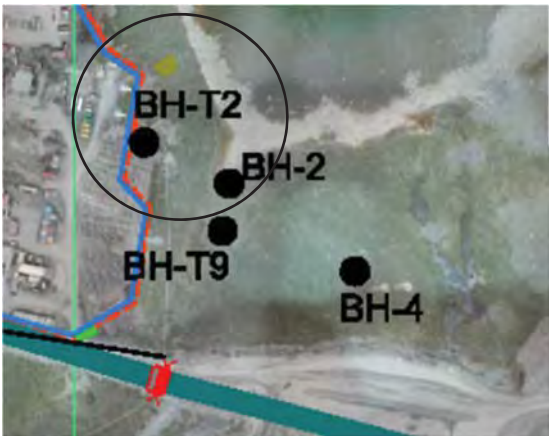


V651A Long TH

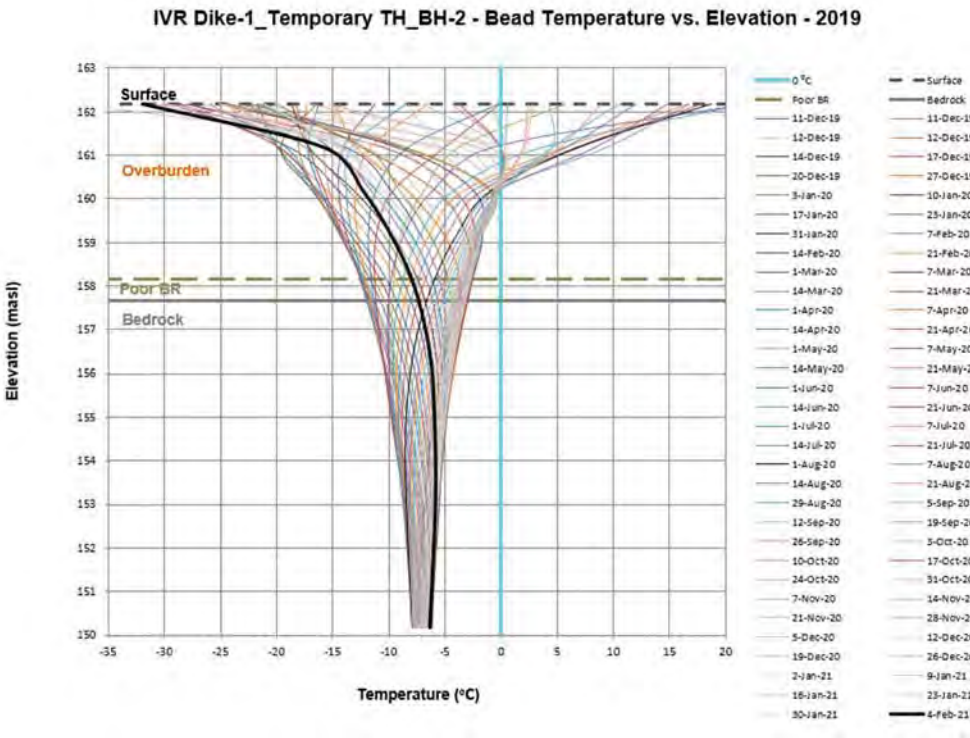
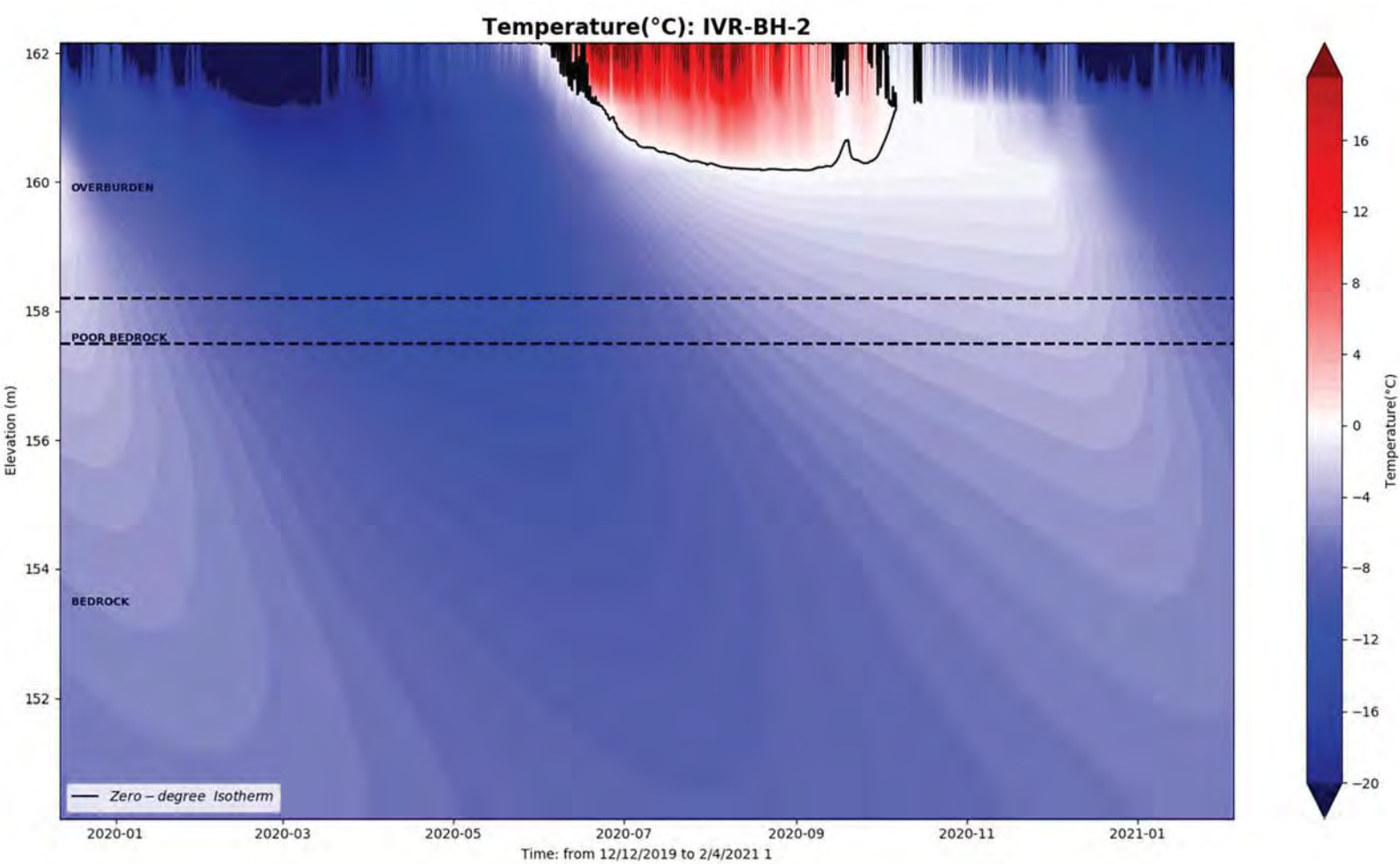
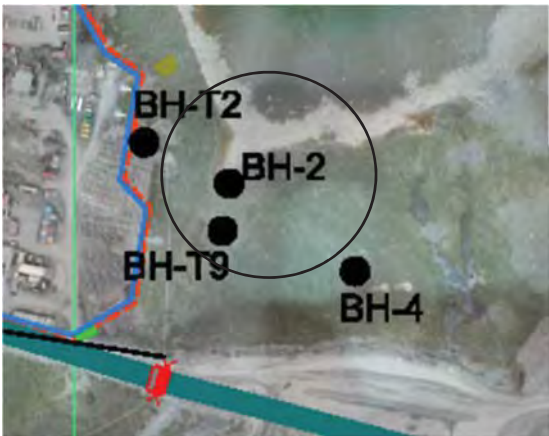




IVR-BH-T2

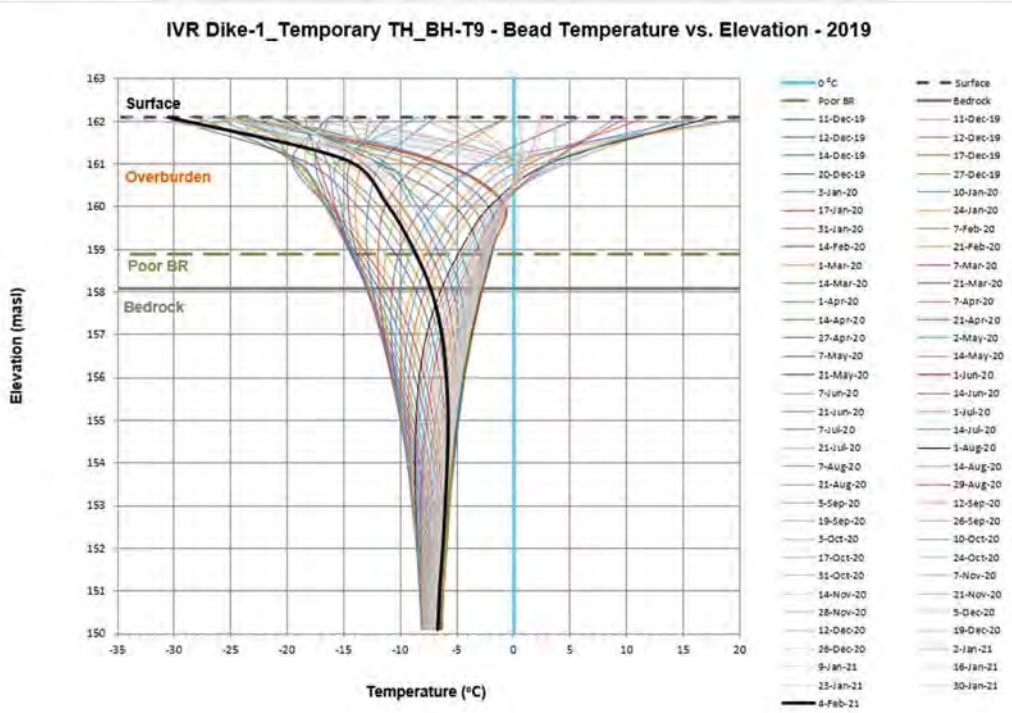
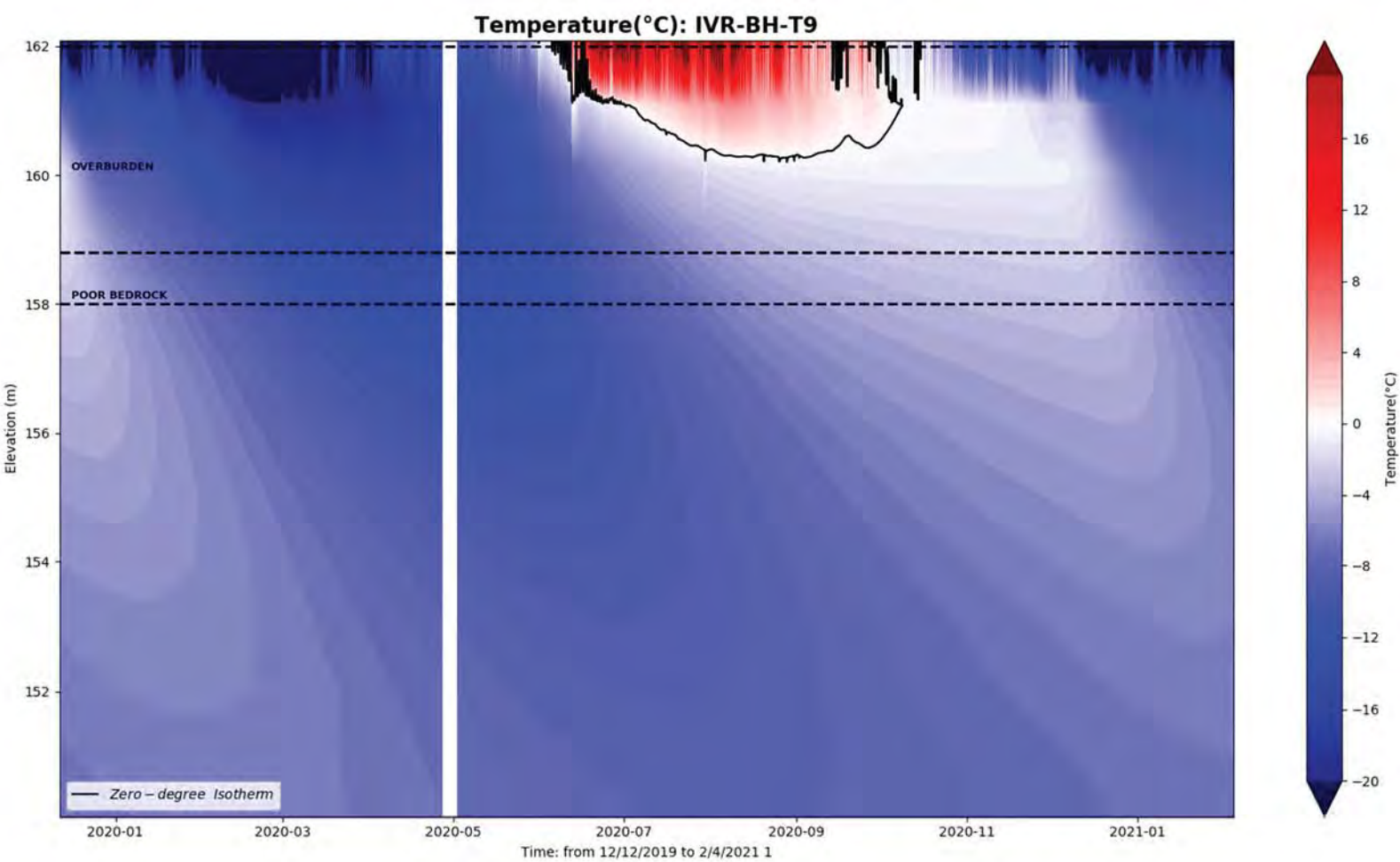
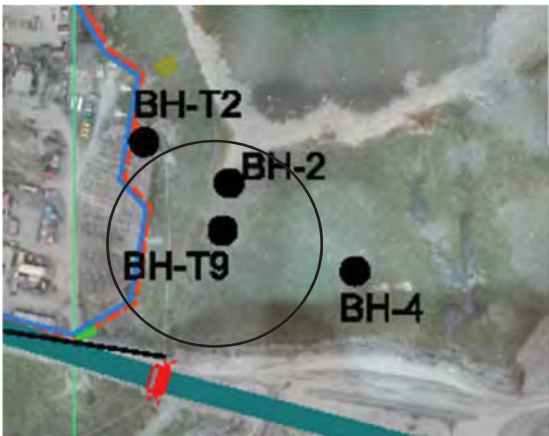


IVR-BH-2

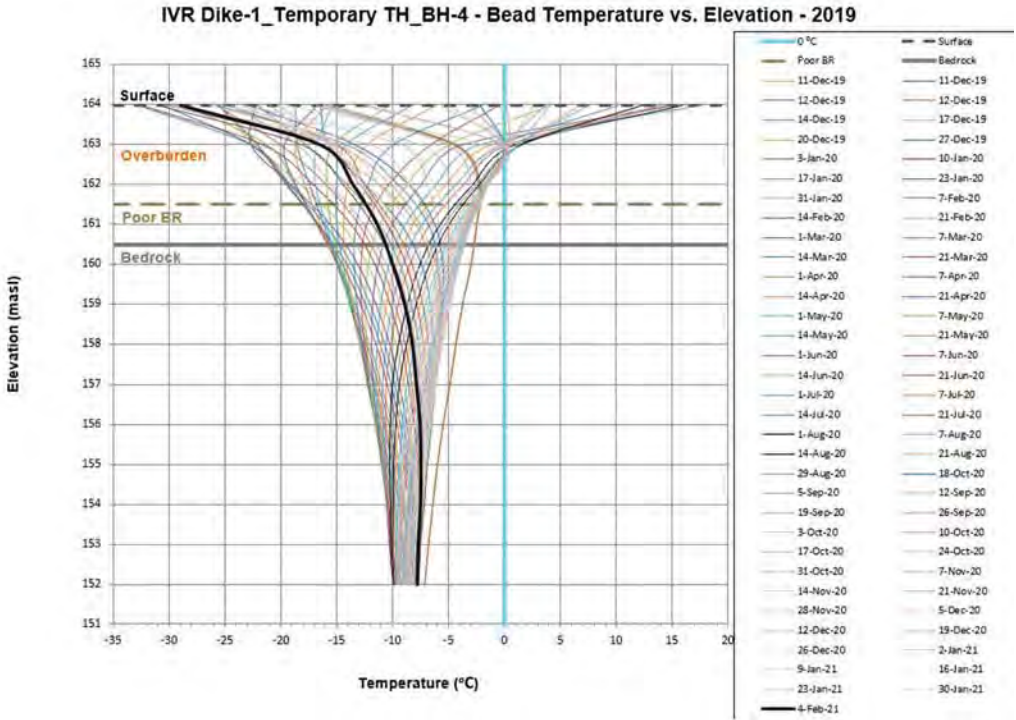
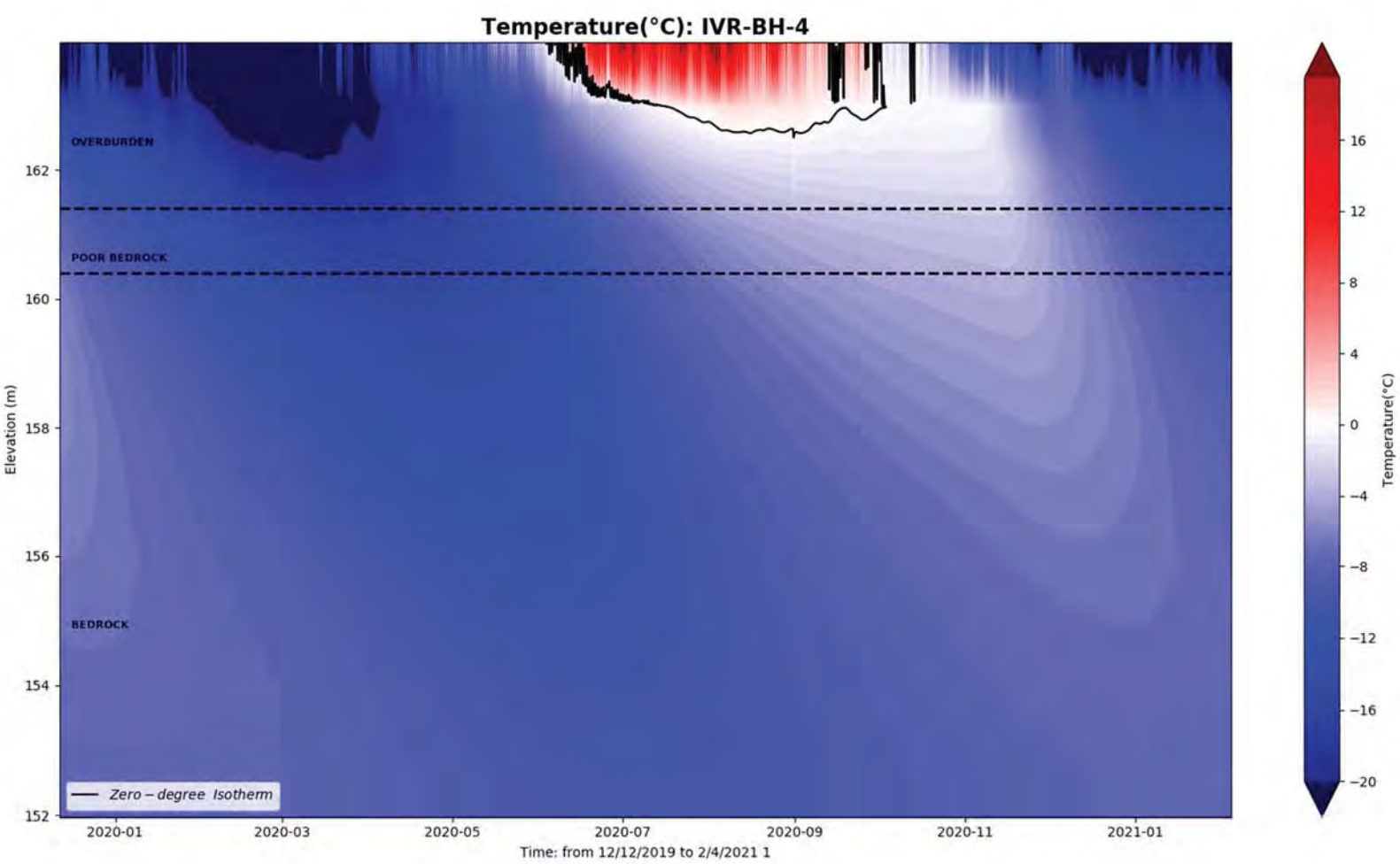
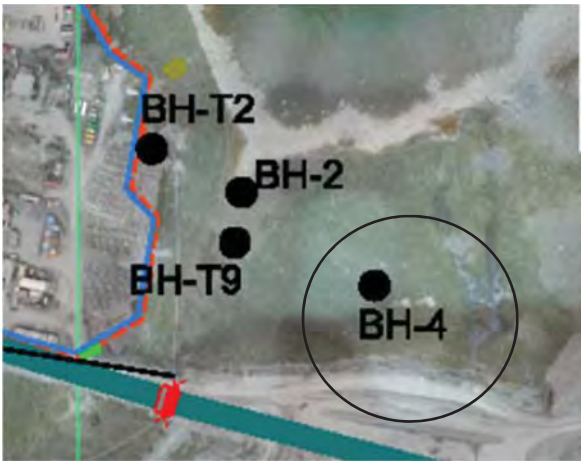




IVR-BH-T9



IVR-BH-4

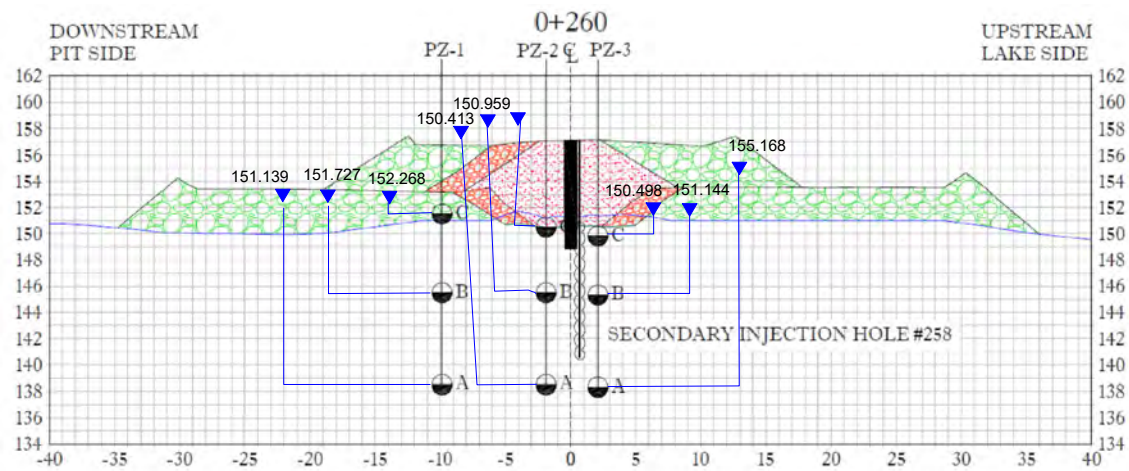


**ATTACHMENT C**

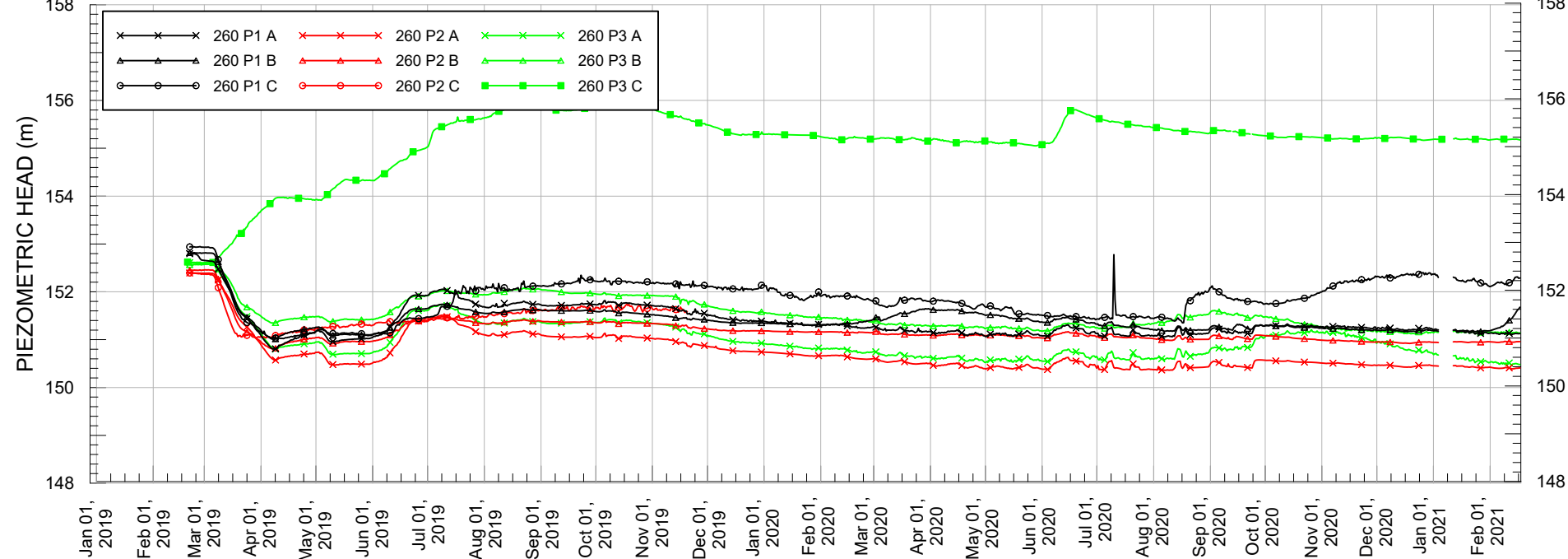
## 2020 Piezometric and Thermistor Data



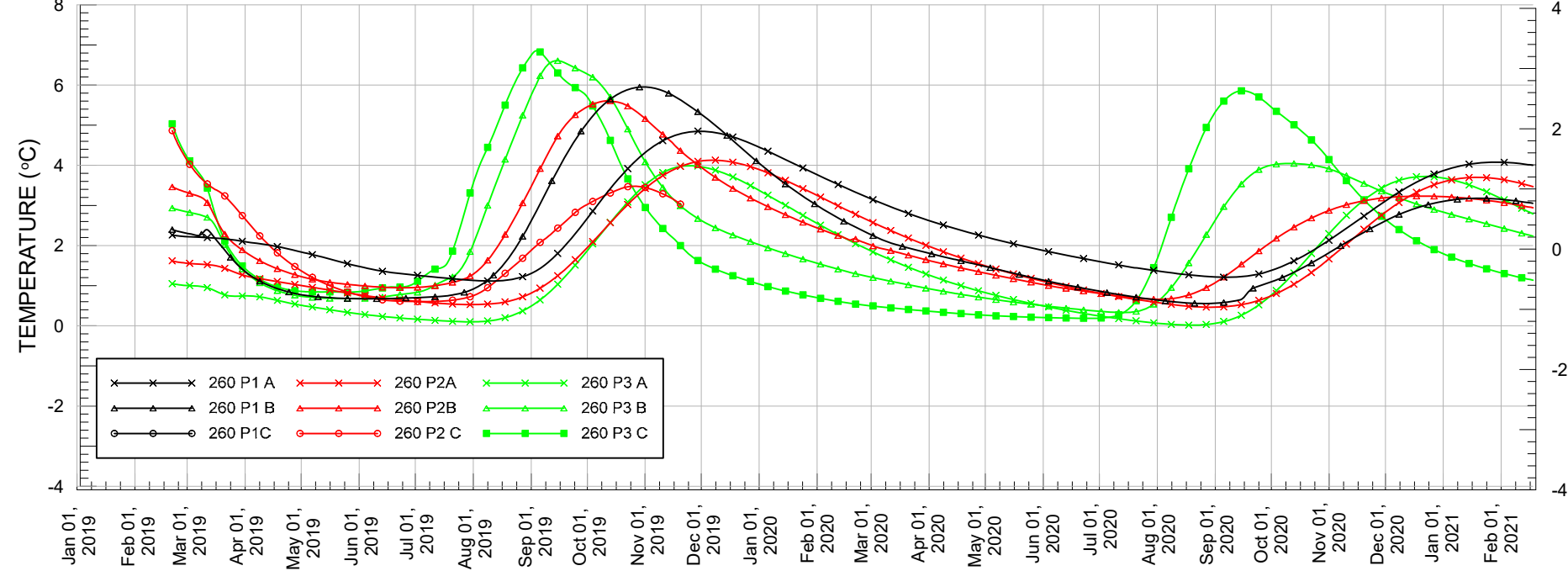
Whale Tail Dike - Section 0+260




VW Piezometer - Total Head



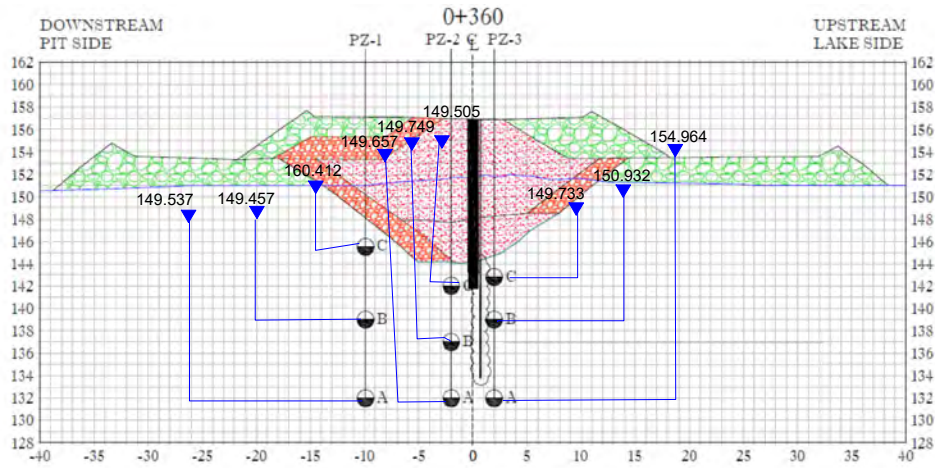
VW Piezometer - Temperature - Section 0+260



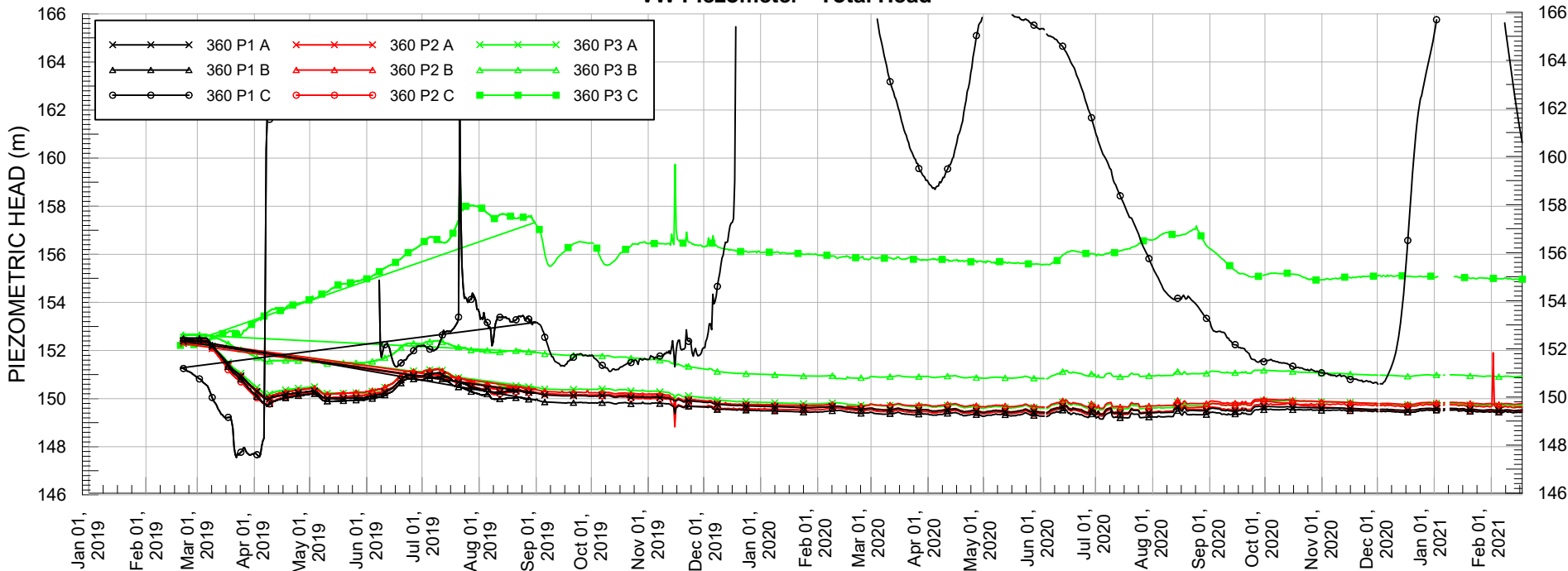
PROJECT		AGNICO EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT				
TITLE		WHALE TAIL DIKE Section 0+260 - PIEZOMETRIC DATA (Jan 1/19 to Feb 18/21)				
	PROJECT No.			PHASE No.		
	DESIGN	TD	28AUG14	SCALE	AS SHOWN	
	CADD	TD	28AUG14	FIGURE 1		
	CHECK	PG	28AUG14			
	REVIEW					
					REV.	



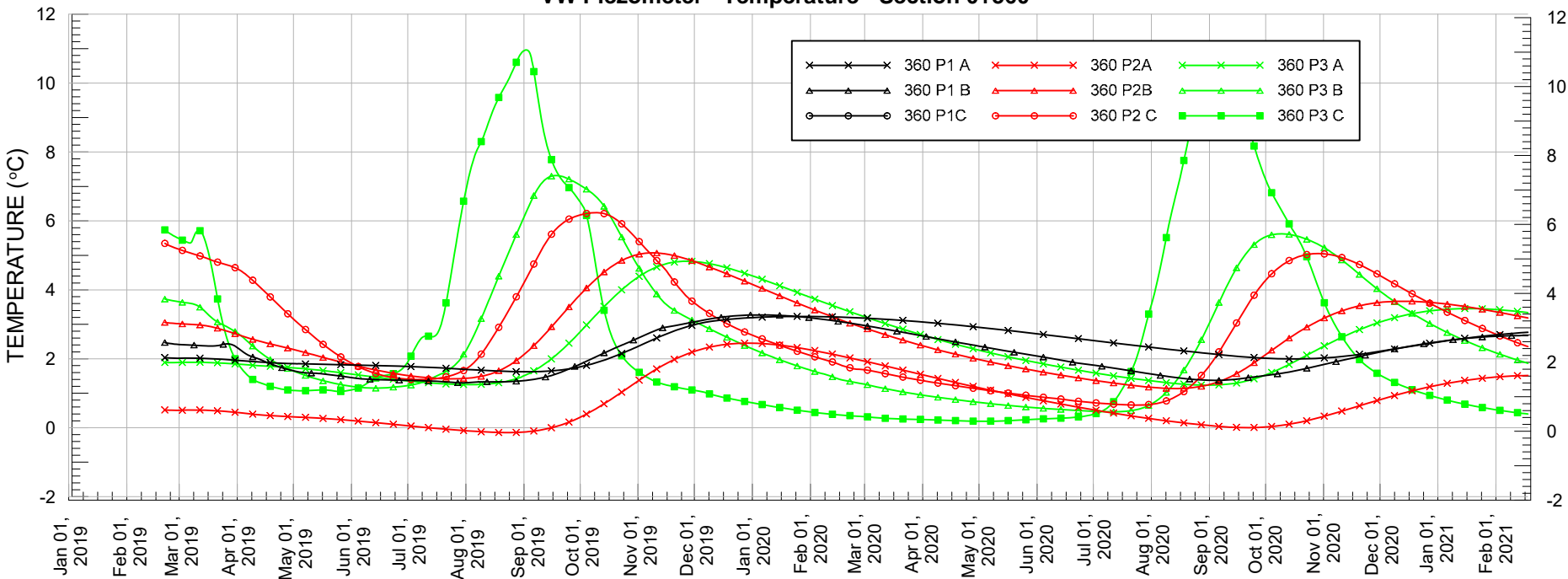
Whale Tail Dike - Section 0+360




VW Piezometer - Total Head

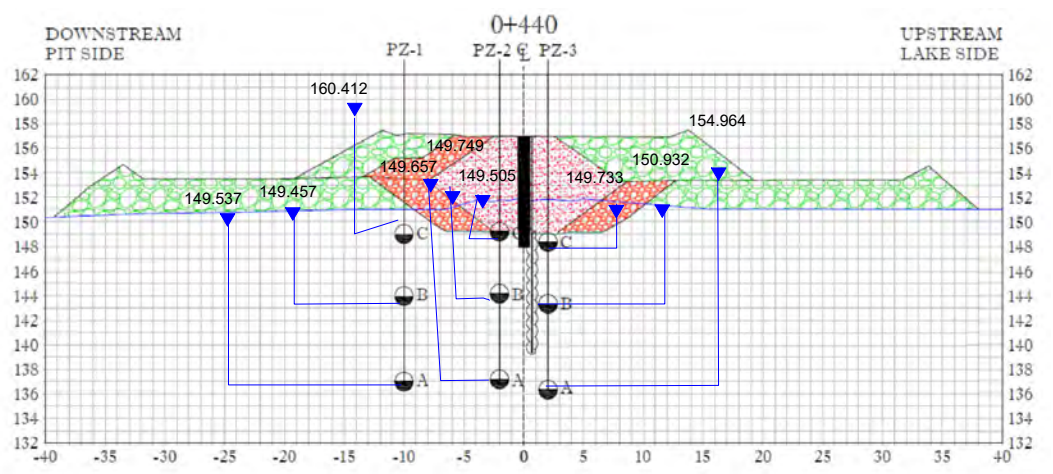


VW Piezometer - Temperature - Section 0+360

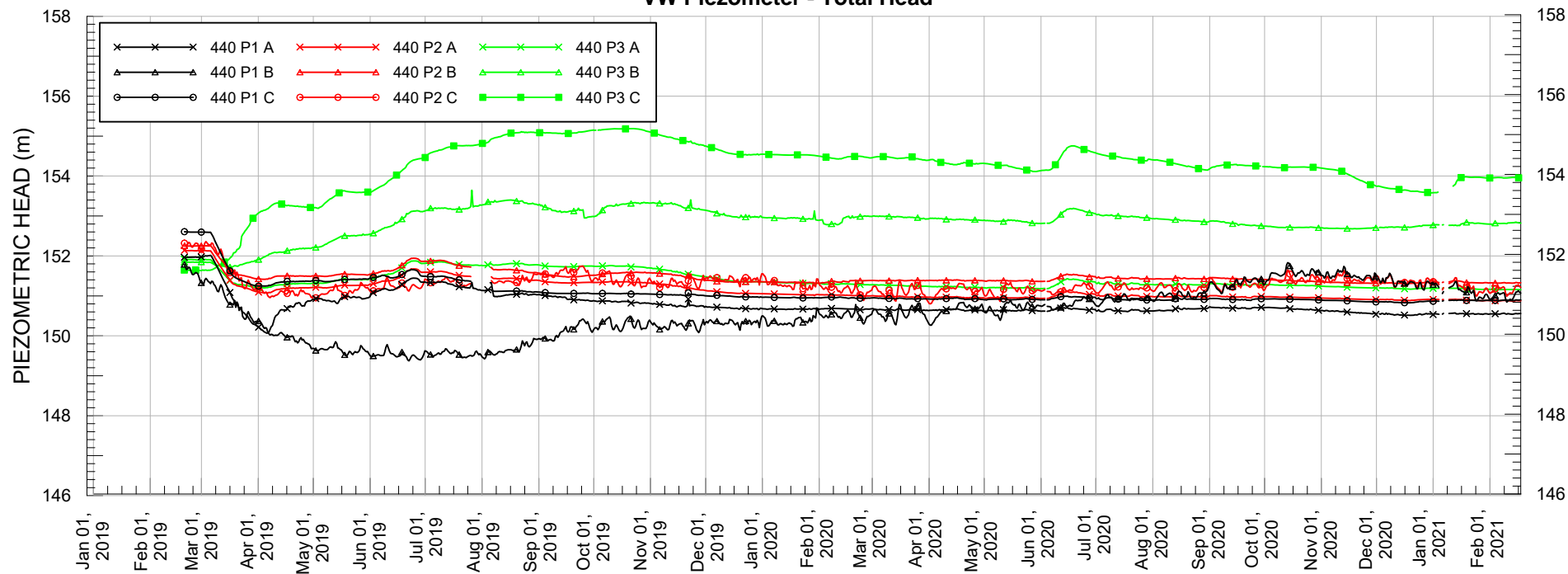


PROJECT		AGNICO EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT			
TITLE		WHALE TAIL DIKE Section 0+360 - PIEZOMETRIC DATA (Jan 1/19 to Feb 18/21)			
	PROJECT No.			PHASE No.	
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	CADD	TD	28AUG14	FIGURE 2	
	CHECK	PG	28AUG14		
	REVIEW				

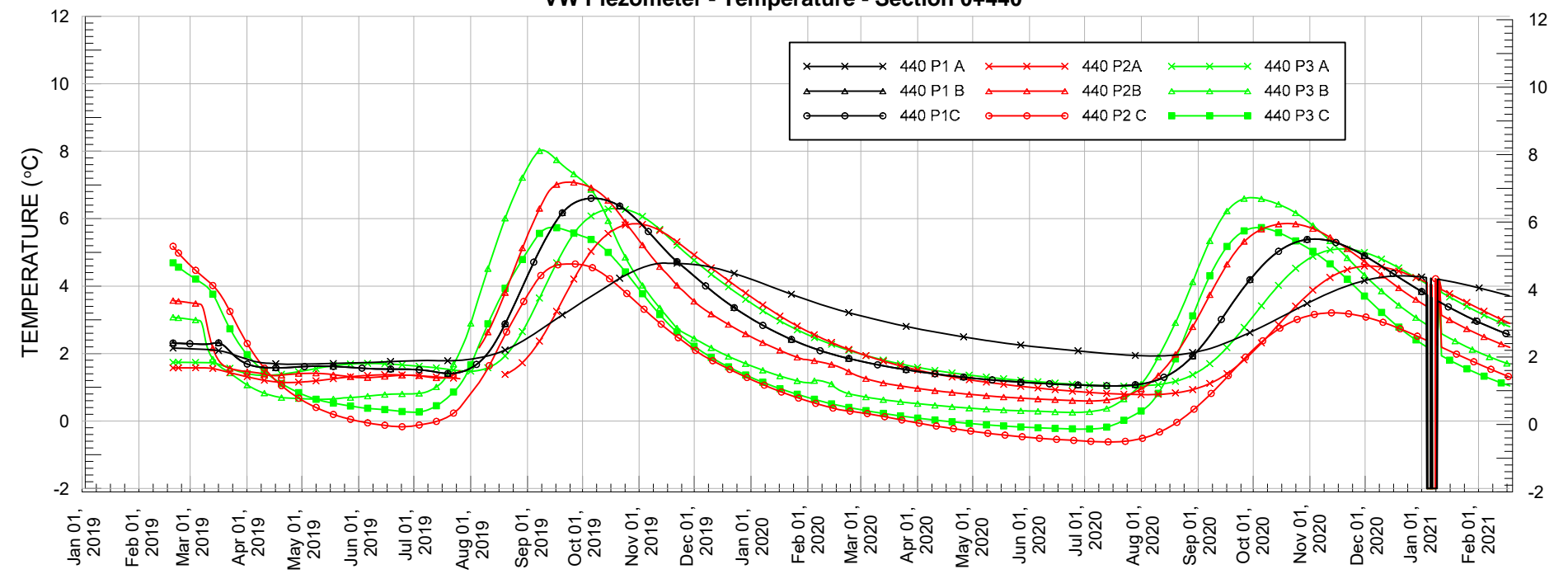
Whale Tail Dike - Section 0+440




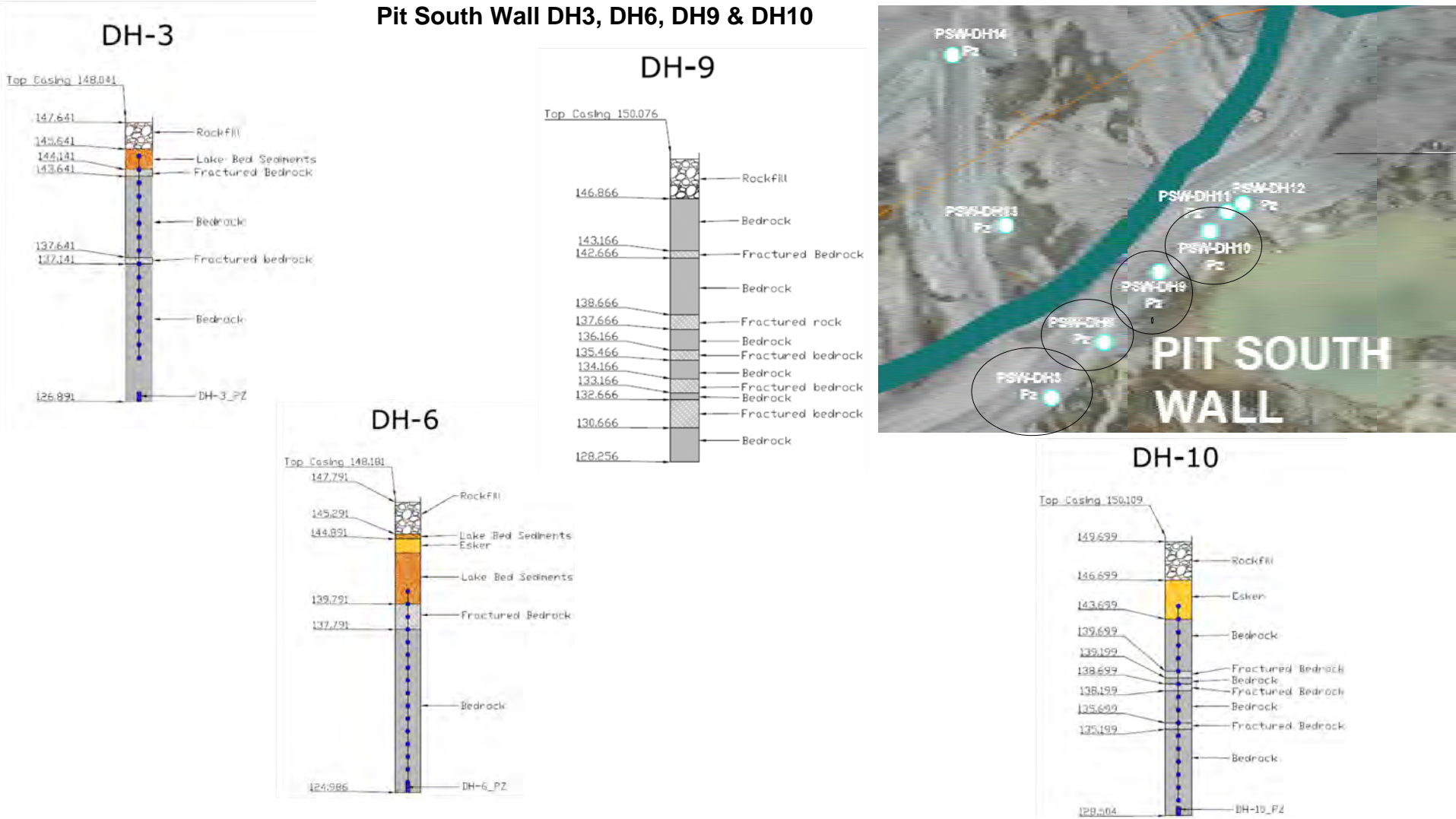
VW Piezometer - Total Head



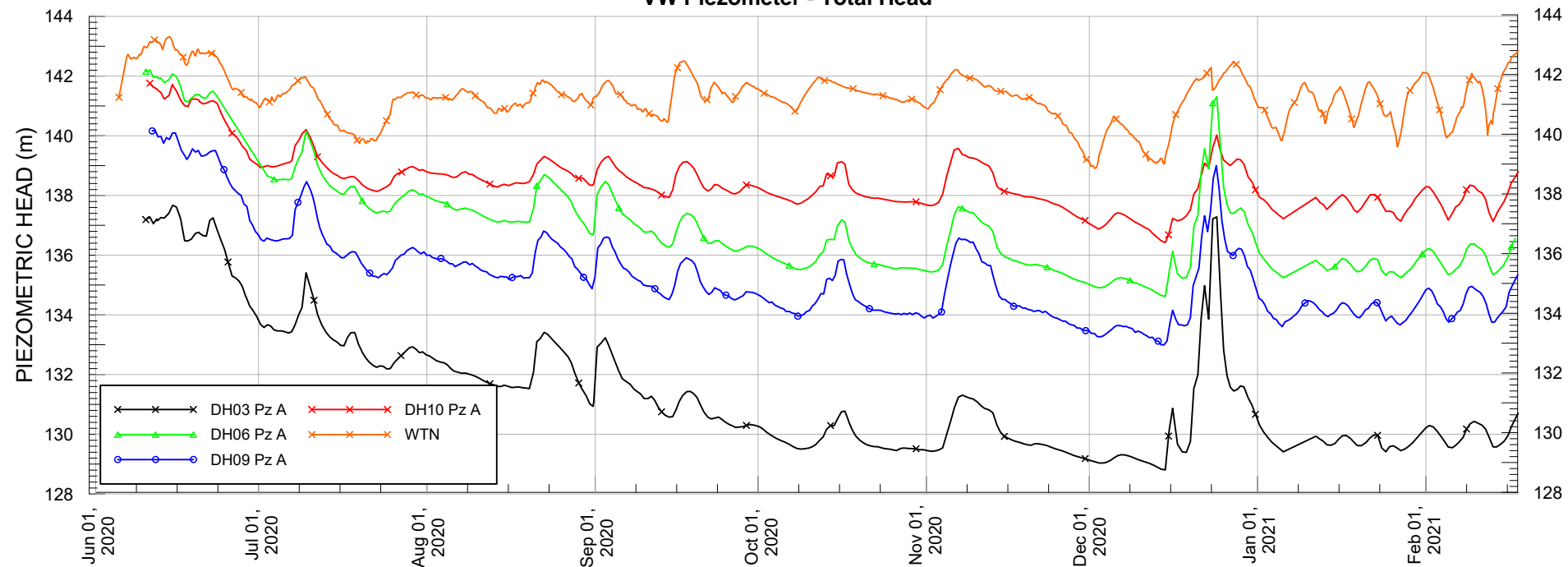
VW Piezometer - Temperature - Section 0+440



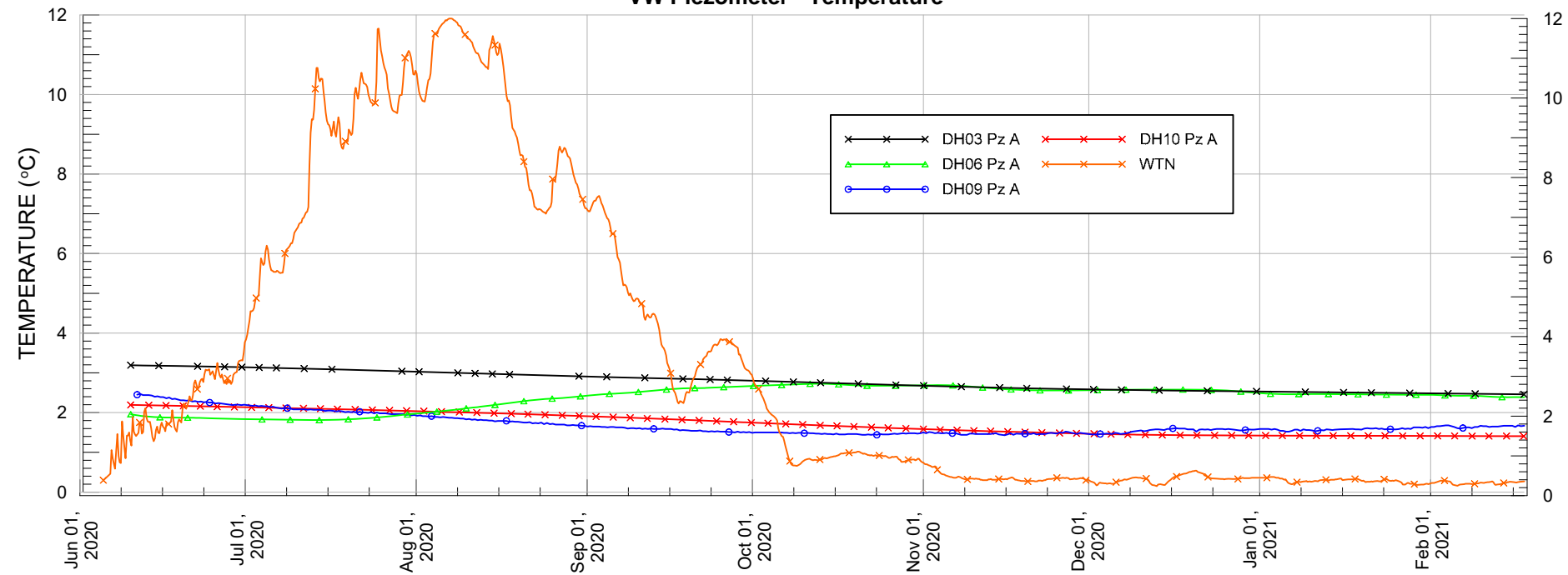
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TITLE		WHALE TAIL DIKE Section 0+440 - PIEZOMETRIC DATA (Jan 1/19 to Feb 18/21)			
 <b>AGNICO EAGLE</b> MEADOWBANK	PROJECT No.			PHASE No.	
	DESIGN	TD	28AUG14	SCALE	AS SHOWN
	CADD	TD	28AUG14	REV.	
	CHECK	PG	28AUG14	<b>FIGURE 2</b>	
	REVIEW				



VW Piezometer - Total Head



VW Piezometer - Temperature



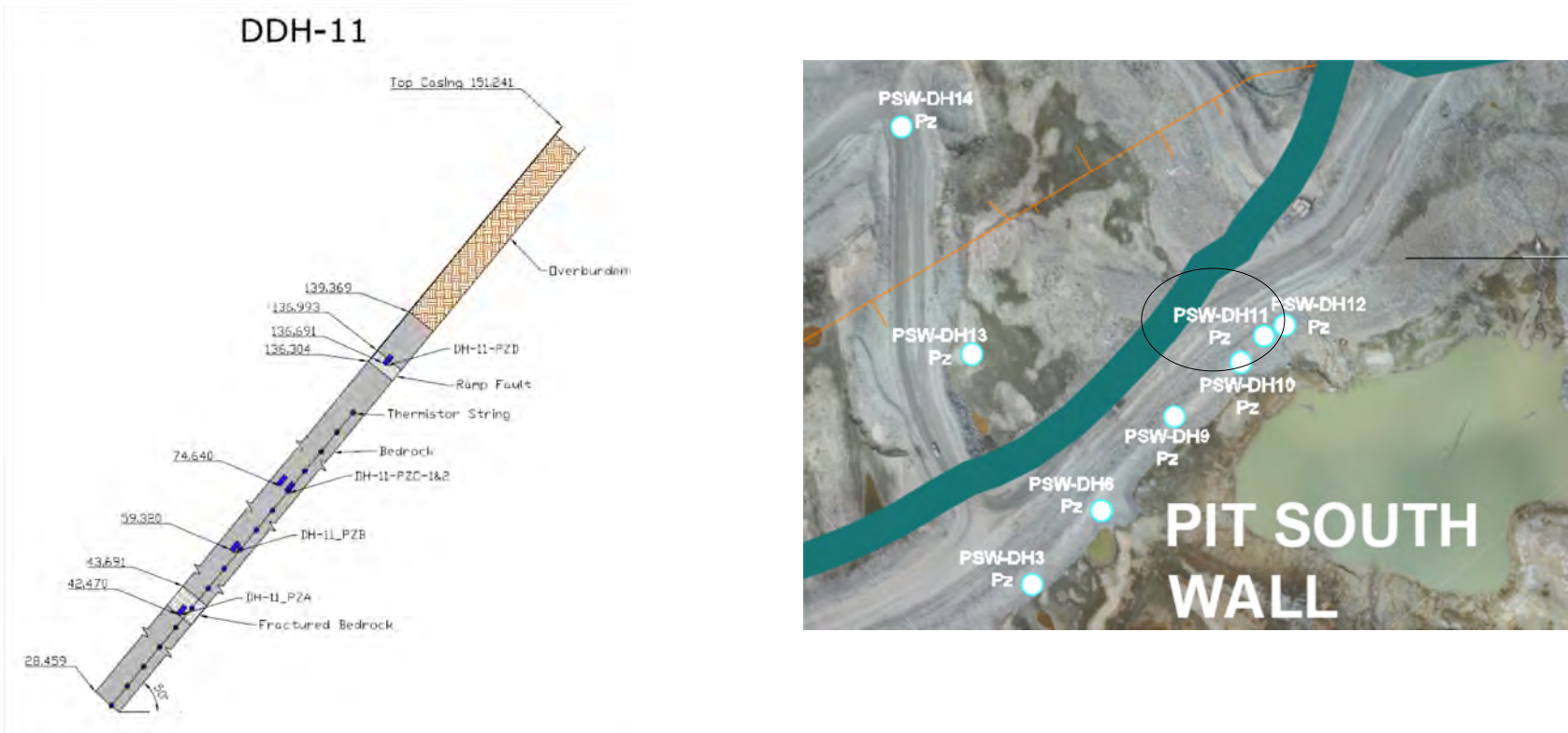
PROJECT **AGNICO EAGLE MINES LIMITED  
MEADOWBANK GOLD PROJECT  
NUNAVUT**

TITLE **WHALE TAIL PIT  
PSW - PIEZOMETRIC DATA  
DH03, 06, 09 & 10(June 1/20 to Feb 18/21)**

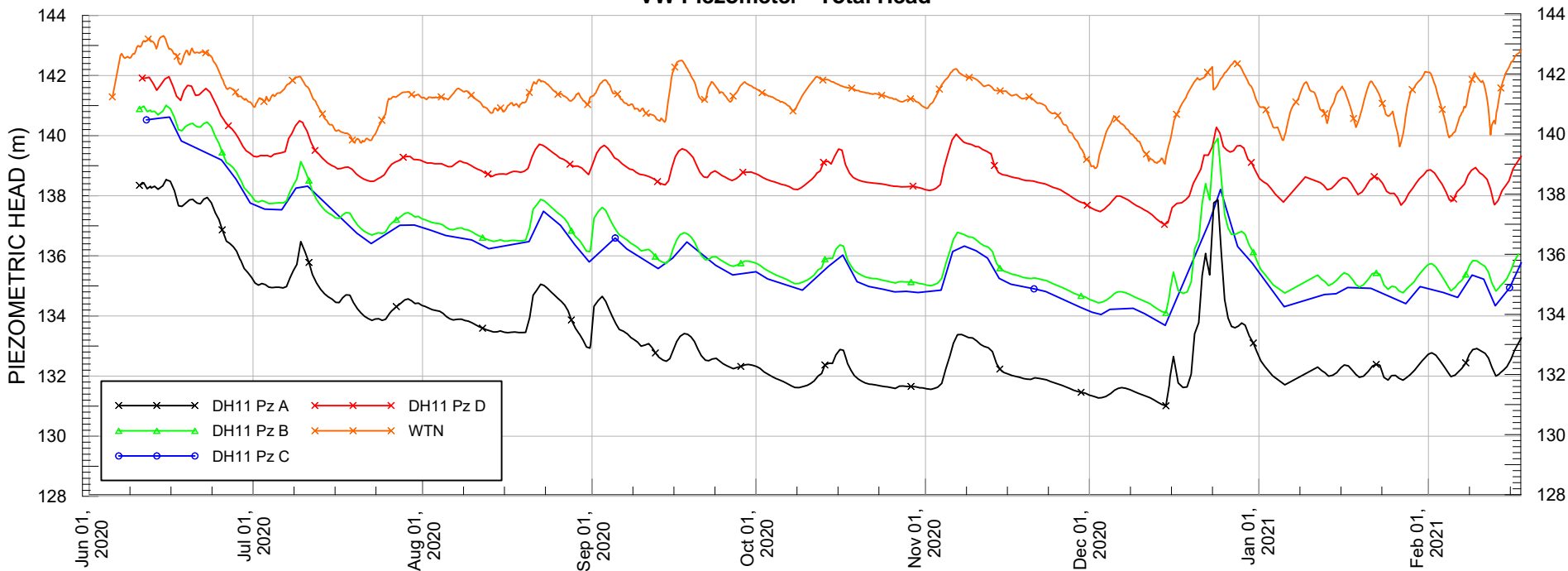
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	CADD	TD	28AUG14	<b>FIGURE 1</b>		
	CHECK	PG	28AUG14			
REVIEW						



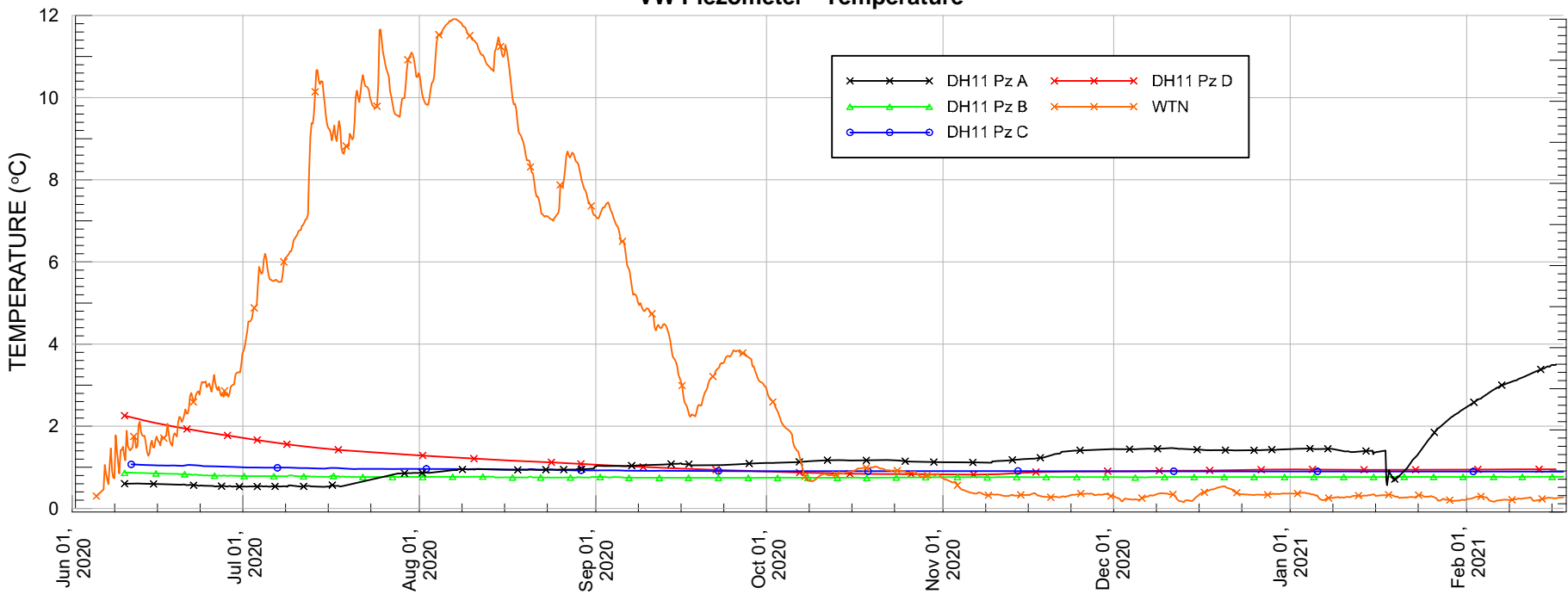
Pit South Wall DH11



VW Piezometer - Total Head



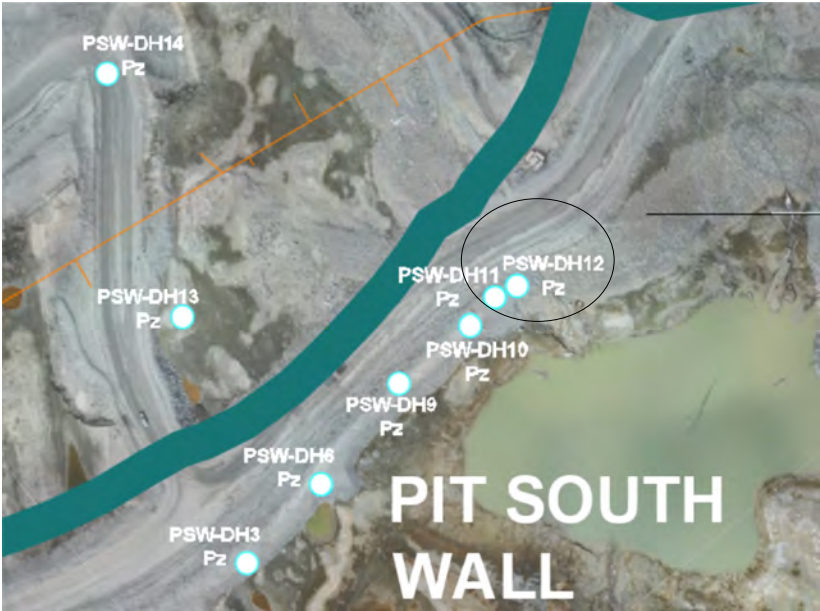
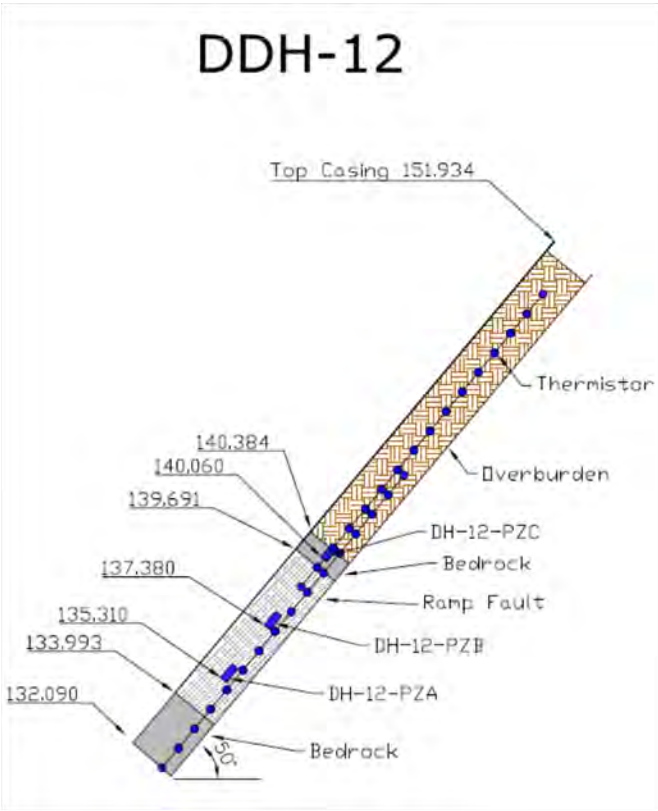
VW Piezometer - Temperature



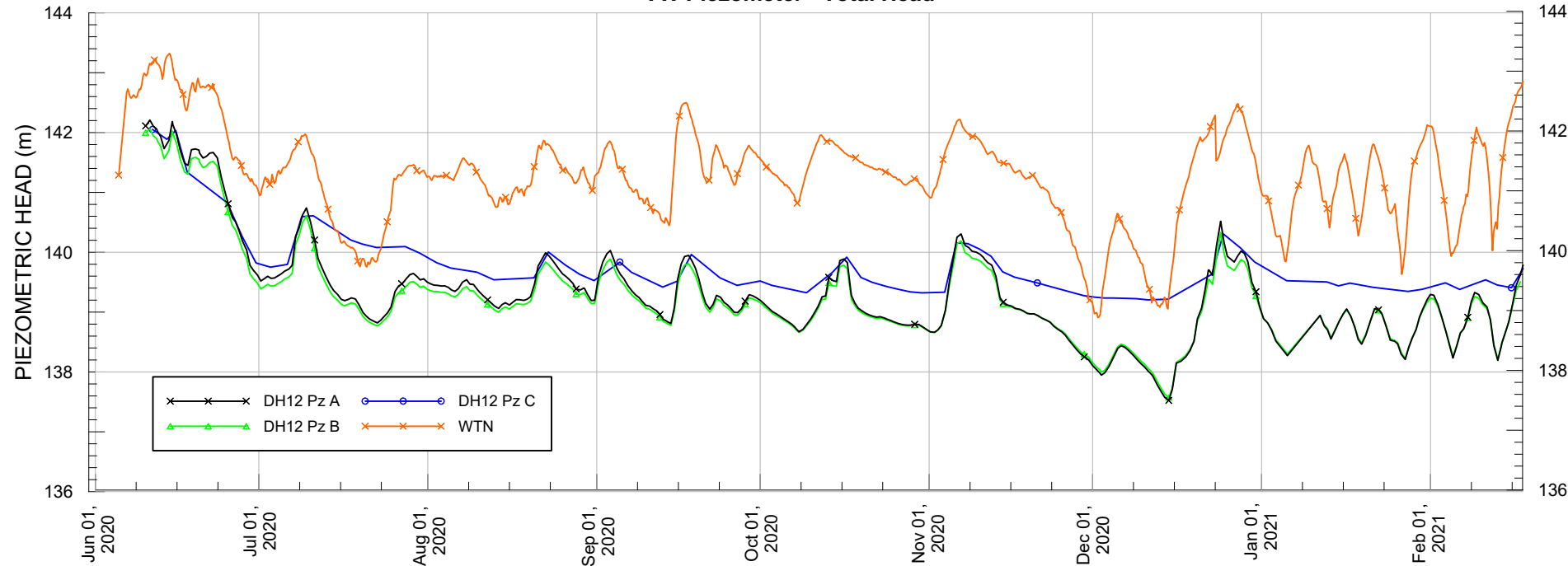
PROJECT	AGNICO EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT				
TITLE	WHALE TAIL PIT PSW - PIEZOMETRIC DATA DH 11(June 1/20 to Feb 18/21)				
	PROJECT No.		PHASE No.		
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	CADD	TD	28AUG14	REV.	
	CHECK	PG	28AUG14	FIGURE 2	
REVIEW					



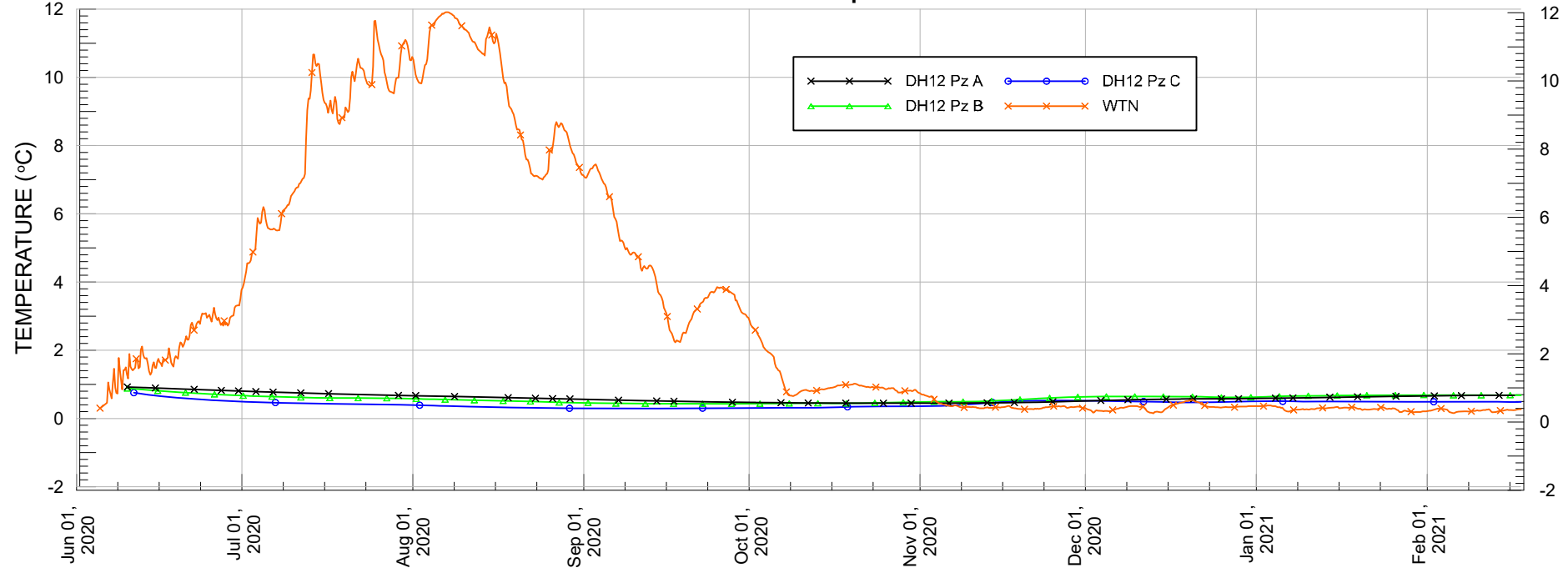
Pit South Wall DH12



VW Piezometer - Total Head

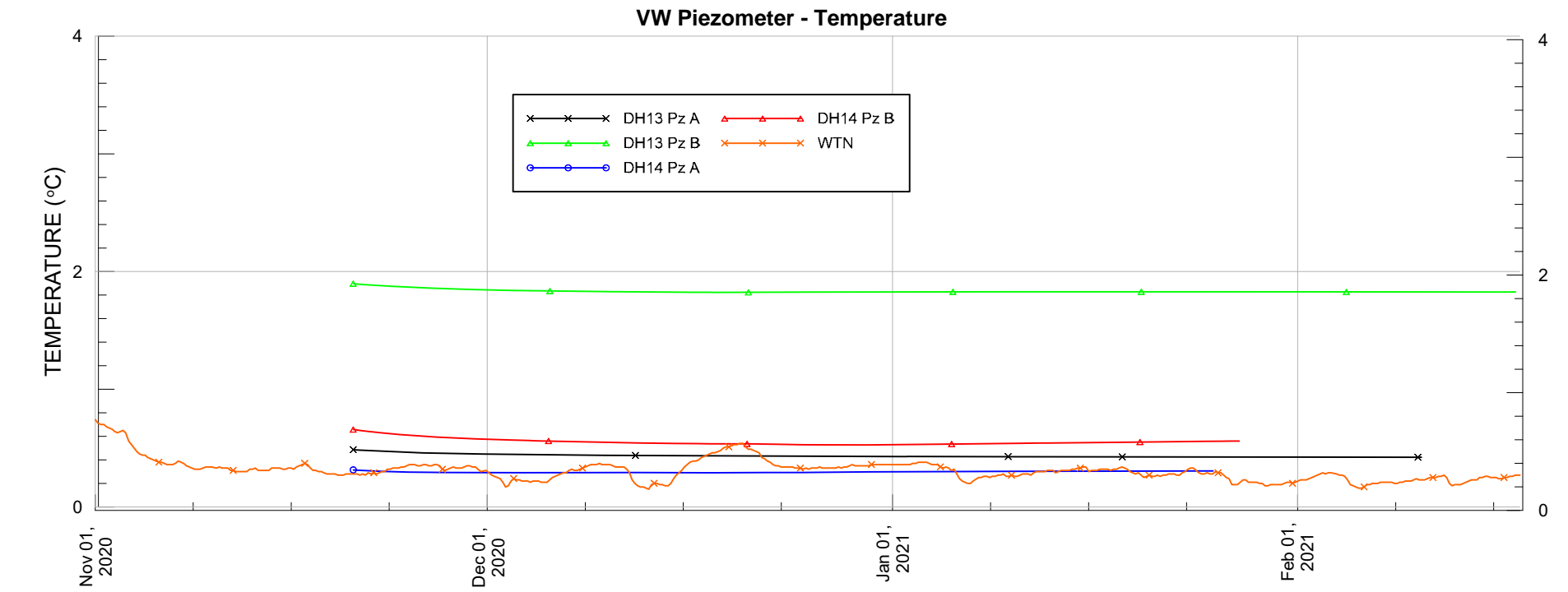
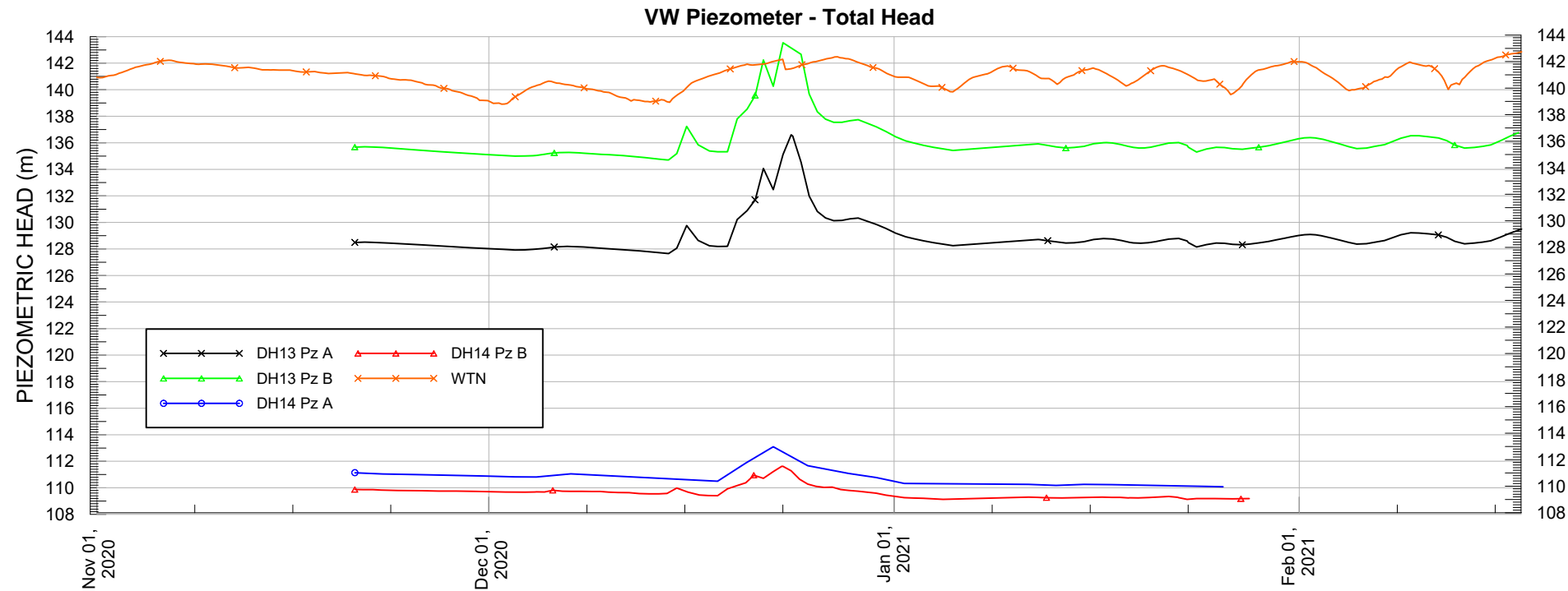
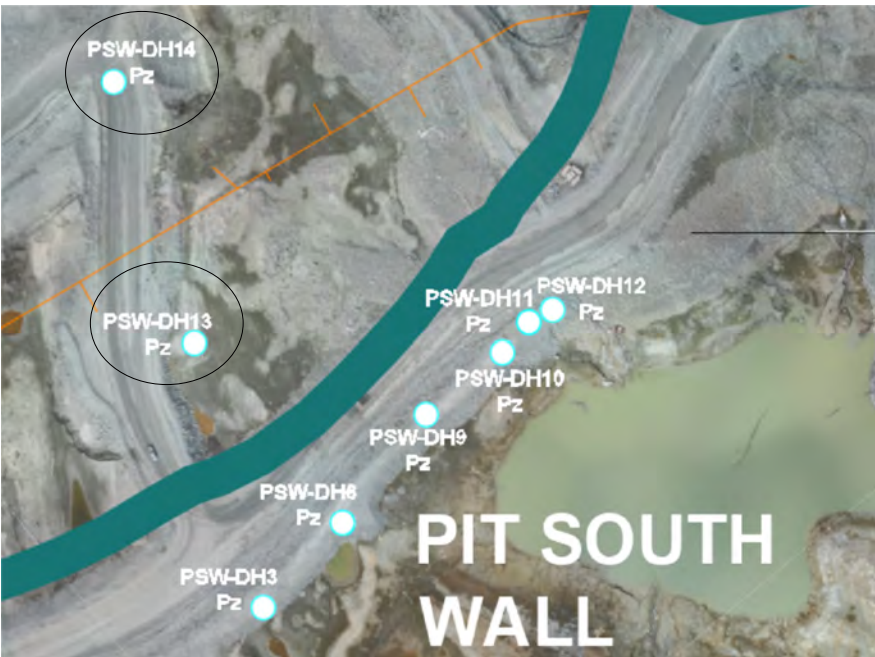
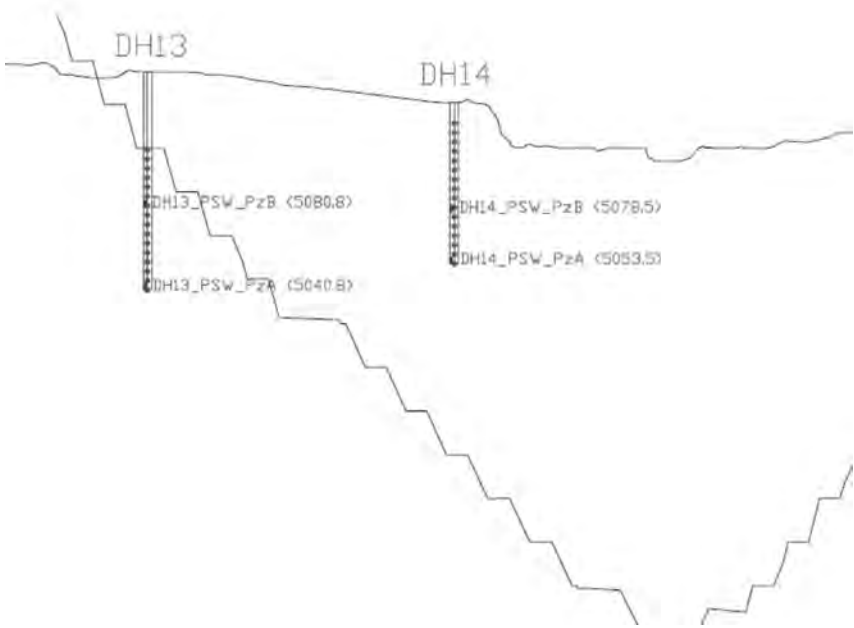


VW Piezometer - Temperature



PROJECT	AGNICO EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT				
TITLE	WHALE TAIL PIT PSW - PIEZOMETRIC DATA DH 12(June 1/20 to Feb 18/21)				
	PROJECT No.			PHASE No.	
	DESIGN	TD	28AUG14	SCALE	AS SHOWN
	CADD	TD	28AUG14	REV.	
	CHECK	PG	28AUG14	FIGURE 3	
REVIEW					

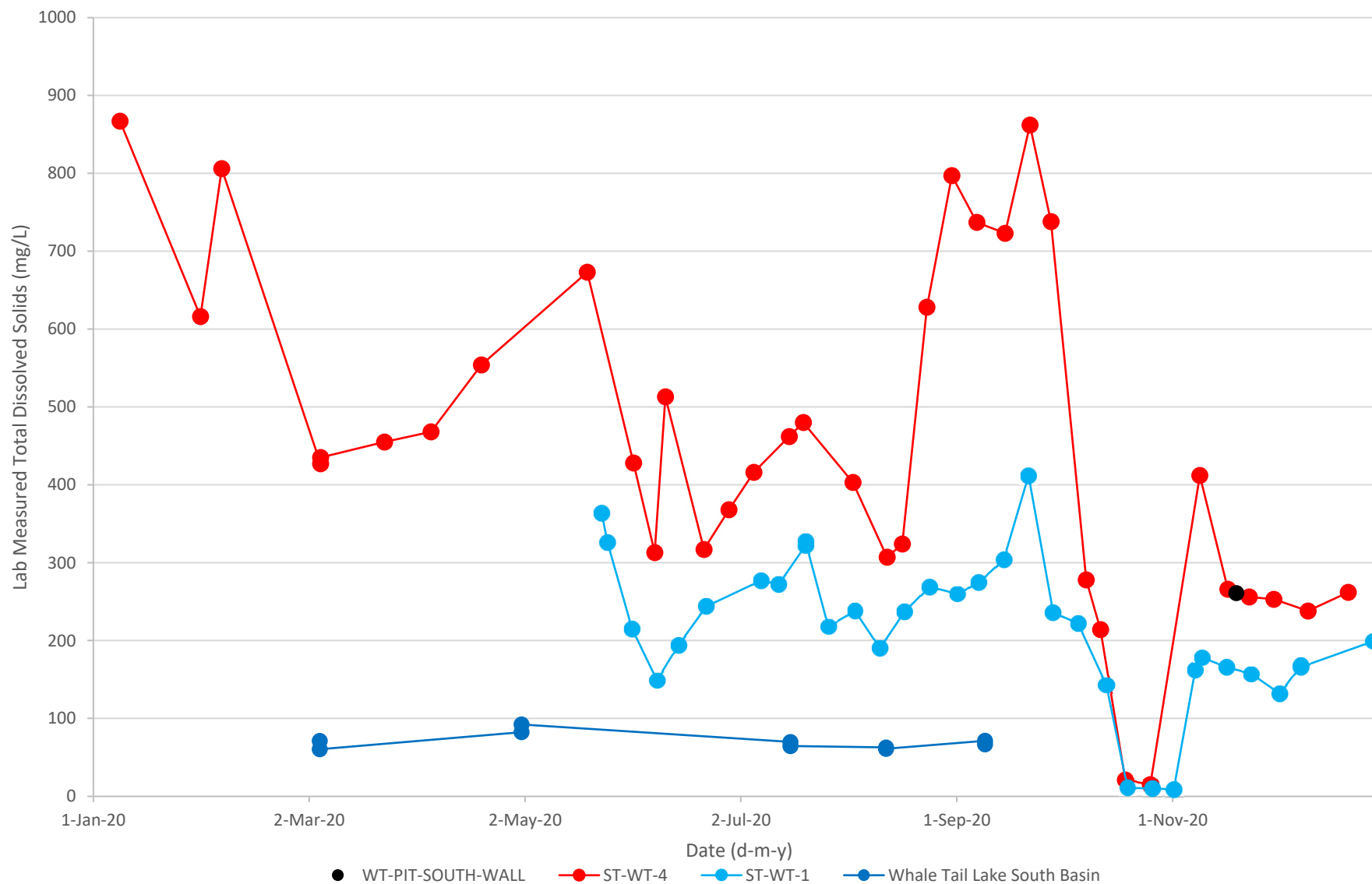
Pit South Wall DH13 & DH14



PROJECTAGNICO EAGLE MINES LIMITED MEADOWBANK GOLD PROJECT NUNAVUT				
TITLEWHALE TAIL PIT PSW - PIEZOMETRIC DATA DH 13 & 14(June 1/20 to Feb 18/21)				
	PROJECT No.			PHASE No.
	DESIGN	TD	28AUG14	SCALE AS SHOWN
	CADD	TD	28AUG14	REV.
	CHECK	PG	28AUG14	FIGURE 4
REVIEW				

**ATTACHMENT D**

# Supplemental 2020 Water Quality Data



Notes:  
 Water quality samples collected by Agnico Eagle and analyzed by analytical laboratory H2Lab located in Val-d'Or, Quebec.  
 ST-S-1 Whale Tail Pit seepage sample  
 ST-WT-1 Whale Tail Attenuation Pond  
 ST-WT-4 Whale Tail Pit sump  
 Whale Tail Lake South Basin data from 2020 Core Receiver  
 Environmental Monitoring Program includes samples collected 3 metres below lake surface.  
 Water stored in GSP-1 was pumped to ST-WT-1 in September 2020.

CLIENT



AGNICO EAGLE MINES LIMITED:  
MEADOWBANK DIVISION

CONSULTANT



YYYY-MM-DD	2021-04-07
PREPARED	DH
DESIGN	-
REVIEW	JL
APPROVED	JL

PROJECT

2020 GROUNDWATER MONITORING PROGRAM  
WHALE TAIL PIT PROJECT, NUNAVUT

TITLE

**TOTAL DISSOLVED SOLIDS CONCENTRATIONS, JANUARY TO DECEMBER 2020**

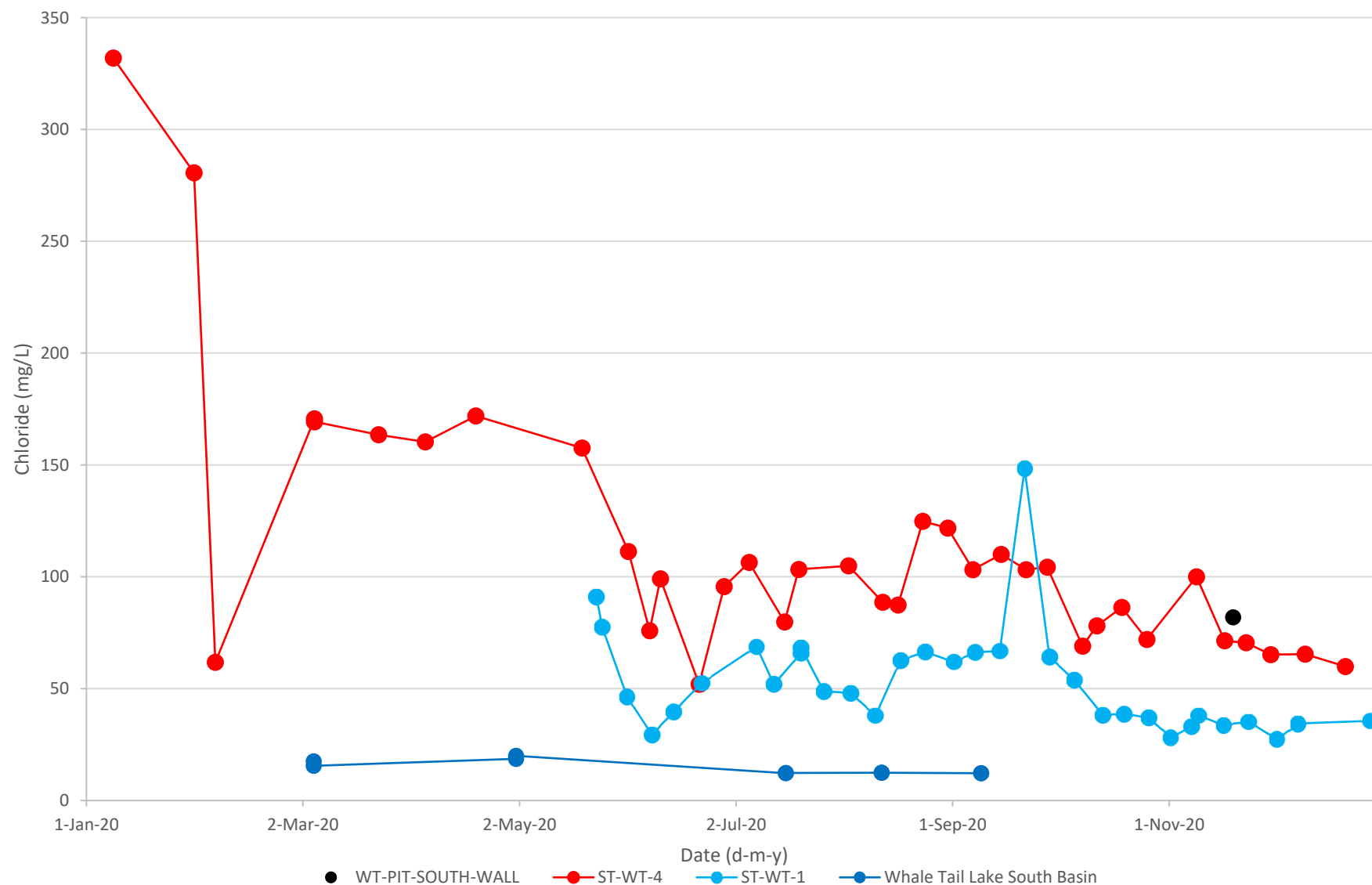
PROJECT No.  
20148777

DOC.  
516

Rev.  
0

D-1





#### Notes:

Water quality samples collected by Agnico Eagle and analyzed by analytical laboratory H2Lab located in Val-d'Or, Quebec.

ST-S-1 Whale Tail Pit seepage sample

ST-WT-1 Whale Tail Attenuation Pond

ST-WT-4 Whale Tail Pit sump

Whale Tail Lake South Basin data from 2020 Core Receiver Environmental Monitoring Program includes samples collected 3 metres below lake surface.

Water stored in GSP-1 was pumped to ST-WT-1 in September 2020.

CLIENT



AGNICO EAGLE MINES LIMITED:  
MEADOWBANK DIVISION

CONSULTANT



YYYY-MM-DD 2021-04-07

PREPARED DH

DESIGN -

REVIEW JL

APPROVED JL

PROJECT

2020 GROUNDWATER MONITORING PROGRAM  
WHALE TAIL PIT PROJECT, NUNAVUT

TITLE

**CHLORIDE CONCENTRATIONS, JANUARY TO DECEMBER  
2020**

PROJECT No.  
20148777

DOC.  
516

Rev.  
0

D-2

**Table D-1: WHALE TAIL PIT SOUTH WALL SEEPAGE WATER QUALITY**  
**WHALE TAIL PIT, NUNAVUT**

Sample Date Sample Location Approximate Sample Elevation	Unit	Limit of Detection	19-Nov-20 WT-PIT-SOUTH-WALL 99 masl
<b>Conventional Parameters</b>			
pH (T)	pH units	0.005	7.69
Turbidity	NTU	0.0200	4.52
Electrical Conductivity	umhos/cm	1	392
Hardness	mg CaCO <sub>3</sub> /L	1	175
Total alkalinity, as CaCO <sub>3</sub>	mg CaCO <sub>3</sub> /L	5	82
Total Suspended Solids	mg/L	1	7
Total Dissolved Solids	mg/L	1	261
<b>Major Ions</b>			
Chloride	mg/L	0.5	81.9
Fluoride	mg/L	0.02	0.18
Sulphate	mg/L	0.600	31.8
<b>Nutrients</b>			
Total ammonia (NH <sub>3</sub> - NH <sub>4</sub> )	mg/L	0.01	0.19
Un-ionized Ammonia, calculated	mg-N/L	0.01	<0.01
Nitrate	mg-N/L	0.01	<0.01
Nitrite	mg-N/L	0.01	<0.01
Nitrate + nitrite	mg-N/L	0.01	<0.01
Total phosphorus	mg/L	0.01	<0.01
Total orthophosphate (as phosphorus)	mg/L as P	0.01	0.04
<b>Total Metals</b>			
Aluminum	mg/L	0.005	0.046
Arsenic	mg/L	0.0005	0.0537
Barium	mg/L	0.0005	0.0969
Cadmium	mg/L	0.000020	<0.000020
Calcium	mg/L	0.0300	54.2
Chromium	mg/L	0.0006	0.0015
Copper	mg/L	0.00050	0.0018
Iron	mg/L	0.010	0.64
Lead	mg/L	0.00030	<0.00030
Magnesium	mg/L	0.02	9.76
Manganese	mg/L	0.0005	0.3267
Mercury	mg/L	0.00001	<0.00001
Molybdenum	mg/L	0.0005	0.0129
Nickel	mg/L	0.0005	0.0011
Selenium	mg/L	0.0005	<0.0005
Silver	mg/L	0.0001	<0.0001
Thallium	mg/L	0.0002	<0.0002
Zinc	mg/L	0.001	<0.001
<b>Dissolved Metals</b>			
Aluminum	mg/L	0.005	<0.005
Arsenic	mg/L	0.0005	0.0329
Barium	mg/L	0.0005	0.085
Cadmium	mg/L	0.00002	0.00007
Chromium	mg/L	0.0006	<0.0006
Copper	mg/L	0.0005	<0.0005
Iron	mg/L	0.01	<0.01
Lead	mg/L	0.00030	<0.00030
Manganese	mg/L	0.0005	0.349
Mercury	mg/L	0.00001	<0.00001
Molybdenum	mg/L	0.0005	0.0122
Nickel	mg/L	0.0005	0.0008
Selenium	mg/L	0.0005	<0.0005
Silver	mg/L	0.0001	<0.0001
Thallium	mg/L	0.0002	<0.0002
Zinc	mg/L	0.001	<0.001
<b>QA/QC</b>			
Calculated TDS	mg/L	-	215
Lab Measured TDS	mg/L	-	261
Calculated vs Measured TDS	%	-	82%

**Notes:**

masl = metres above sea level

mg/L = milligram per litre

NTU = Nephelometric Turbidity Unit

CaCO<sub>3</sub> = calcium carbonate

P = Phosphorus

N = Nitrogen

umhos/cm = microohms per centimeter



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Toll Free: 1 877 326-8690  
www.h2lab.ca

Certificate # : VD07561

Client # : 990

Client Reference # : WT-Pit-South-Wall

## CERTIFICATE OF ANALYSIS

### Agnico Eagle Division Meadowbank

General Delivery  
Baker Lake  
Nunavut X0C 0A0

Received on:	2020/11/24
Sampled on:	2020/11/19 14:00
Matrix:	Surface Water
Sampling site code:	ST-WT-4
Customer information	sys_sample_code=WT-Pit- South-Wall-1-11/19/20
Order #:	PO:#885073

Samples: WT-PIT-SOUTH-WALL

Sampler : LA/ST

The sample's appreciation and conformity towards established norms, if applicable, is based and limited to analyzed parameters. This report can't be reproduced, unless in whole, without prior written authorization from the laboratory. The results are related only to samples submitted for testing.



*Achille Boukhors*

Signataire, Rouyn-Noranda

Certificate emission date : 2020-11-28

Page 1 of 12



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## CERTIFICATE OF ANALYSIS

### RESULTS





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Certificate # : VD07561

Client # : 990

Client Reference # : WT-Pit-South-Wall

## CERTIFICATE OF ANALYSIS

<b>Laboratory ID</b>		104005
<b>Client ID</b>		WT-Pit-South-Wal I
<b>Matrix</b>		Surface Water
<b>Sampling site</b>		ST-WT-4
<b>Sampled on</b>	<b>unit</b>	2020/11/19 14:00
Chloride (Cl) <b>a 2</b>	mg/L	81,9
Fluoride (F) <b>a 2</b>	mg/L	0,18
Orthophosphate <b>a 2</b>	mg/L P	0,04
Aluminum (Al) <b>a 2</b>	mg/L	0,046
Silver (Ag) <b>a 2</b>	mg/L	<0,0001
Arsenic (As) <b>a 2</b>	mg/L	0,0537
Barium (Ba) <b>a 2</b>	mg/L	0,0969
Cadmium (Cd) <b>a 2</b>	mg/L	<0,000020
Calcium (Ca) <b>a 2</b>	mg/L	54,2
Chromium (Cr) <b>a 2</b>	mg/L	0,0015
Copper (Cu) <b>a 2</b>	mg/L	0,0018
Hardness <b>2</b>	mg/L CaCO 3	175
Iron (Fe) <b>a 2</b>	mg/L	0,64
Magnesium (Mg) <b>a 2</b>	mg/L	9,76



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Certificate # : VD07561

Client # : 990

Client Reference # : WT-Pit-South-Wall

## CERTIFICATE OF ANALYSIS

<b>Laboratory ID</b>		104005
<b>Client ID</b>		WT-Pit-South-Wal I
<b>Matrix</b>		Surface Water
<b>Sampling site</b>		ST-WT-4
<b>Sampled on</b>	<b>unit</b>	2020/11/19 14:00
Manganese (Mn) <b>a 2</b>	mg/L	0,3267
Molybdenum (Mo) <b>a 2</b>	mg/L	0,0129
Nickel (Ni) <b>a 2</b>	mg/L	0,0011
Lead (Pb) <b>a 2</b>	mg/L	<0,00030
Selenium (Se) <b>a 2</b>	mg/L	<0,0005
Thallium (Tl) <b>2</b>	mg/L	<0,0002
Zinc (Zn) <b>a 2</b>	mg/L	<0,001
Dissolved Aluminum (Al) <b>a 2</b>	mg/L	< 0,005
Dissolved Silver (Ag) <b>a 2</b>	mg/L	<0,0001
Dissolved Arsenic (As) <b>a 2</b>	mg/L	0,0329
Dissolved Barium (Ba) <b>a 2</b>	mg/L	0,0850
Dissolved Cadmium (Cd) <b>a 2</b>	mg/L	0,00007
Dissolved Chromium (Cr) <b>a 2</b>	mg/L	<0,0006



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Client # : 990

Client Reference # : WT-Pit-South-Wall

## CERTIFICATE OF ANALYSIS

<b>Laboratory ID</b>		104005
<b>Client ID</b>		WT-Pit-South-Wal I
<b>Matrix</b>		Surface Water
<b>Sampling site</b>		ST-WT-4
<b>Sampled on</b>	<b>unit</b>	2020/11/19 14:00
Dissolved Copper (Cu) <b>a 2</b>	mg/L	<0,0005
Dissolved Iron (Fe) <b>a 2</b>	mg/L	<0,01
Dissolved Manganese (Mn) <b>a 2</b>	mg/L	0,3490
Dissolved Molybdenum (Mo) <b>a 2</b>	mg/L	0,0122
Dissolved Nickel (Ni) <b>a 2</b>	mg/L	0,0008
Dissolved Lead (Pb) <b>a 2</b>	mg/L	<0,00030
Dissolved Selenium (Se) <b>a 2</b>	mg/L	<0,0005
Dissolved thallium (Tl) <b>2</b>	mg/L	<0,0002
Dissolved Zinc <b>a 2</b>	mg/L	<0,001
Mercury (Hg) <b>a 2</b>	mg/L	<0,00001
Dissolved Mercury (Hg) <b>2</b>	mg/L	<0,00001
Suspended Solids <b>a 1</b>	mg/L	7



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Client # : 990

Client Reference # : WT-Pit-South-Wall

## CERTIFICATE OF ANALYSIS

<b>Laboratory ID</b>		104005
<b>Client ID</b>		WT-Pit-South-Wal I
<b>Matrix</b>		Surface Water
<b>Sampling site</b>		ST-WT-4
<b>Sampled on</b>	<b>unit</b>	2020/11/19 14:00
Non-ionized Ammoniac <b>a 2</b>	mg/L N	< 0,01
Ammonia nitrogen (NH <sub>3</sub> -NH <sub>4</sub> ) <b>a 2</b>	mg/L N	0,19
NH <sub>4</sub> <b>a 2</b>	mg/L N	0,19
Nitrate (NO <sub>3</sub> ) <b>a 2</b>	mg/L N	< 0,01
Nitrites (NO <sub>2</sub> ) <b>a 2</b>	mg/L N	< 0,01
Nitrite-nitrate <b>a 2</b>	mg/L N	< 0,01
Total phosphorus (P tot) <b>a 2</b>	mg/L P	< 0,01
Sulfate (SO <sub>4</sub> ) <b>a 2</b>	mg/L	31,8
Turbidity <b>a 2</b>	UTN	4,52
Alkalinity <b>1</b>	mg/L CaCO 3	82
Conductivity <b>a 1</b>	µmhos /cm	392





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Certificate # : VD07561

Client # : 990

Client Reference # : WT-Pit-South-Wall

## CERTIFICATE OF ANALYSIS

Laboratory ID		104005
Client ID		WT-Pit-South-Wal I
Matrix		Surface Water
Sampling site		ST-WT-4
Sampled on	unit	2020/11/19 14:00
pH a 1	UpH	7,69
Total dissolved solids 1	mg/L	261



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Certificate # : VD07561

Client # : 990

Client Reference # : WT-Pit-South-Wall

## CERTIFICATE OF ANALYSIS

### Quality control

Parameter (method)	*LDR	Unit	Blank	Standard				Duplicate		Analyzed on
				Name	Value	Expected	Interval	#1	#2	
Chloride (Cl) (H2Lab-Chlo-211) <b>a</b>	0,5	mg/L	< 0,5	DMR-0555-20 20-CL	102,8	107	[94,2,119,8]	--	--	2020-11-25
Fluoride (F) (H2Lab-Chro-211) <b>a</b>	0,02	mg/L	< 0,06	Dmr-0555-20 20-7-Fluorure s	[2,18 - 2,54]	2.36	[2,18,2,54]	±7,50%	0,72	2020-11-26
Aluminum (Al) (H2Lab-MET-211) <b>a</b>	0,005	mg/L	< 0,006	C00-046-705 _X_1000	1,080	1	[0,800,1,200]	--	--	2020-11-25
Dissolved Aluminum (Al) (H2Lab-MET-211) <b>a</b>	0,005	mg/L	< 0,006	C00-046-705 _X_1000	0,993	1.000	[0,800,1,200]	--	--	2020-11-25
Silver (Ag) (H2Lab-MET-211) <b>a</b>	0,0001	mg/L	<0,0001	--	--	--	--	--	--	2020-11-25
Dissolved Silver (Ag) (H2Lab-MET-211) <b>a</b>	0,0001	mg/L	<0,0001	MR-CEU-302- Ag	0,6014	0.5503	[0,4403,0,660 3]	--	--	2020-11-25
Arsenic (As) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,1239	0,1000	[0,0700,0,130 0]	0,0007	0,0005	2020-11-25
Dissolved Arsenic (As) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,1297	0.1000	[0,0700,0,130 0]	--	--	2020-11-25
Barium (Ba) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,0999	0.1000	[0,0800,0,120 0]	--	--	2020-11-25
Dissolved Barium (Ba) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,1011	0.1000	[0,0800,0,120 0]	--	--	2020-11-25
Cadmium (Cd) (H2Lab-MET-211) <b>a</b>	0,00002 0	mg/L	<0,00002 0	C00-046-705 _X_1000	0,10	0.1000	[0,080,0,12]	--	--	2020-11-25
Dissolved Cadmium (Cd) (H2Lab-MET-211) <b>a</b>	0,00002	mg/L	<0,00002	C00-046-705 _X_1000	0,09957	0.1000	[0,08001,0,119 99]	--	--	2020-11-25
Calcium (Ca) (H2Lab-MET-211) <b>a</b>	0,0300	mg/L	<0,0300	C00-046-705 _X_1000	0,990	1.000	[0,800,1,20]	--	--	2020-11-25

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				Name	Value	Expected	Interval	#1	#2	
Chromium (Cr) (H2Lab-MET-211) <b>a</b>	0,0006	mg/L	<0,0006	C00-046-705 _X_1000	0,1032	0.1000	[0,0800,0,120 0]	--	--	2020-11-25
Dissolved Chromium (Cr) (H2Lab-MET-211) <b>a</b>	0,0006	mg/L	<0,0006	C00-046-705 _X_1000	0,0932	0.1000	[0,0800,0,120 0]	--	--	2020-11-25
Copper (Cu) (H2Lab-MET-211) <b>a</b>	0,00050 0	mg/L	<0,00050 0	C00-046-705 _X_1000	0,112	0.1000	[0,0800,0,120]	--	--	2020-11-25
Dissolved Copper (Cu) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,1001	0.1000	[0,0800,0,120 0]	--	--	2020-11-25
Hardness (H2Lab-MET-211) <b>2</b>	1	mg/L CaCO <sub>3</sub>	< 1	C00-046-705 _X_1000	7	6.6	[5,8]	--	--	2020-11-25
Iron (Fe) (H2Lab-MET-211) <b>a</b>	0,010	mg/L	<0,010	C00-046-705 _X_1000	1,1	1.000	[0,80,1,2]	--	--	2020-11-25
Dissolved Iron (Fe) (H2Lab-MET-211) <b>a</b>	0,01	mg/L	<0,01	C00-046-705 _X_1000	1,02	1.000	[0,80,1,20]	--	--	2020-11-25
Magnesium (Mg) (H2Lab-MET-211) <b>a</b>	0,02	mg/L	<0,02	C00-046-705 _X_1000	1,06	1.000	[0,80,1,20]	--	--	2020-11-25
Manganese (Mn) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,1083	0.1000	[0,0800,0,120 0]	--	--	2020-11-25
Dissolved Manganese (Mn) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,0992	0.1000	[0,0800,0,120 0]	--	--	2020-11-25
Mercury (Hg) (H2Lab-MET-211) <b>a</b>	0,00001	mg/L	<0,00001	DMR-0276-20 19-HgEU	0,00523	0.0050	[0,00300,0,00 700]	--	--	2020-11-25
Dissolved Mercury (Hg) (H2Lab-MET-211) <b>2</b>	0,00001	mg/L	<0,00001	DMR-0276-20 19-HgEU	0,00523	0.0050	[0,00300,0,00 700]	--	--	2020-11-25
Molybdenum (Mo) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,0932	0.1000	[0,0800,0,120 0]	--	--	2020-11-25
Dissolved Molybdenum (Mo) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,0916	0.1000	[0,0800,0,120 0]	--	--	2020-11-25

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Nickel (Ni) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,1066	0.1000	[0,0800,0,1200]	--	--	2020-11-25
Dissolved Nickel (Ni) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	<0,0005	C00-046-705 _X_1000	0,0965	0.1000	[0,0800,0,1200]	--	--	2020-11-25
Lead (Pb) (H2Lab-MET-211) <b>a</b>	0,00017	mg/L	<0,00030	C00-046-705 _X_1000	0,09750	0.1000	[0,08001,0,11999]	--	--	2020-11-25
Dissolved Lead (Pb) (H2Lab-MET-211) <b>a</b>	0,00017	mg/L	<0,00030	C00-046-705 _X_1000	0,09900	0.1000	[0,08001,0,11999]	--	--	2020-11-25
Selenium (Se) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	< 0,0010	C00-046-705 _X_1000	0,1064	0.1000	[0,0800,0,1200]	--	--	2020-11-25
Dissolved Selenium (Se) (H2Lab-MET-211) <b>a</b>	0,0005	mg/L	< 0,0010	C00-046-705 _X_1000	0,1006	0.1000	[0,0800,0,1200]	--	--	2020-11-25
Thallium (Tl) (H2Lab-MET-211) <b>2</b>	0,0002	mg/L	< 0,0008	--	--	--	--	--	--	2020-11-25
Dissolved thallium (Tl) (H2Lab-MET-211) <b>2</b>	0,0002	mg/L	< 0,0008	Tl-S1409090 23-1000ppm	901,4286	1000	[800,0500,1199,9500]	--	--	2020-11-25
Zinc (Zn) (H2Lab-MET-211) <b>a</b>	0,001	mg/L	<0,001	C00-046-705 _X_1000	0,110	0.1000	[0,080,0,120]	--	--	2020-11-25
Dissolved Zinc (H2Lab-MET-211) <b>a</b>	0,001	mg/L	<0,001	C00-046-705 _X_1000	0,099	0.1000	[0,080,0,120]	--	--	2020-11-25
Non-ionized Ammoniac (H2Lab-NH3-211*) <b>2</b>	0,01	mg/L N	< 0,01	--	--	--	--	--	--	2020-11-26
NH4 (H2Lab-NH3-211*) <b>a</b>	0,01	mg/L N	< 0,01	--	--	--	--	--	--	2020-11-26
Ammonia nitrogen (NH3-NH4) (H2Lab-NH3-211) <b>a</b>	0,01	mg/L N	< 0,01	DMR-0555-20 20-NH3-NH4	2,54	2.34	[1,99,2,69]	3,62	3,65	2020-11-26
Nitrate (NO3) (H2Lab-NITR-211) <b>a</b>	0,0100	mg/L N	< 0,0100	--	--	--	--	--	--	2020-11-25
Nitrites (NO2) (H2Lab-NITR-211) <b>a</b>	0,0100	mg/L N	< 0,0100	DMR-0555-20 20-NO2	1,66	1.61	[1,37,1,85]	--	--	2020-11-24

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Nitrite-nitrate (H2Lab-NITR-211) <b>a</b>	0,0100	mg/L N	< 0,0100	DMR-0555-20 20-NO2-NO3	1,81	1.98	[1,68,2,28]	--	--	2020-11-25
Orthophosphate (H2Lab-OPO4-211) <b>a</b>	0,01	mg/L P	< 0,01	DMR-0555-20 20-OPO4	0,52	0.481	[0,42,0,54]	--	--	2020-11-24
Total phosphorus (P tot) (H2Lab-PTOT-211) <b>a</b>	0,01	mg/L P	0,03	DMR-0504-20 20-Ptot	1,46	1,46	[1,28,1,64]	< 0,01	< 0,01	2020-11-25
Sulfate (SO4) (H2Lab-SO4-211) <b>a</b>	0,600	mg/L	< 0,600	DMR-0555-20 20-SO4	112	118	[109,127]	--	--	2020-11-25
Suspended Solids (H2Lab-SOLI-011) <b>a</b>	1	mg/L	< 1	STD-MES 25mg/L	26	25	[19,31]	89	88	2020-11-25
Alkalinity (H2Lab-TIT-011) <b>1</b>	5	mg/L CaCO3	-	STD alcalinité	160	145	[123,167]	--	--	2020-11-24
Conductivity (H2Lab-TIT-011) <b>a</b>	1	µmhos/c m	1	STD cond maison	1409	1415	[1309,1521]	--	--	2020-11-24
pH (H2Lab-TIT-011) <b>a</b>	0,00500	UpH	-	STD pH 7.0	7,05	7.00	[6,94,7,06]	--	--	2020-11-24
Total dissolved solids (H2Lab-TIT-011) <b>1</b>	1	mg/L	-	--	--	--	--	--	--	2020-11-24
Turbidity (H2Lab-TURB-211) <b>a</b>	0,0200	UTN	0,0600	DMR-0555-20 20-TURB	5,75	6.69	[5,69,7,69]	--	--	2020-11-24

### Legend :

**a** : Accredited parameter  
detection reported

**2** : analysis made by H2Lab Laboratory at Rouyn-Noranda

**1** : analysis made by H2Lab Laboratory at Val d'Or

**\*LDR** : Limit of



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## CERTIFICATE OF ANALYSIS

The sample's appreciation and conformity towards established norms, if applicable, is based and limited to analyzed parameters. This report can't be reproduced, unless in whole, without prior written authorization from the laboratory. The results are related only to samples submitted for testing.

**END OF CERTIFICATE**