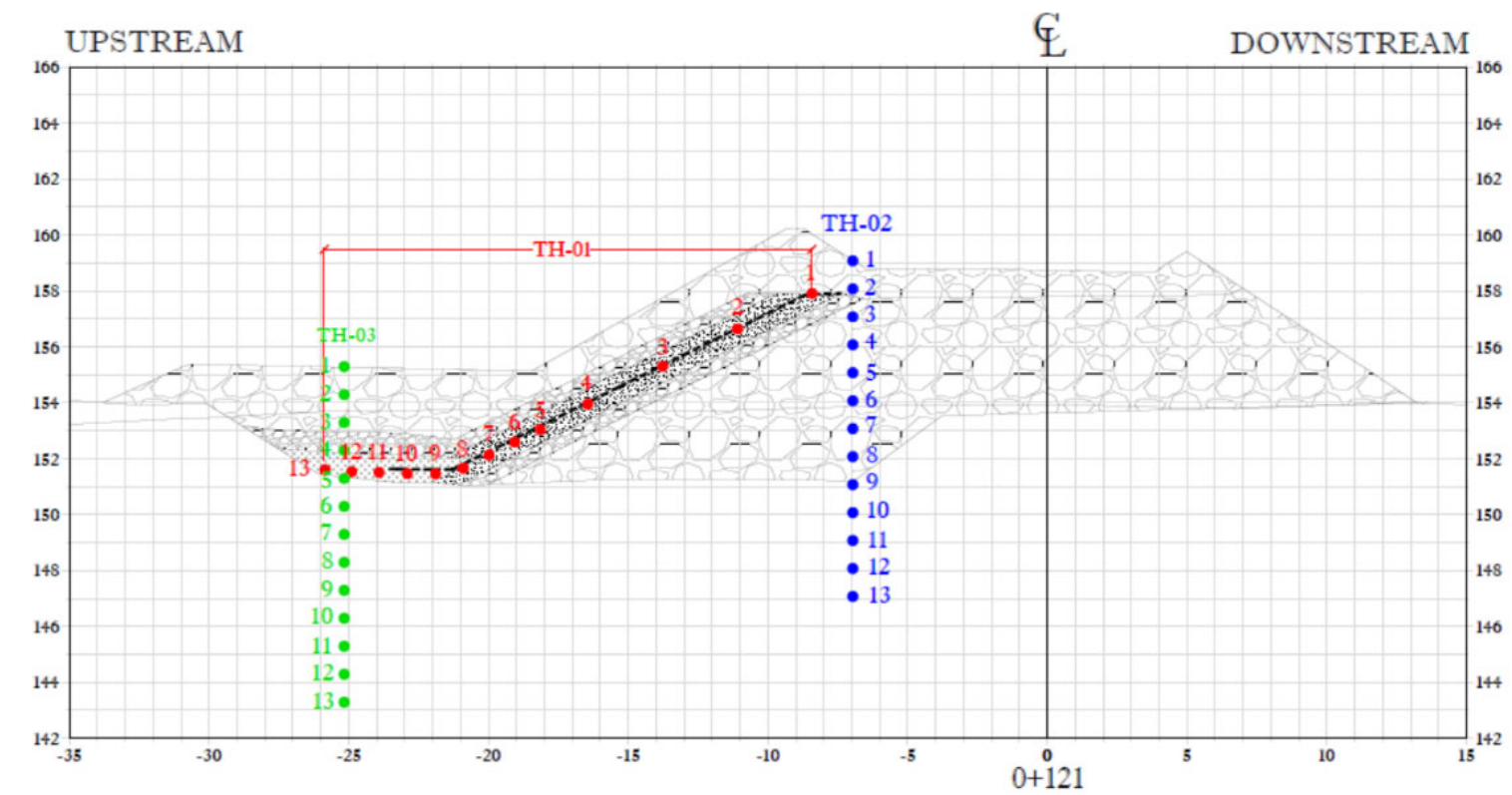
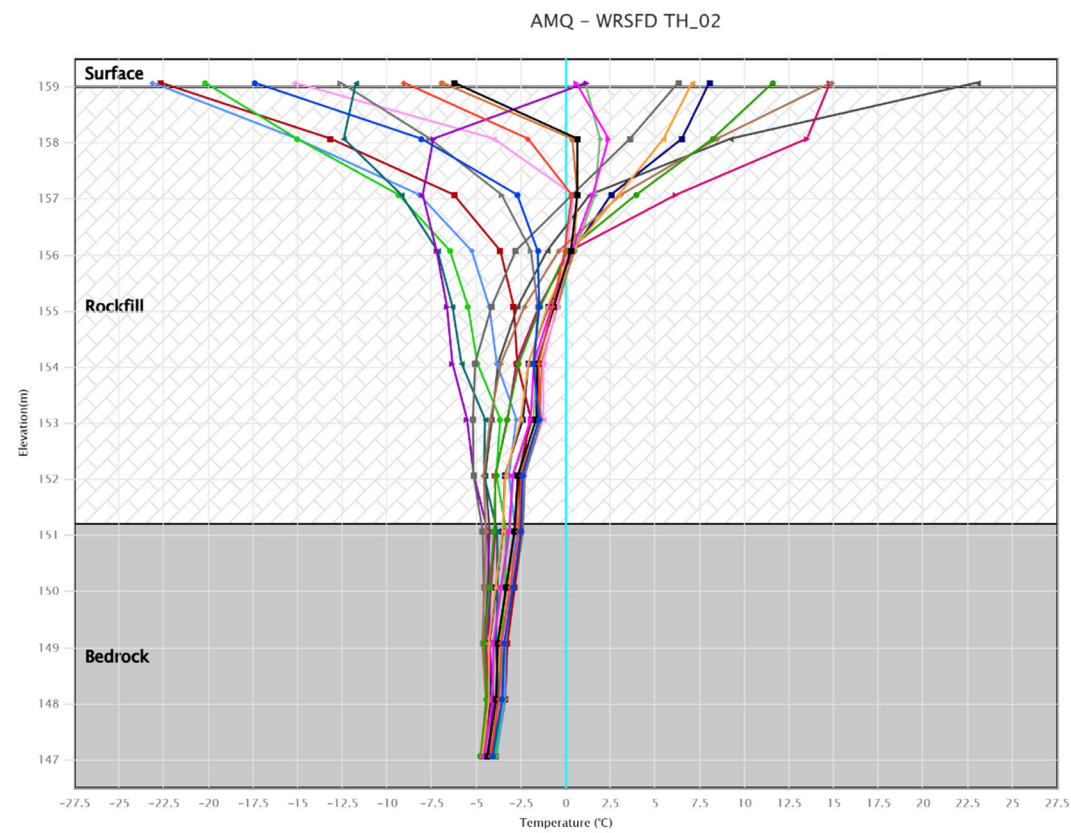
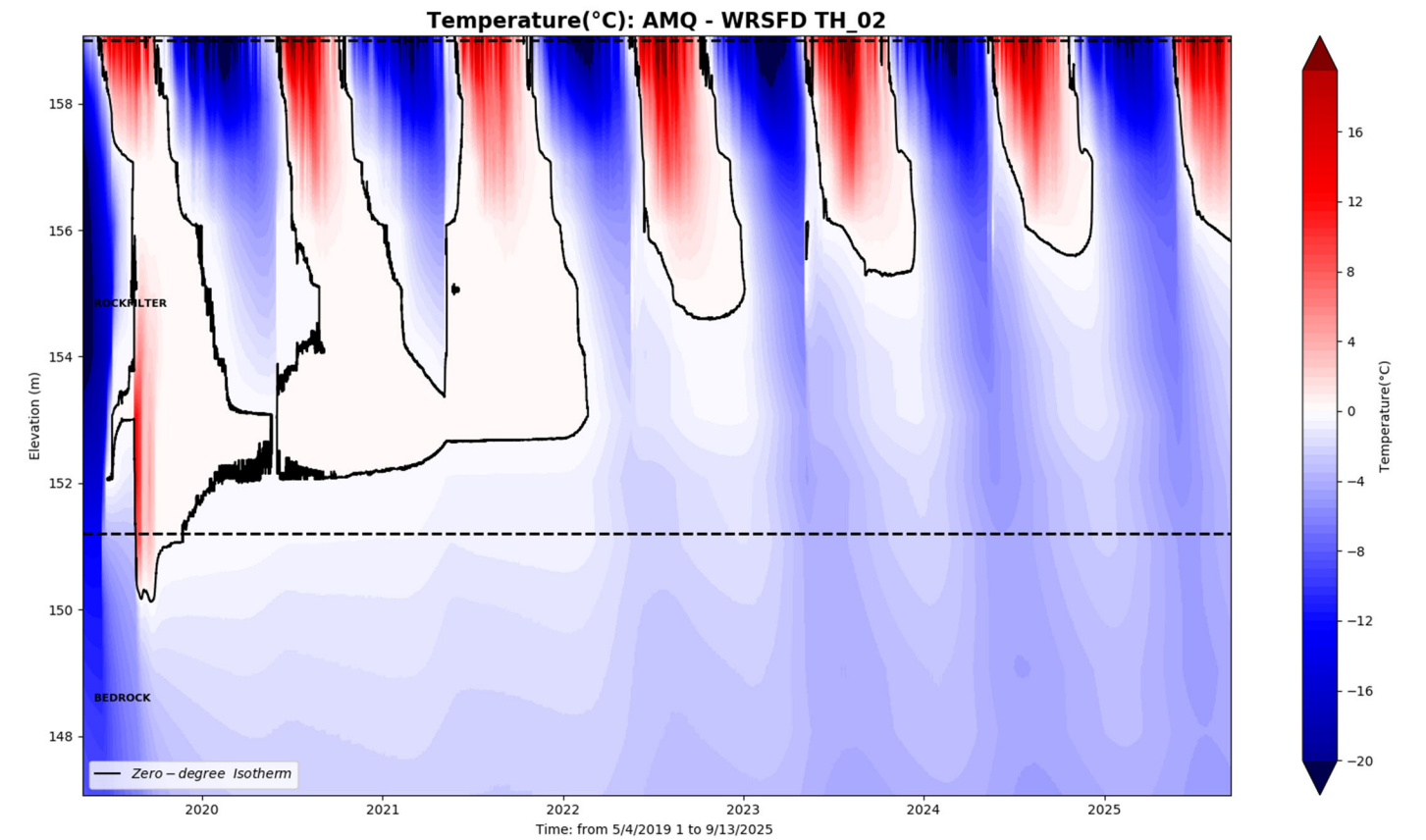
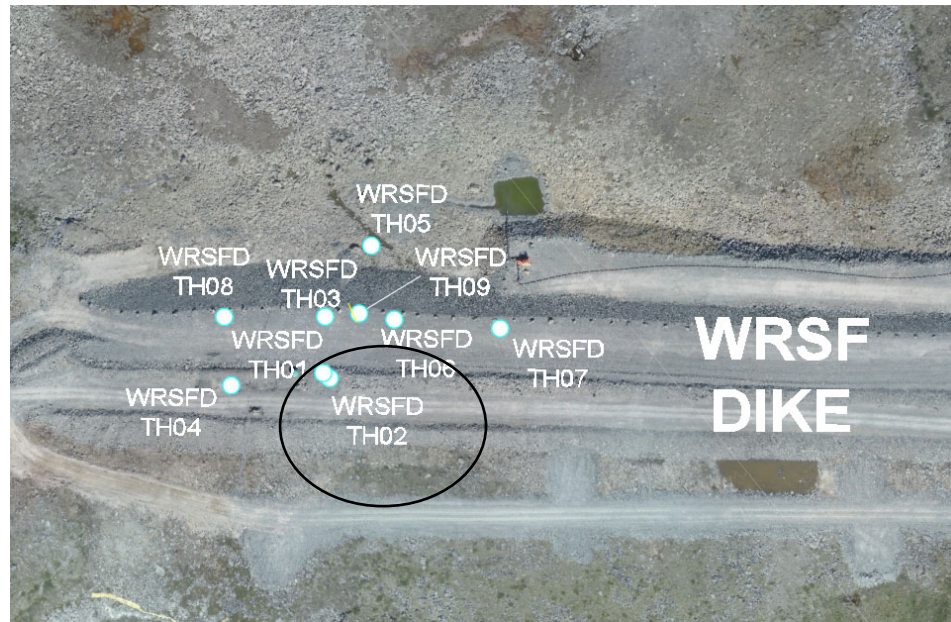
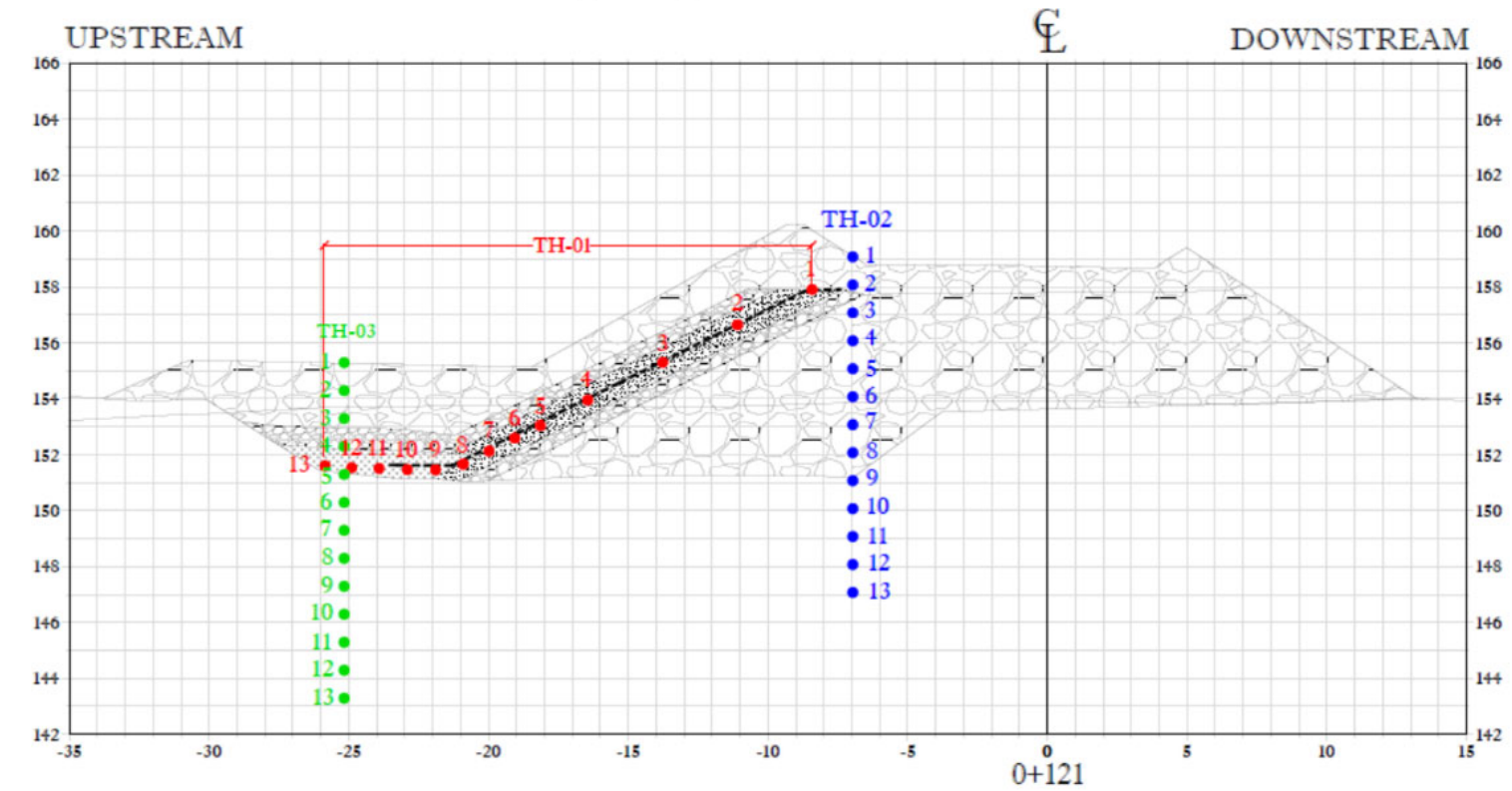
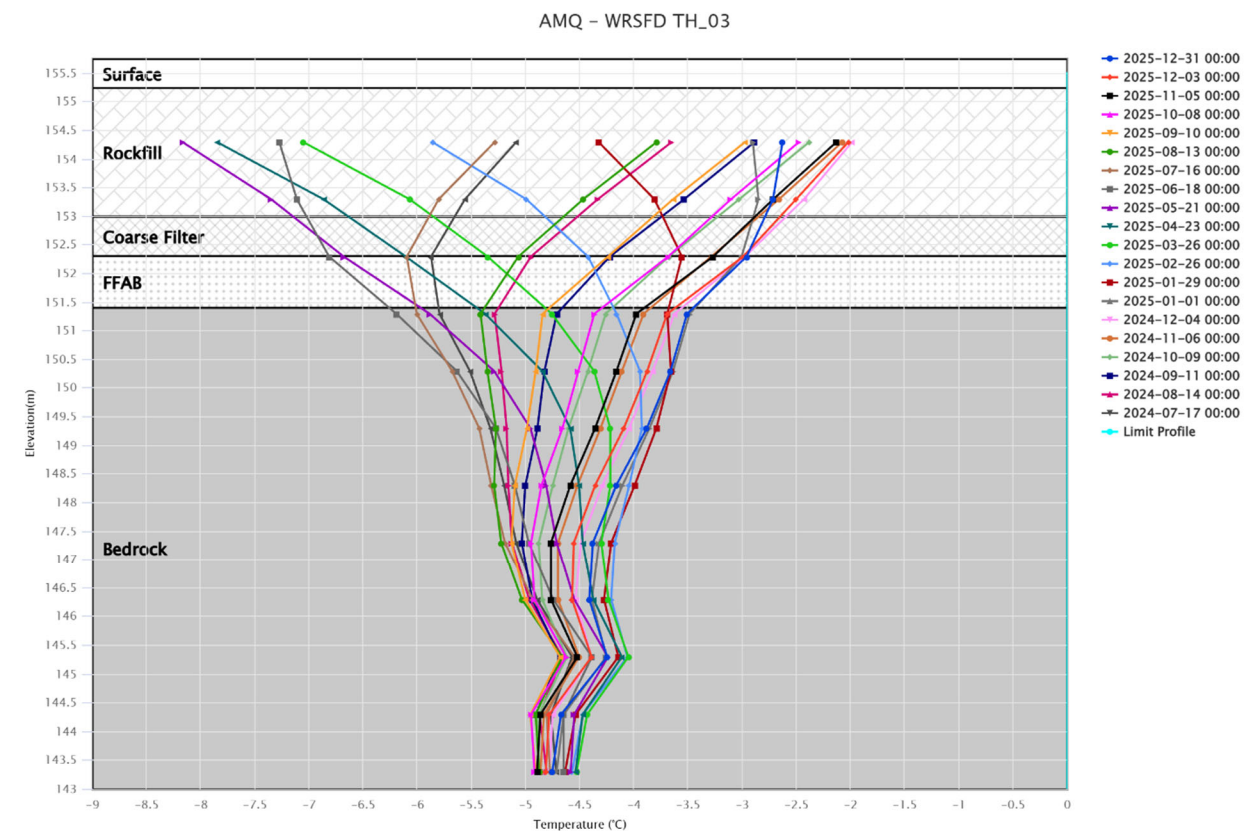
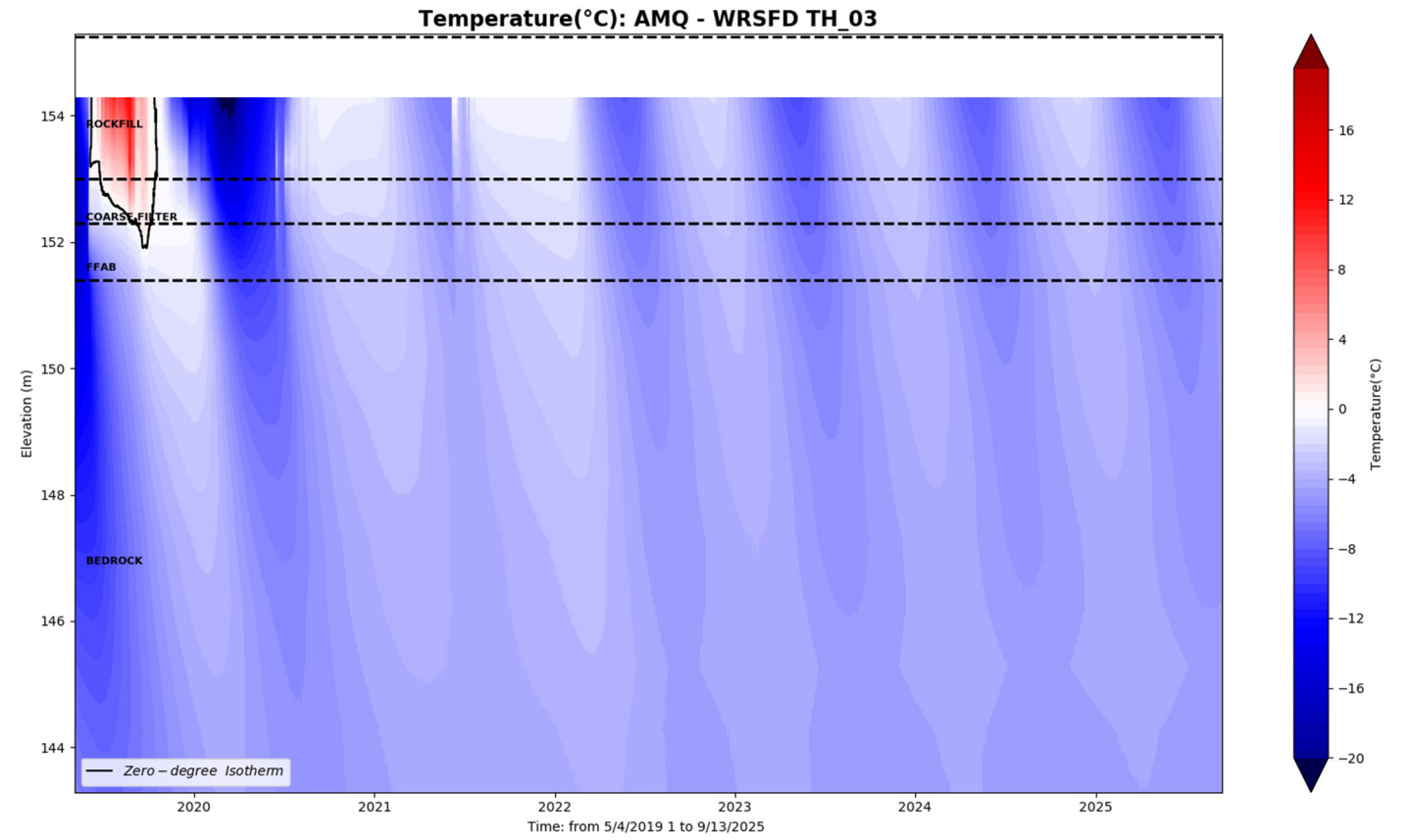
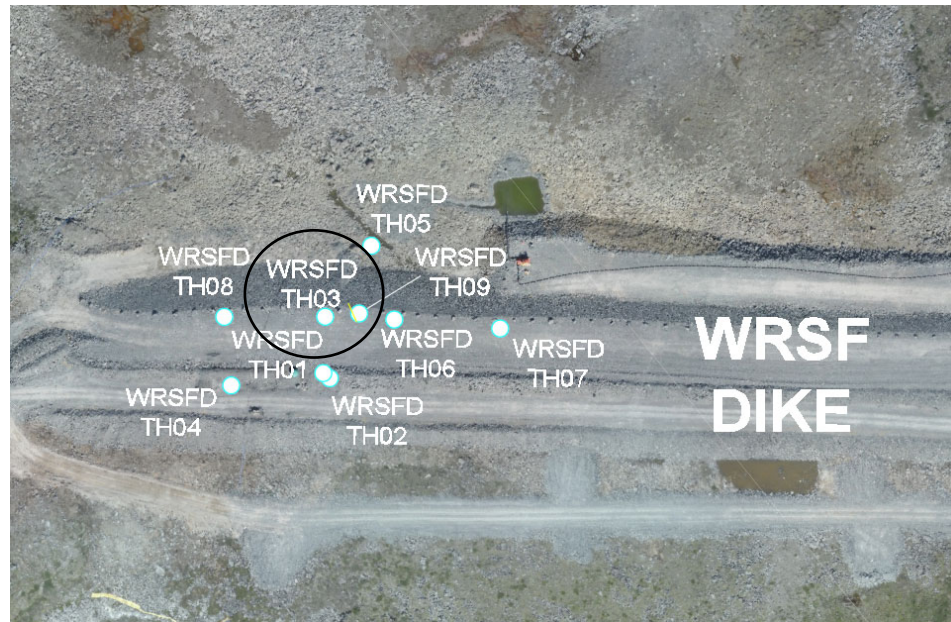


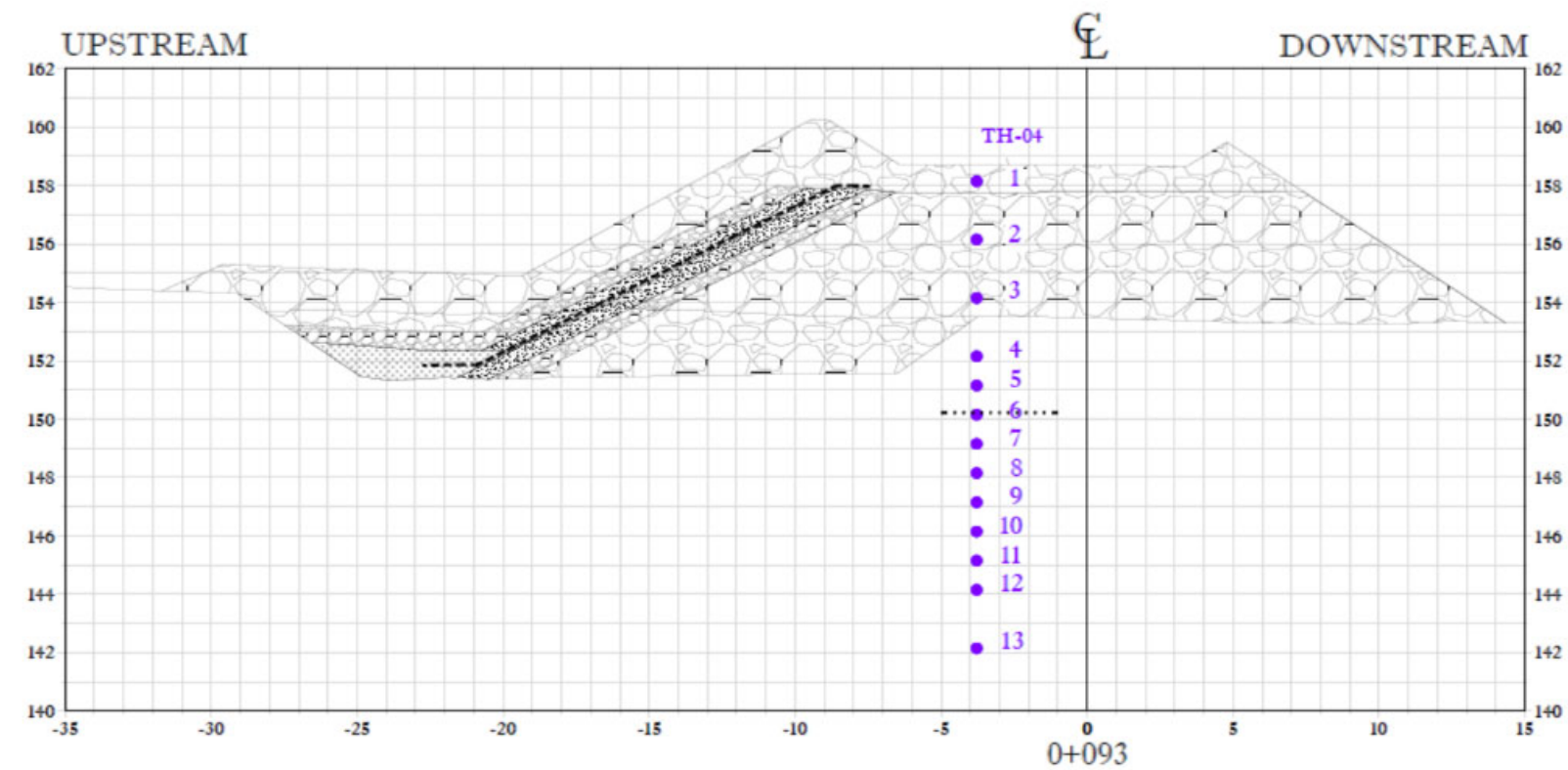
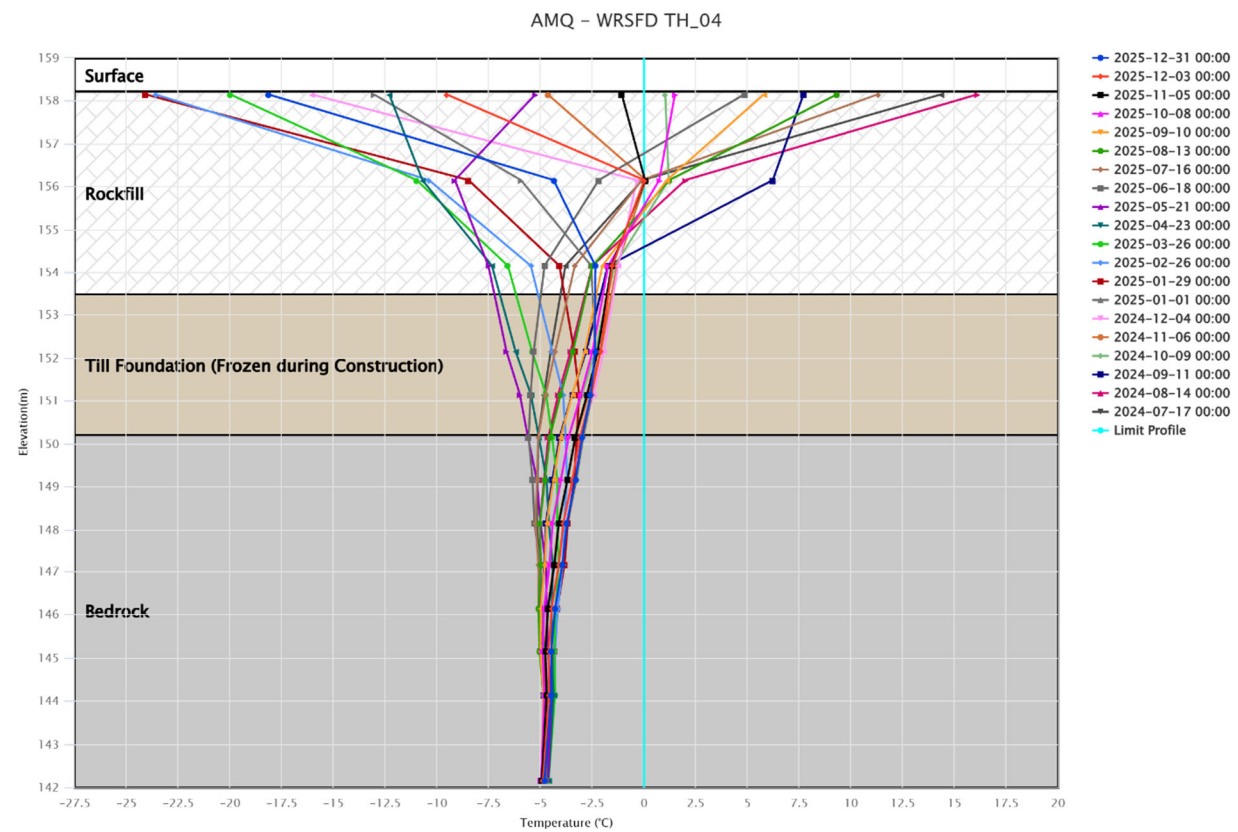
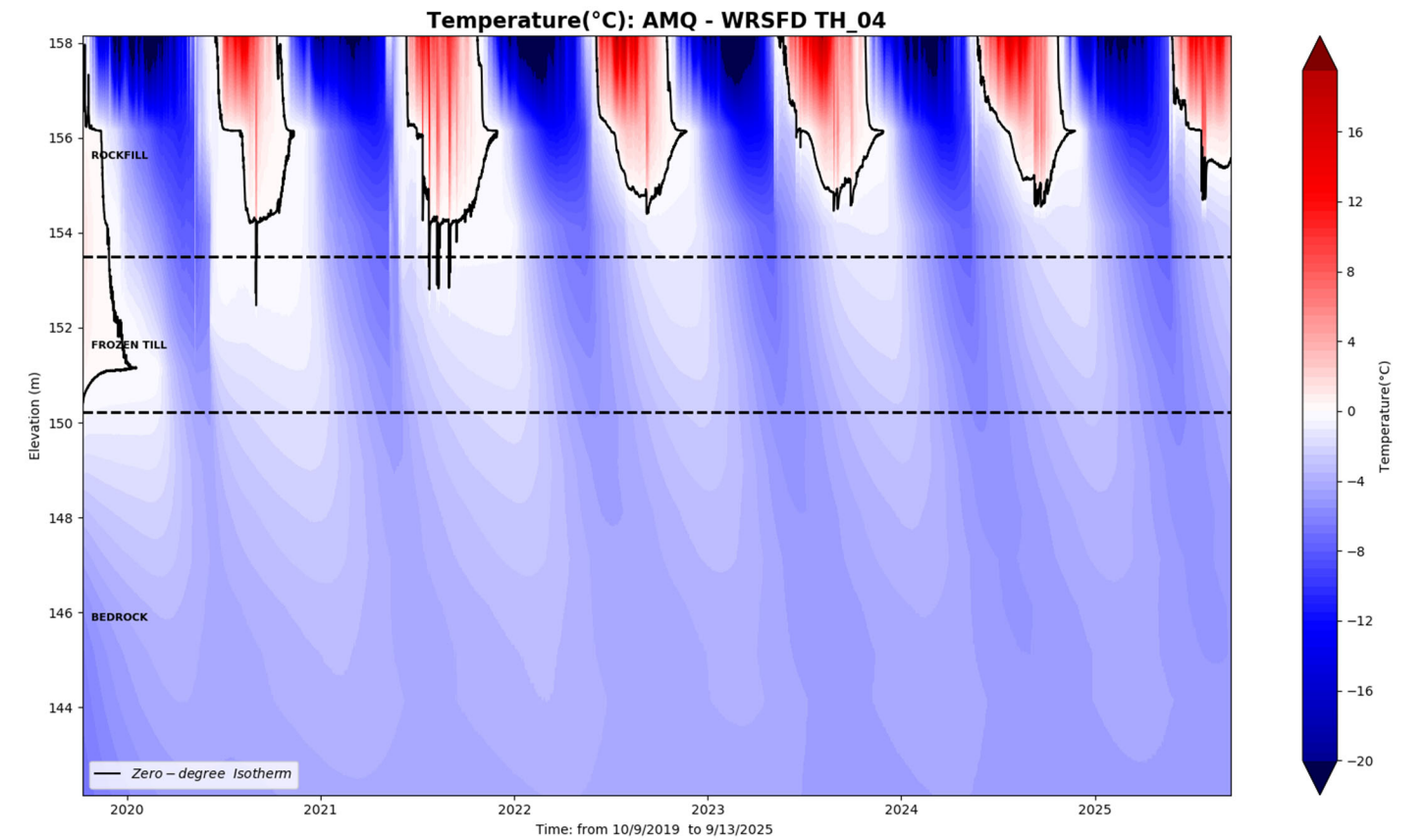
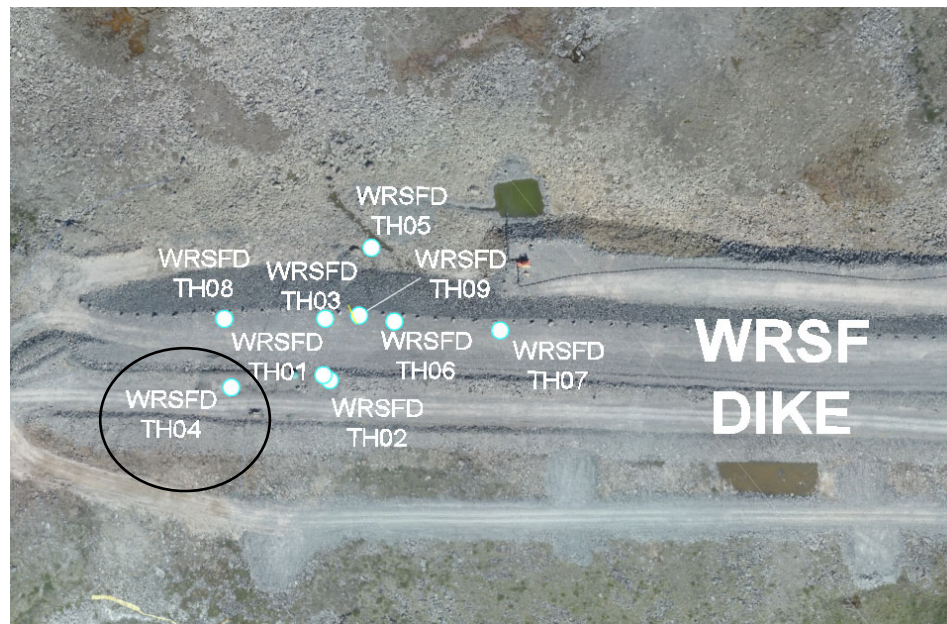
WRSFD TH02



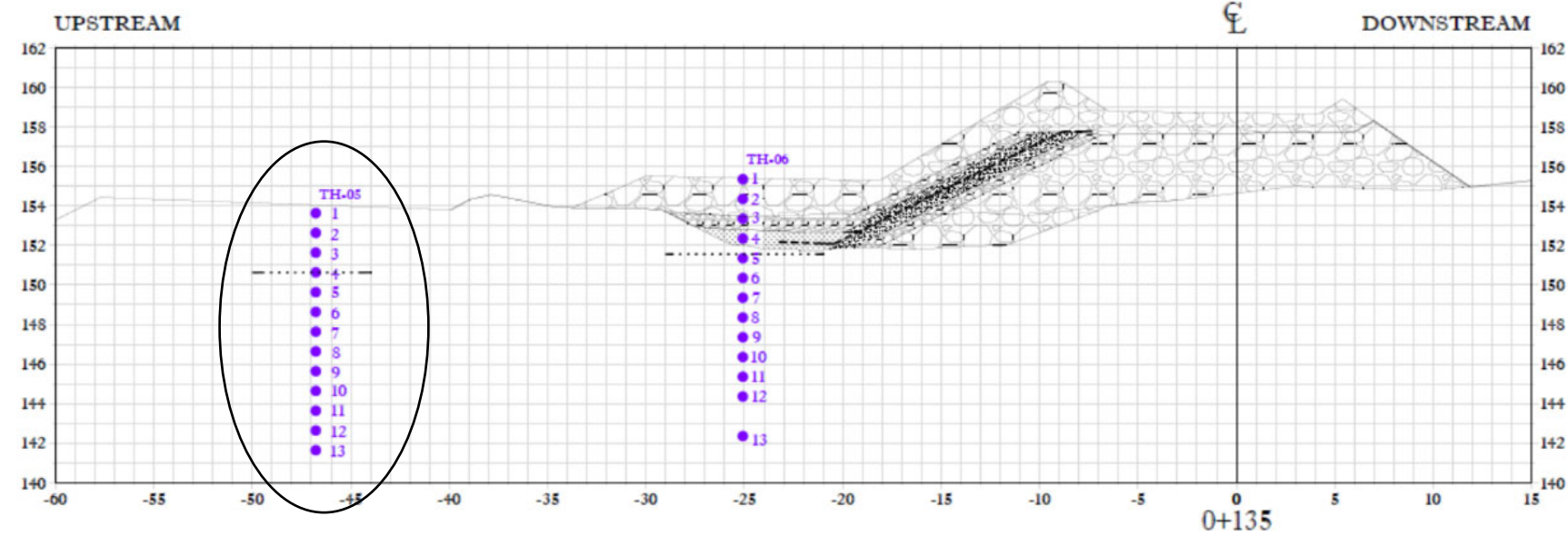
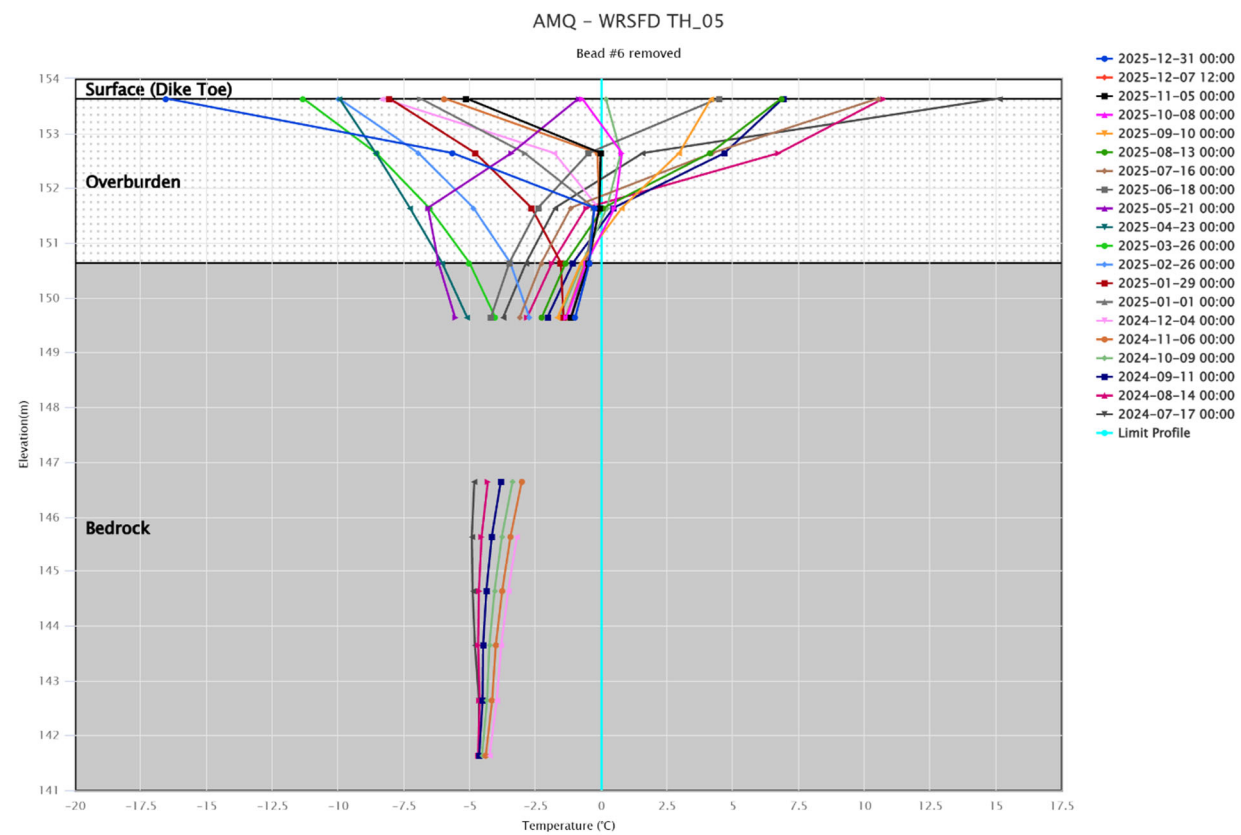
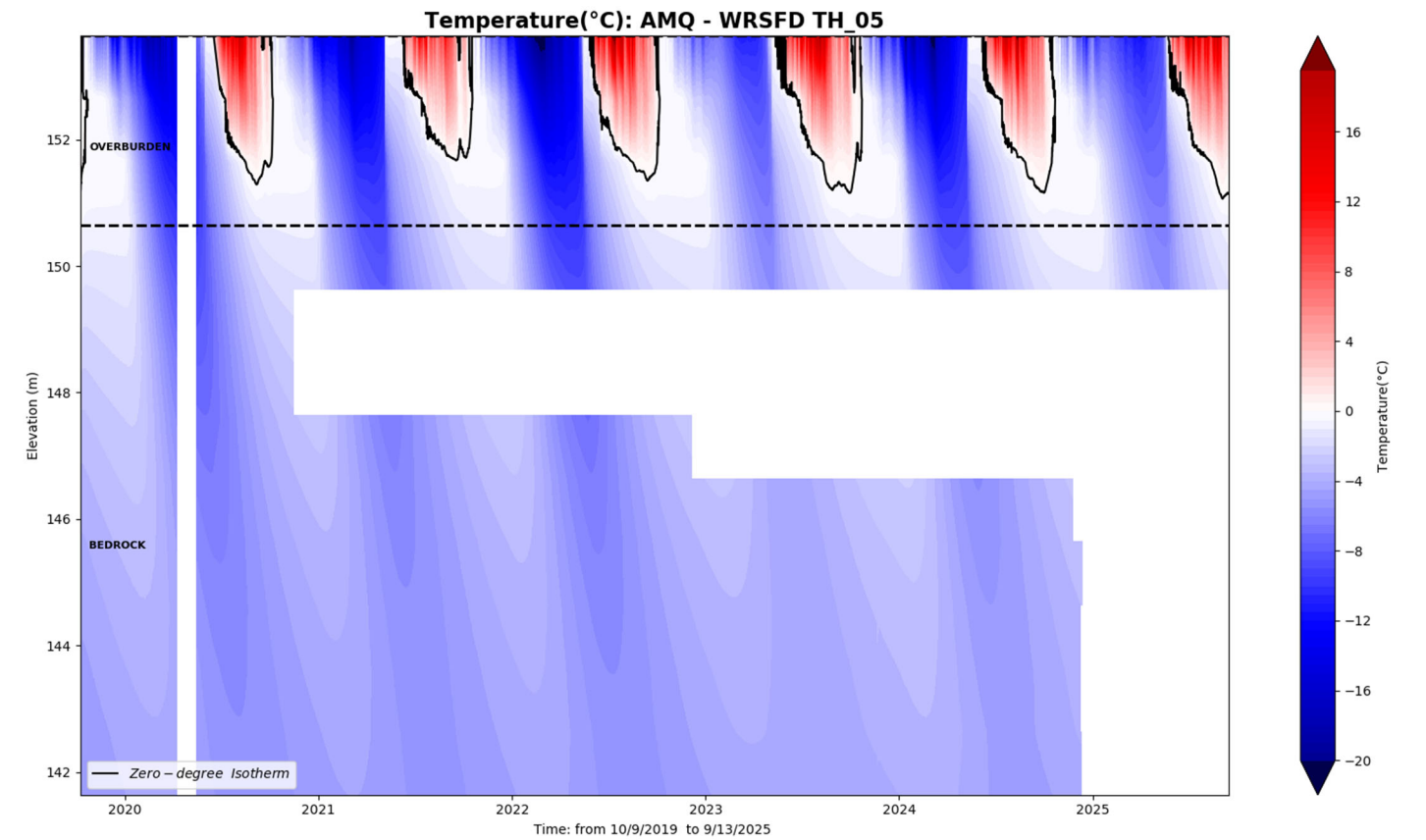
### WRSFD TH03



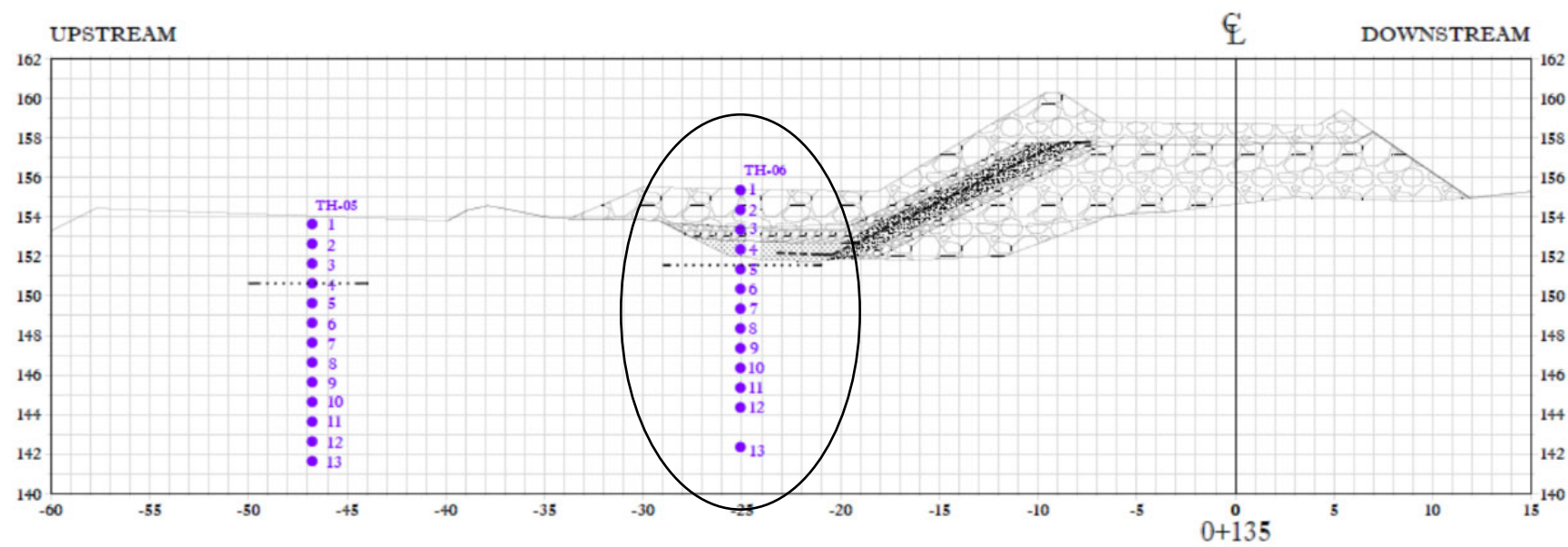
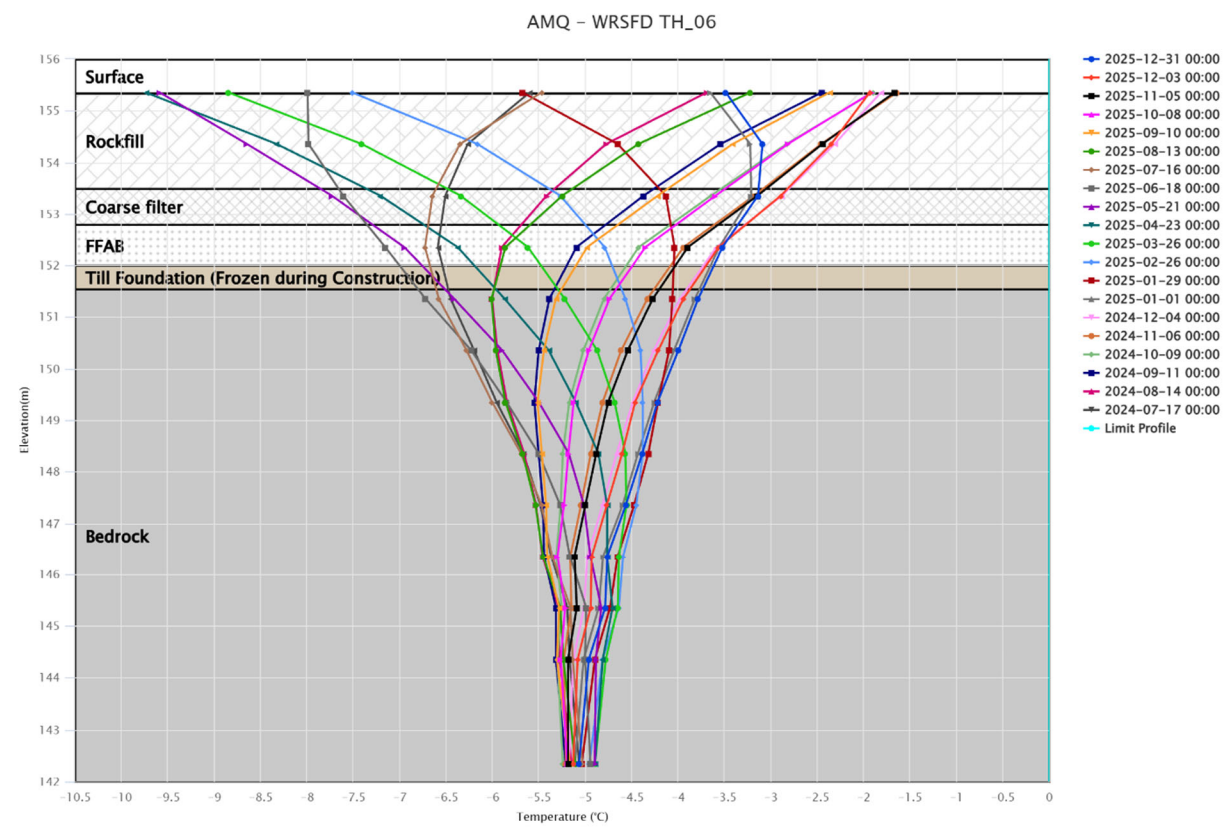
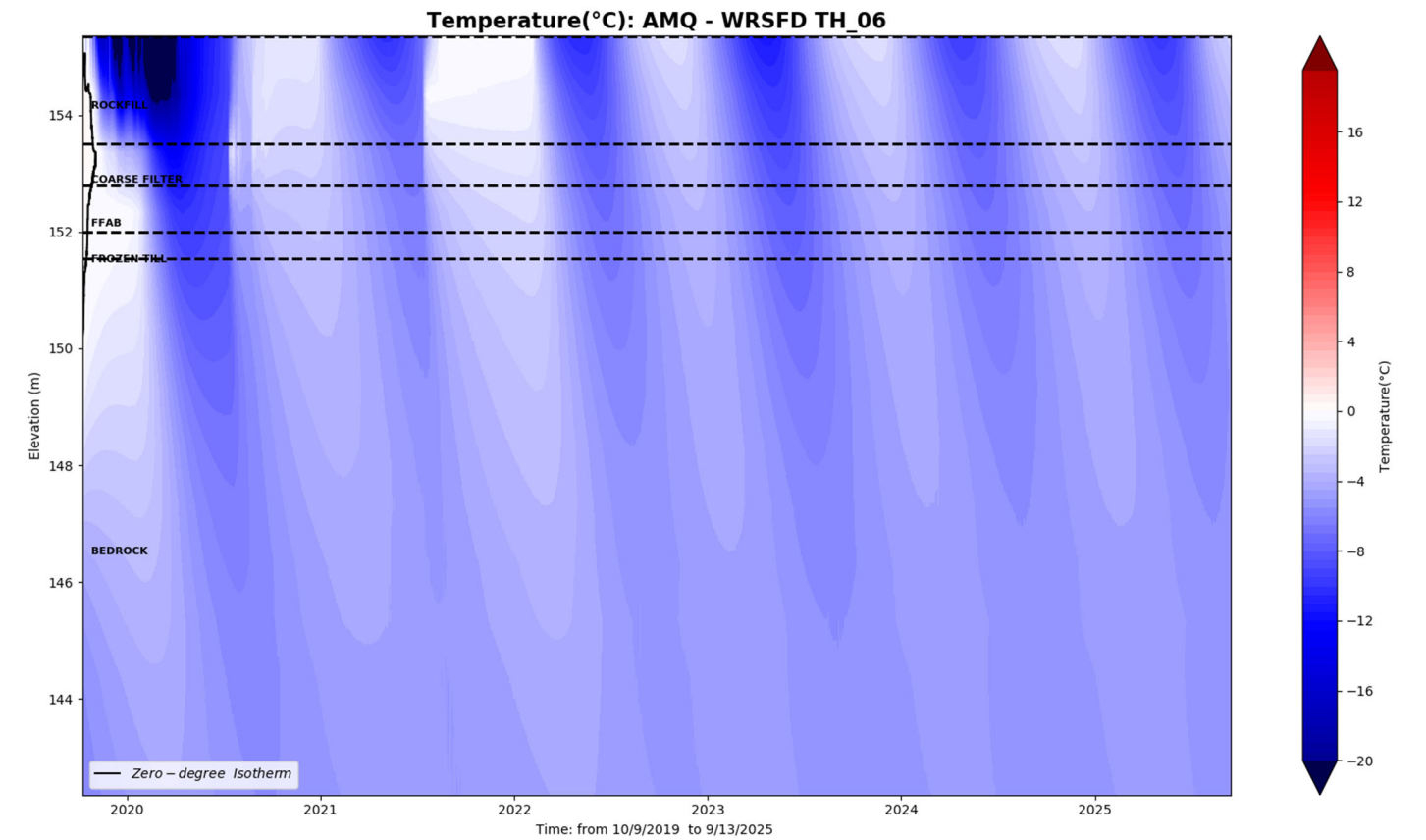
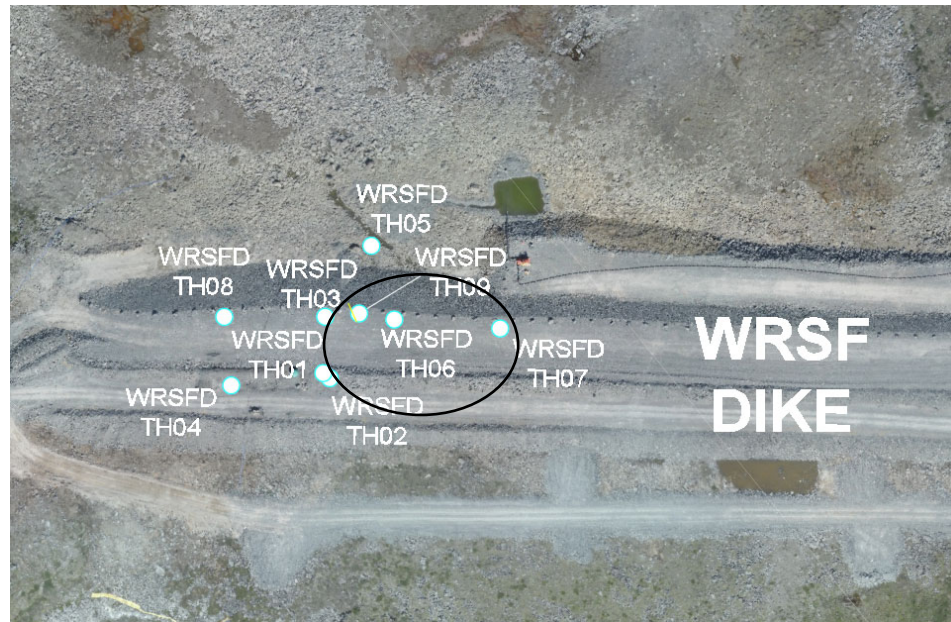
WRSFD TH04



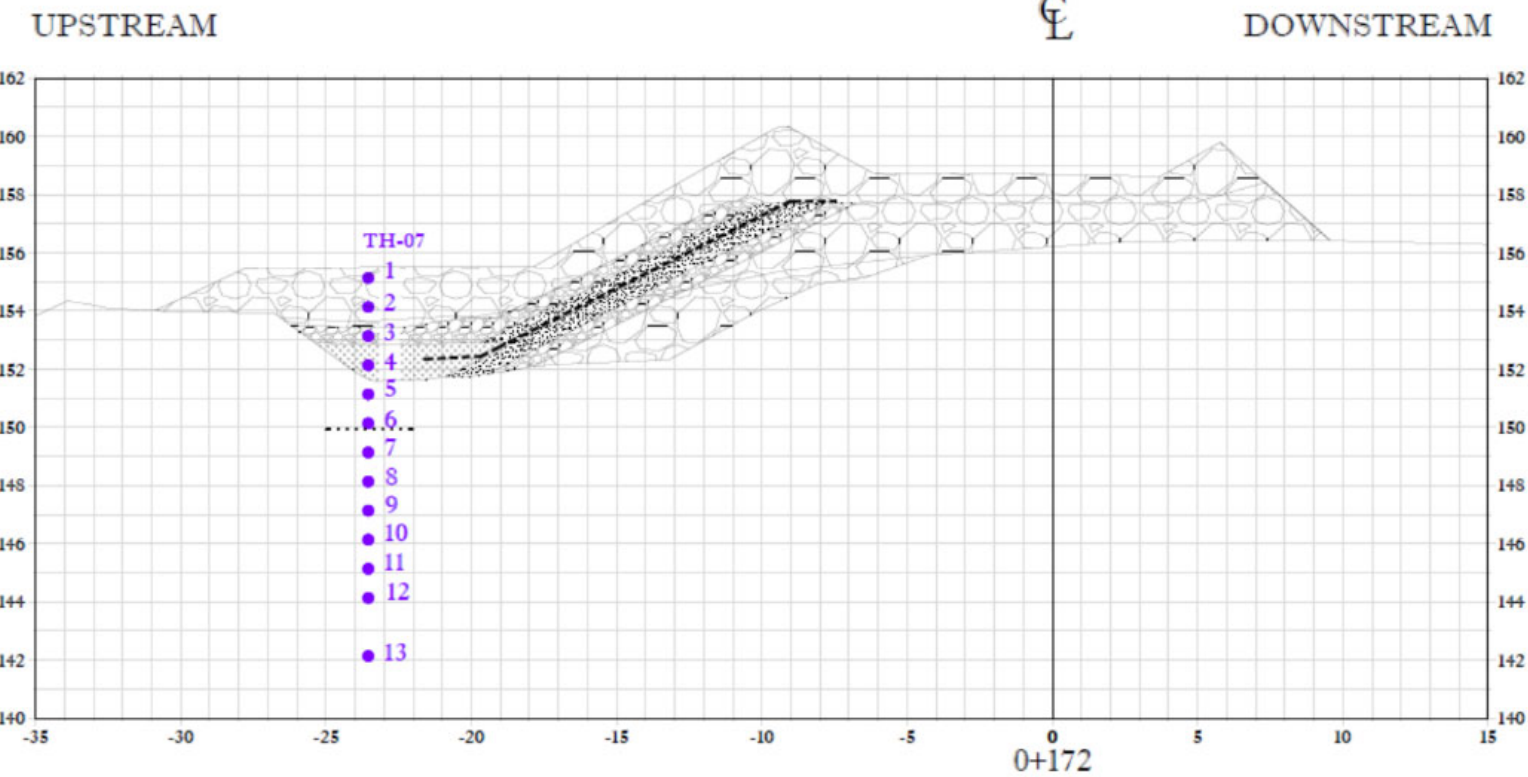
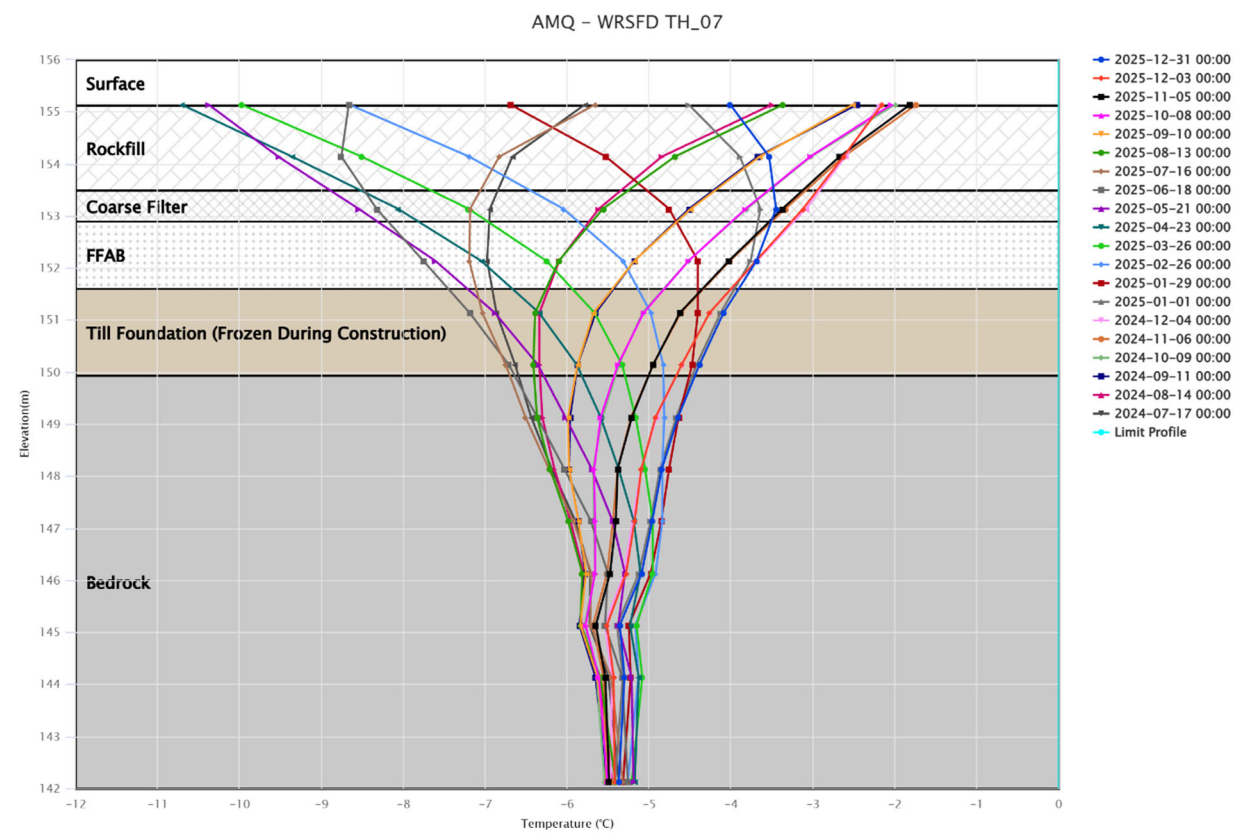
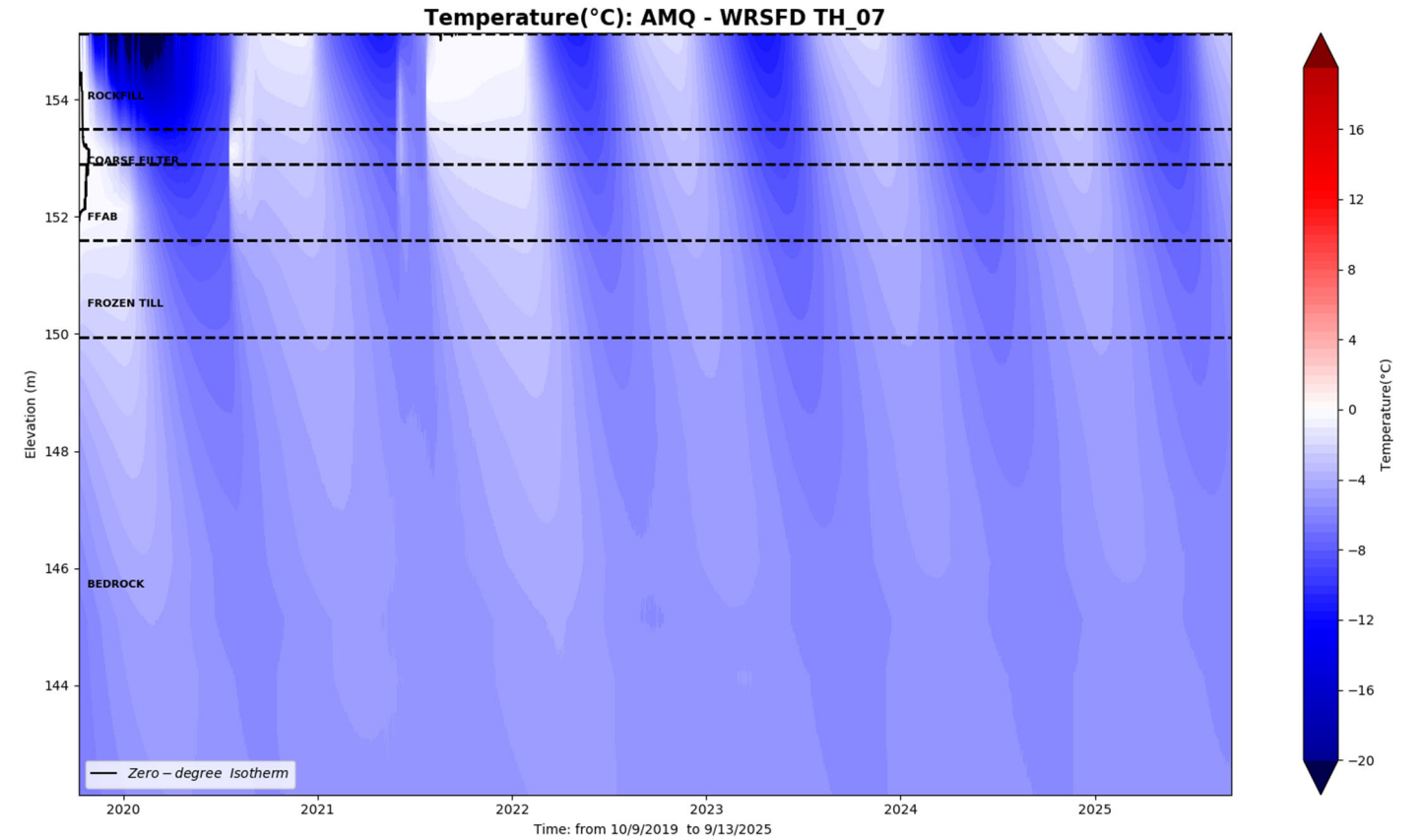
WRSFD TH05



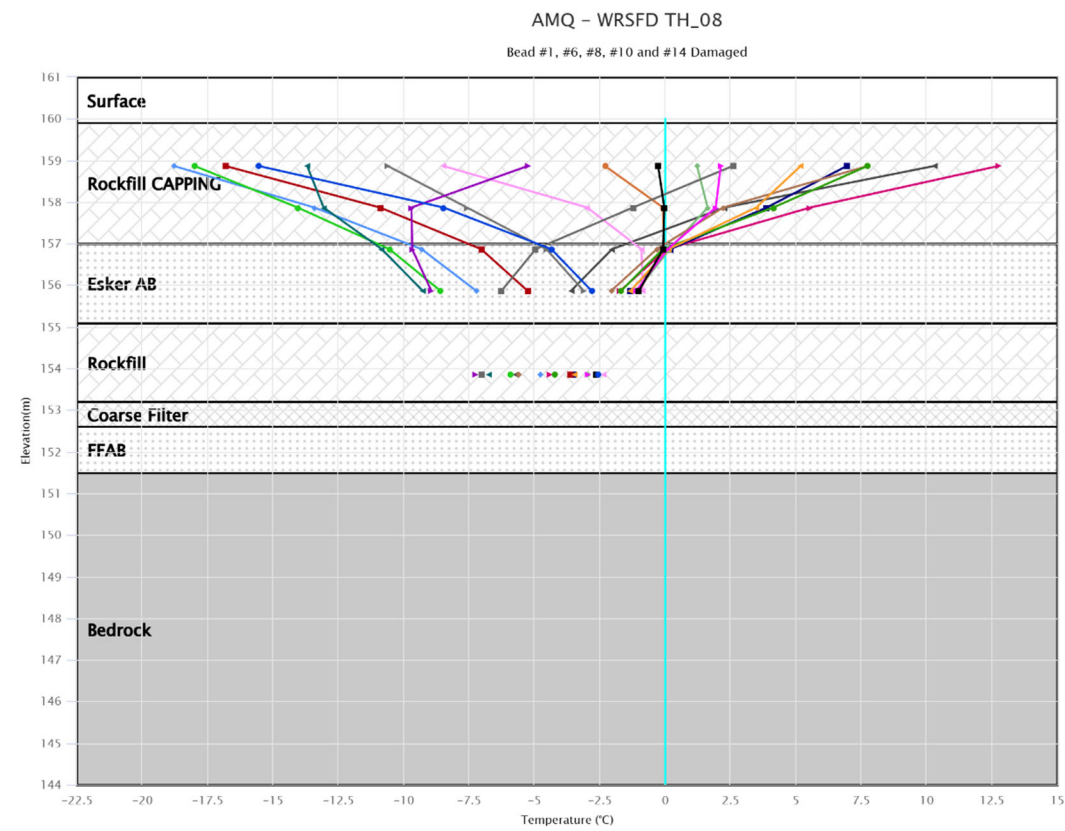
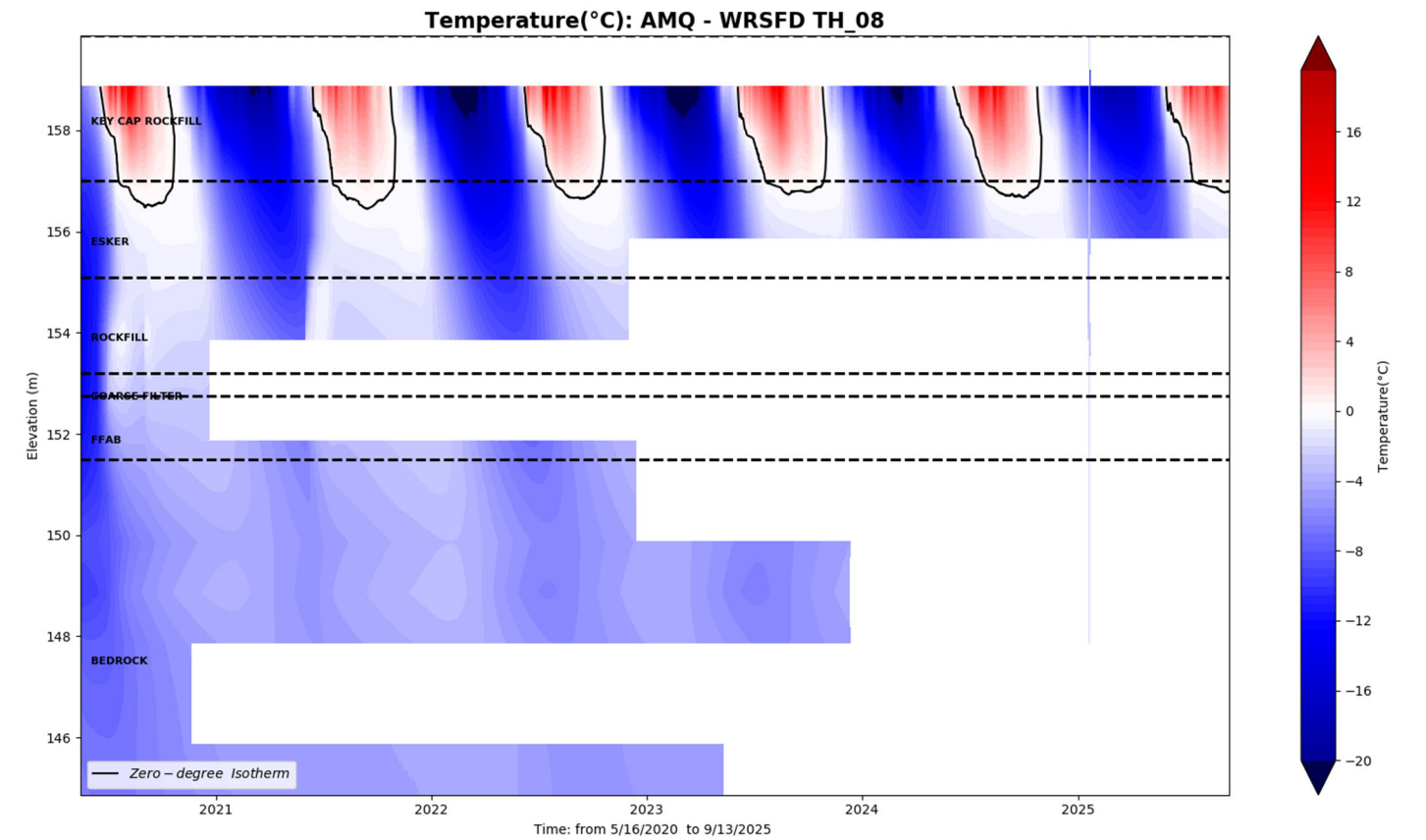
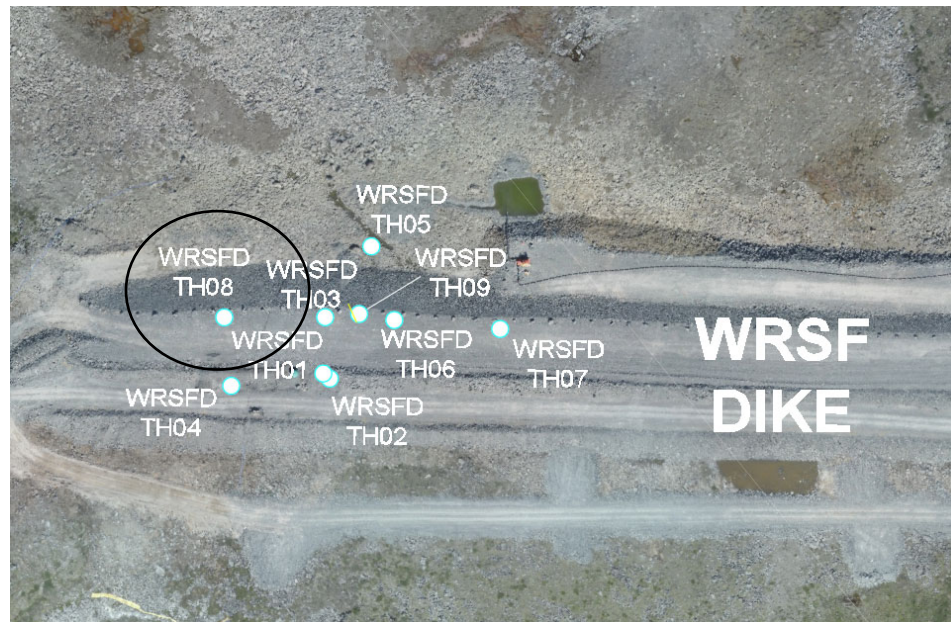
### WRSFD TH06



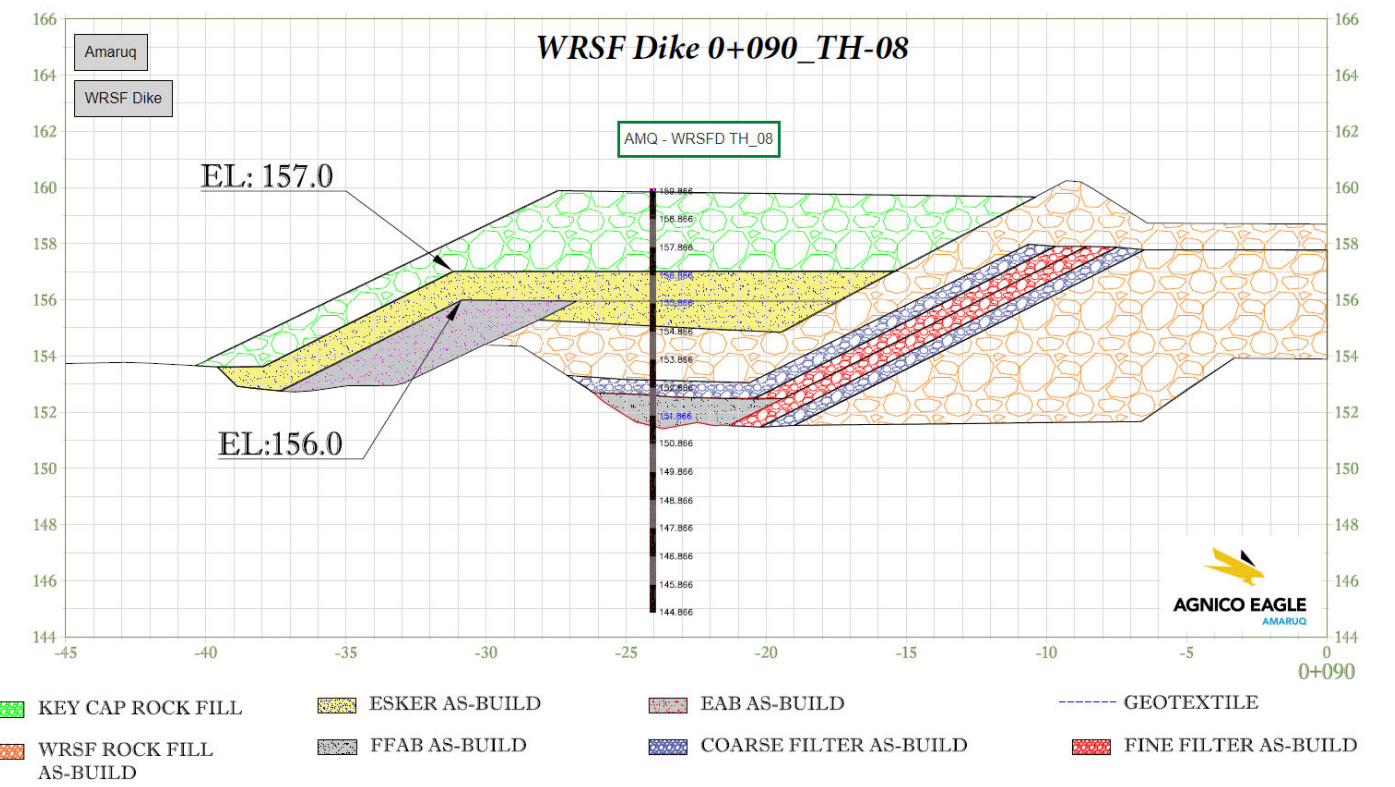
WRSFD TH07



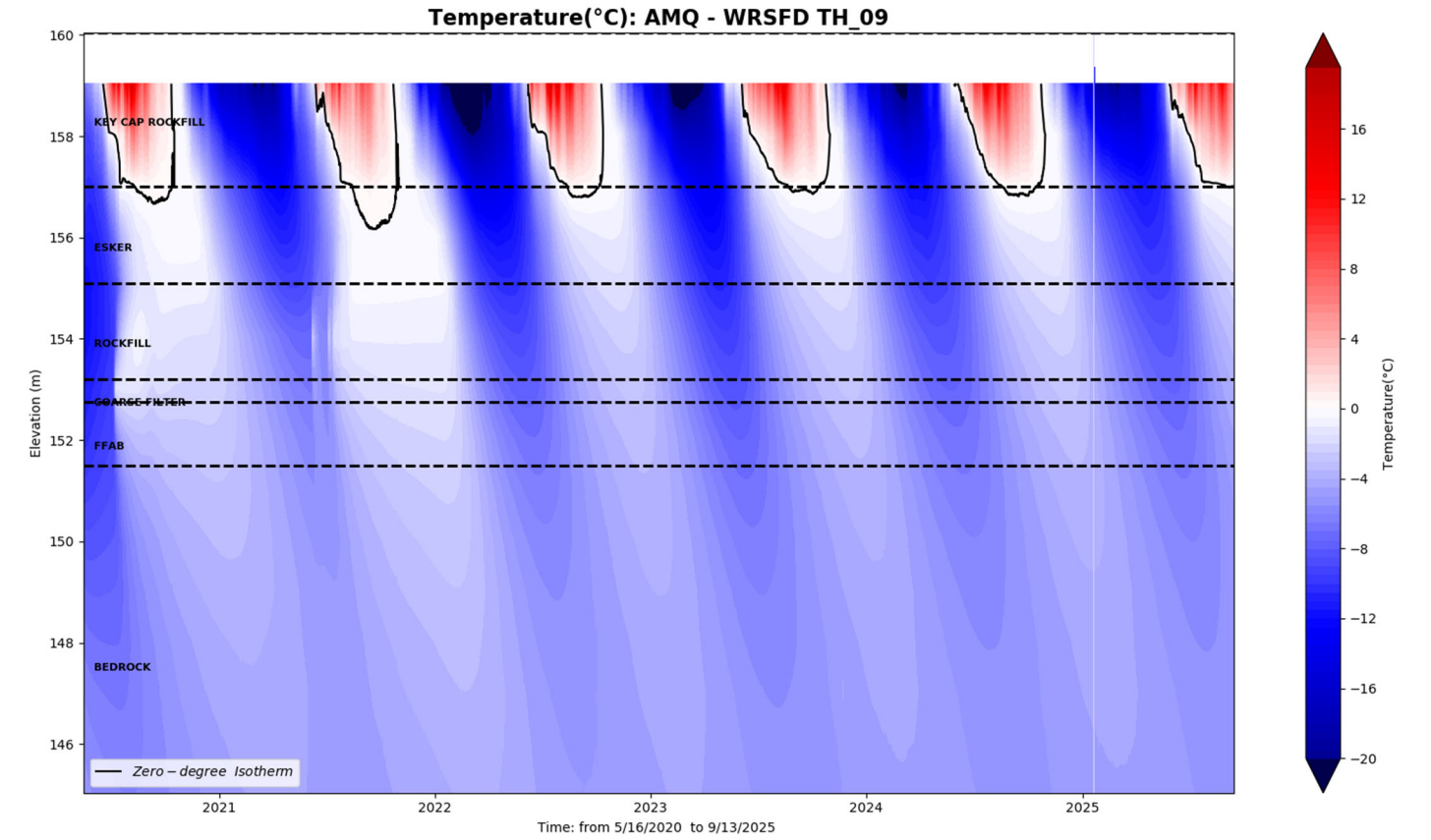
WRSFD TH08



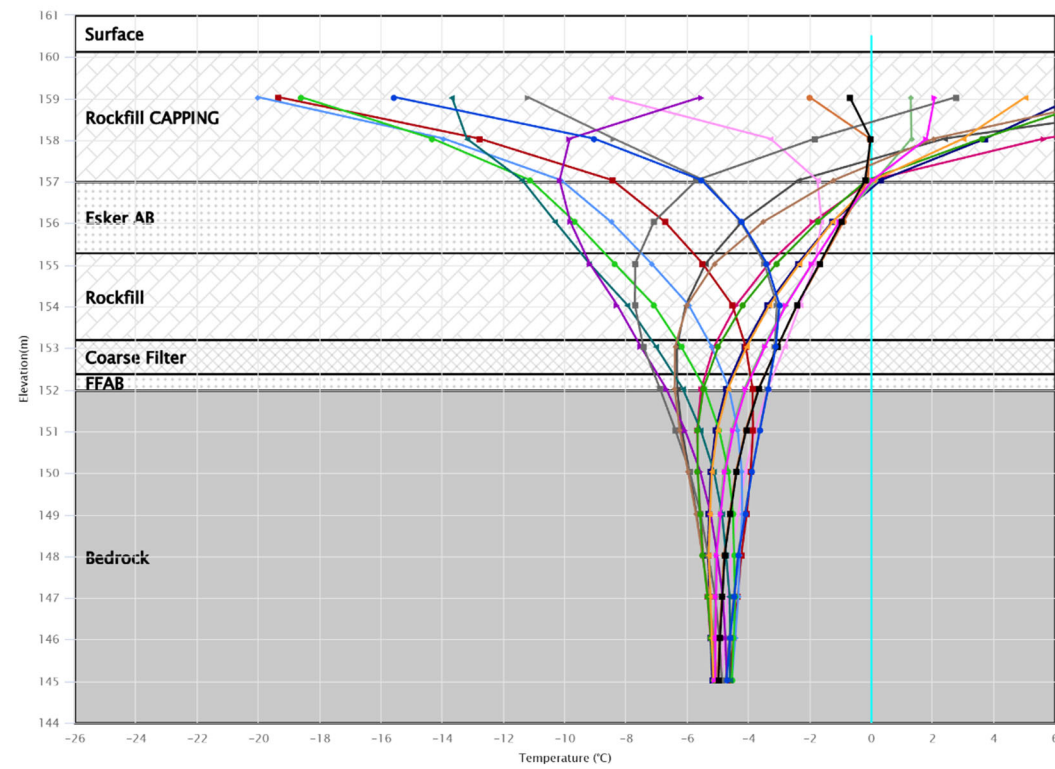
- 2025-12-31 00:00
- 2025-12-07 12:00
- 2025-11-05 00:00
- 2025-10-08 00:00
- 2025-09-10 00:00
- 2025-08-13 00:00
- 2025-07-16 00:00
- 2025-06-18 00:00
- 2025-05-21 00:00
- 2025-04-23 00:00
- 2025-03-26 00:00
- 2025-02-26 00:00
- 2025-01-29 00:00
- 2025-01-01 00:00
- 2024-12-04 00:00
- 2024-11-06 00:00
- 2024-10-09 00:00
- 2024-09-11 00:00
- 2024-08-14 00:00
- 2024-07-17 00:00
- Limit Profile



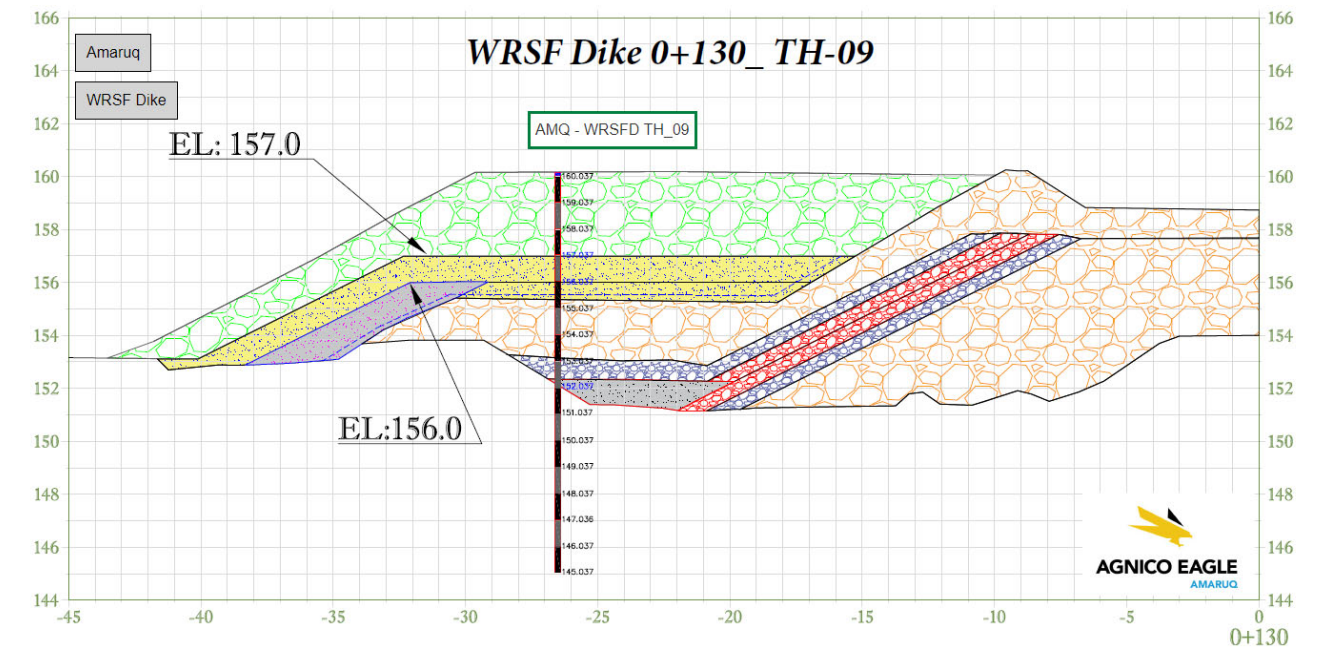
WRSFD TH09



AMQ - WRSFD TH\_09  
Bead #1 removed



- 2025-12-31 00:00
- 2025-12-07 12:00
- 2025-11-05 00:00
- 2025-10-08 00:00
- 2025-09-10 00:00
- 2025-08-13 00:00
- 2025-07-16 00:00
- 2025-06-18 00:00
- 2025-05-21 00:00
- 2025-04-23 00:00
- 2025-03-26 00:00
- 2025-02-26 00:00
- 2025-01-29 00:00
- 2025-01-01 00:00
- 2024-12-04 00:00
- 2024-11-06 00:00
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- 2024-09-11 00:00
- 2024-08-14 00:00
- 2024-07-17 00:00
- Limit Profile

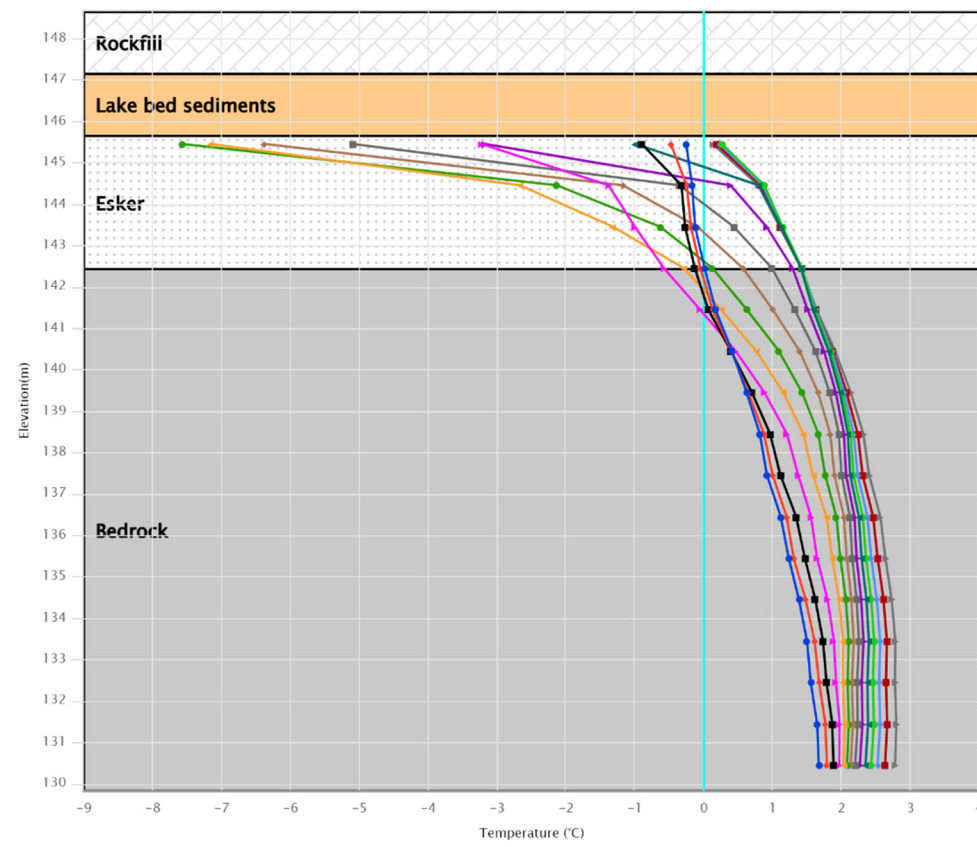


- KEY CAP ROCK FILL
- ESKER AS-BUILD
- EAB AS-BUILD
- WRSF ROCK FILL AS-BUILD
- COARSE FILTER
- FFAB AS-BUILD
- FINE FILTER AS-BUILD
- GEOTEXTILE

PSW – DH 2 TH

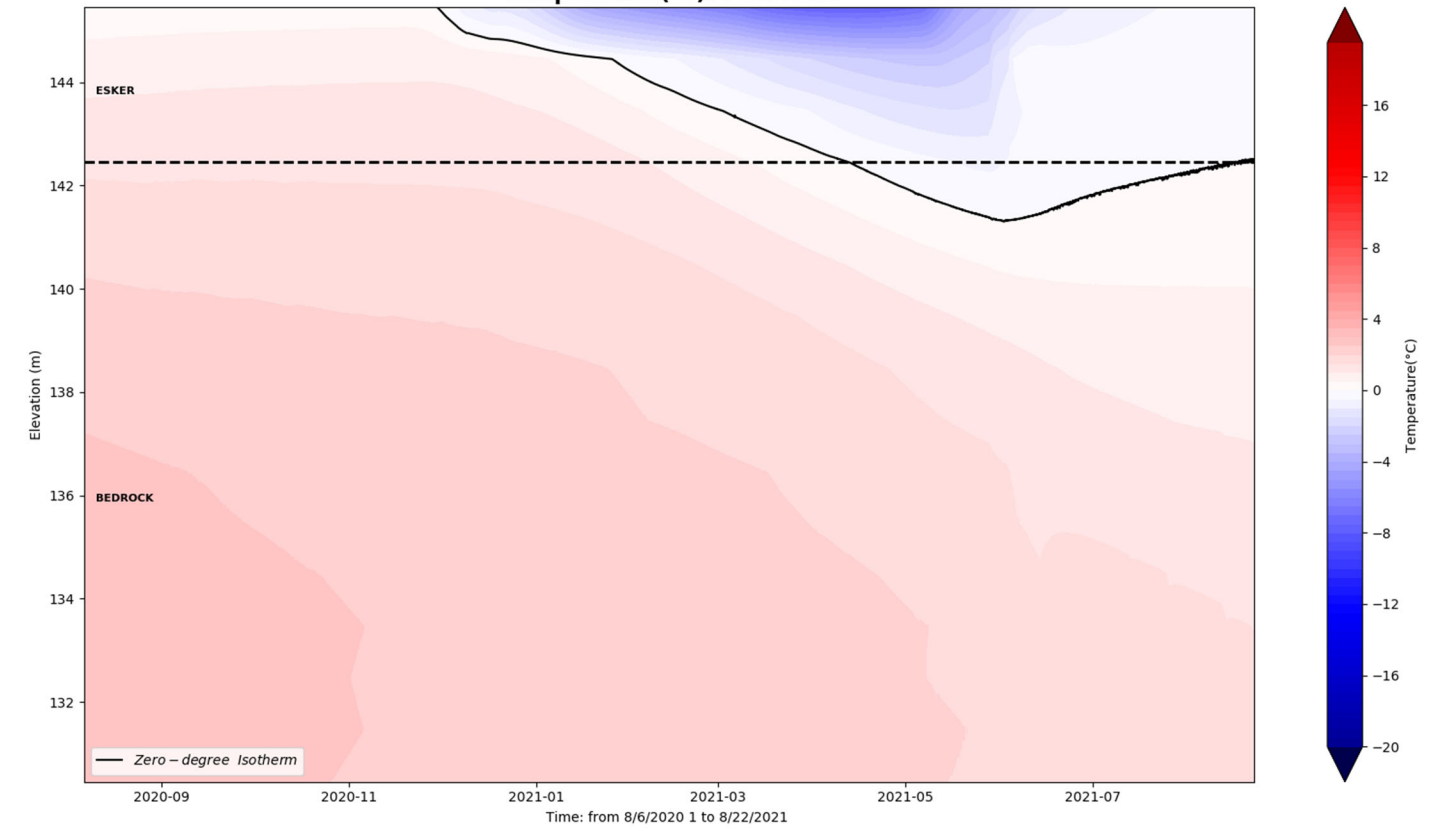


AMQ – PSW – DH02\_TH

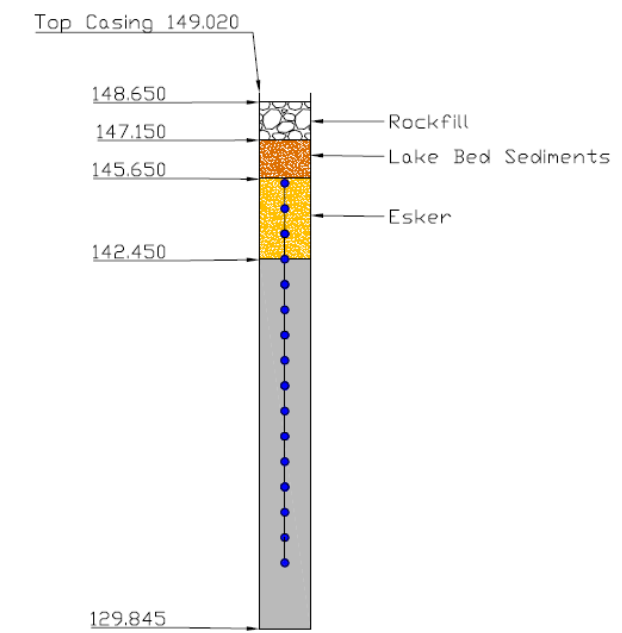


- 2021-08-22 12:00
- 2021-07-25 12:00
- 2021-06-27 12:00
- 2021-05-30 12:00
- 2021-05-02 12:00
- 2021-04-04 12:00
- 2021-03-07 12:00
- 2021-02-07 12:00
- 2021-01-10 12:00
- 2020-12-13 12:00
- 2020-11-15 12:00
- 2020-10-18 12:00
- 2020-09-20 12:00
- 2020-08-23 12:00
- 2020-07-26 12:00
- 2020-06-28 12:00
- 2020-06-09 18:00
- Limit Profile

Temperature(°C): PSW-DH2



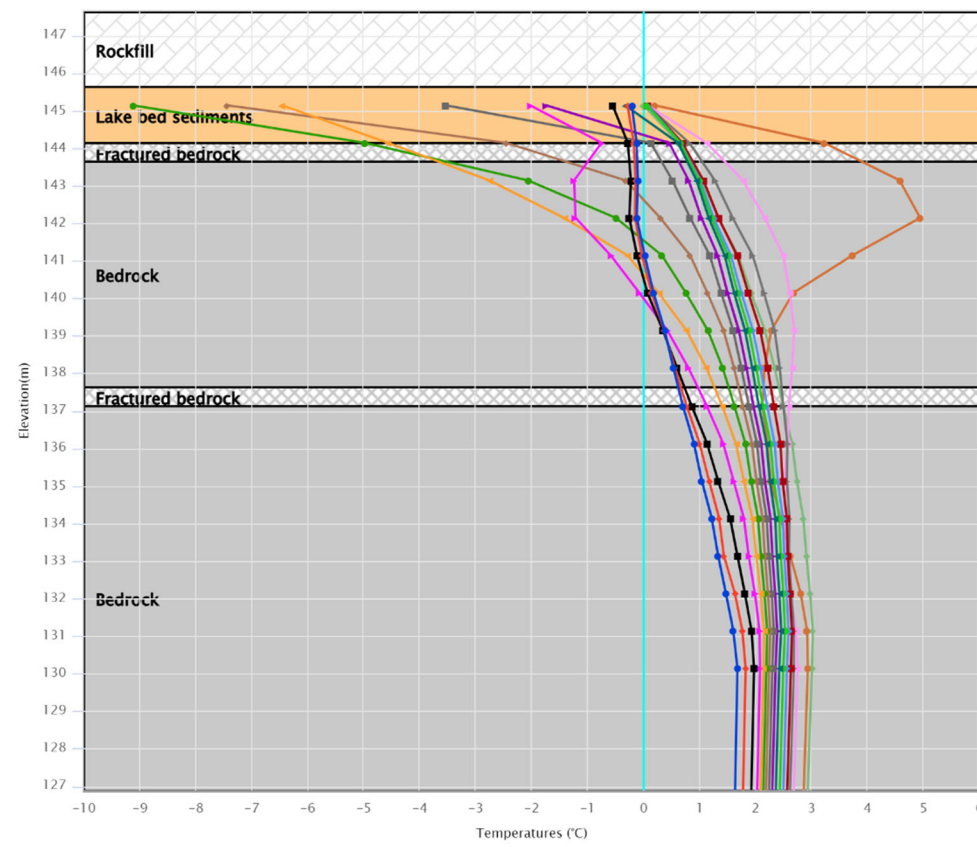
DH-2



PSW – DH 3 TH

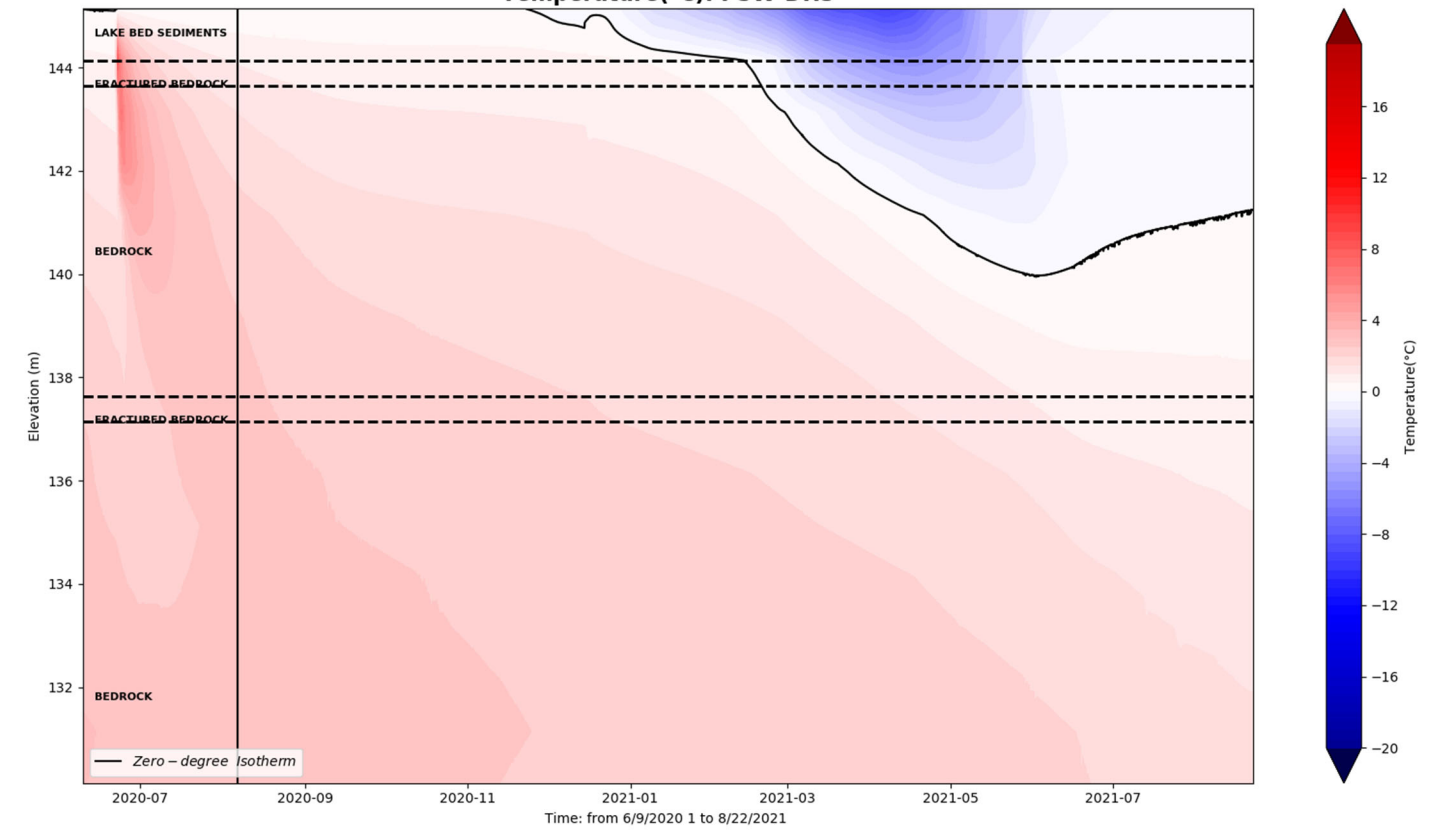


AMQ – PSW – DH03\_TH

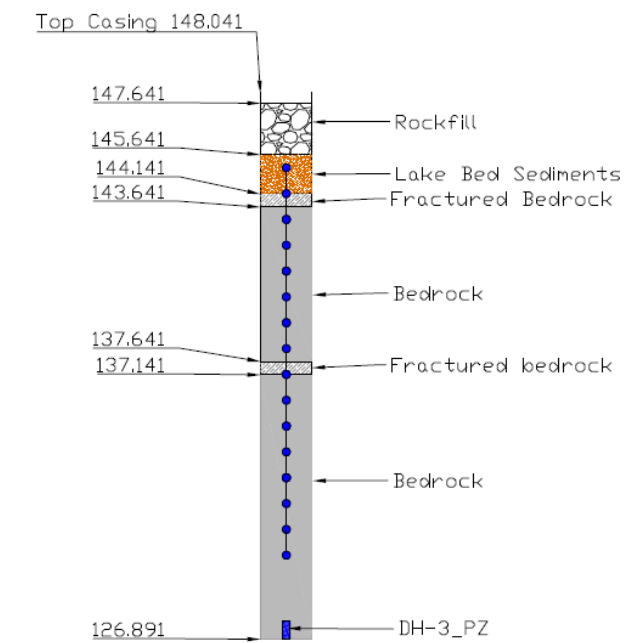


- 2021-08-22 12:00
- 2021-07-25 12:00
- 2021-06-27 12:00
- 2021-05-30 12:00
- 2021-05-02 12:00
- 2021-04-04 12:00
- 2021-03-07 12:00
- 2021-02-07 12:00
- 2021-01-10 12:00
- 2020-12-13 12:00
- 2020-11-15 12:00
- 2020-10-18 12:00
- 2020-09-20 12:00
- 2020-08-23 12:00
- 2020-07-26 12:00
- 2020-06-28 12:00
- 2020-06-09 18:00
- Limit Profile

Temperature(°C): PSW-DH3



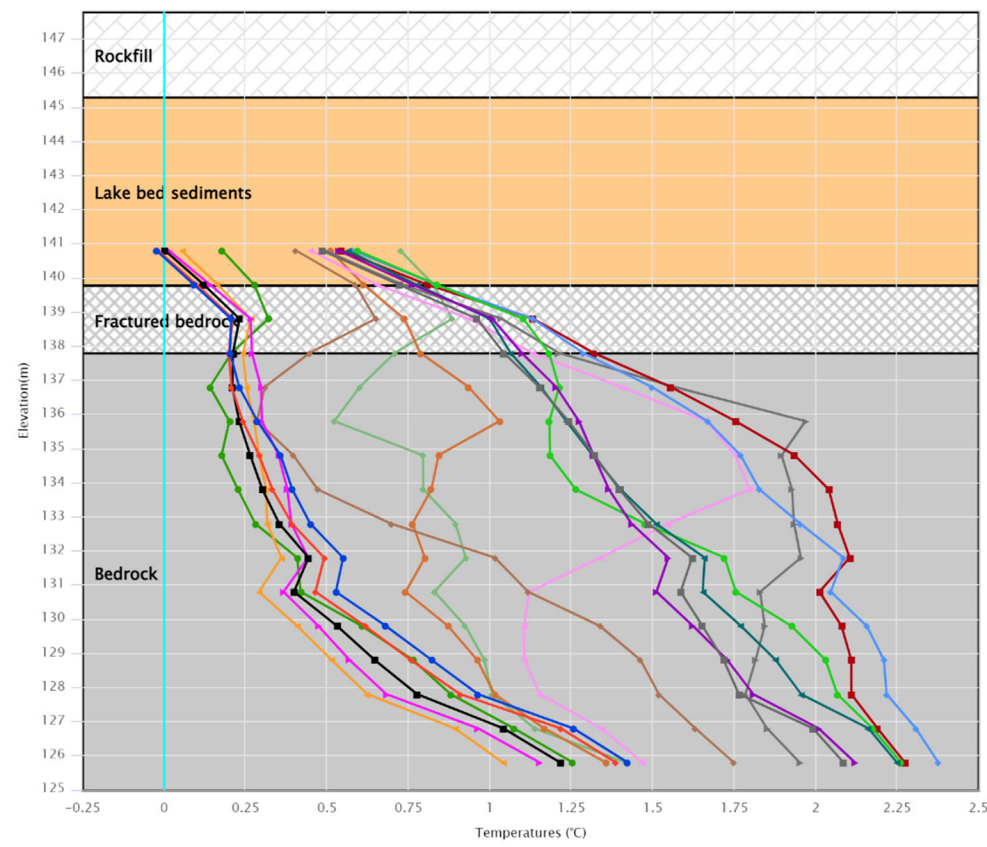
DH-3



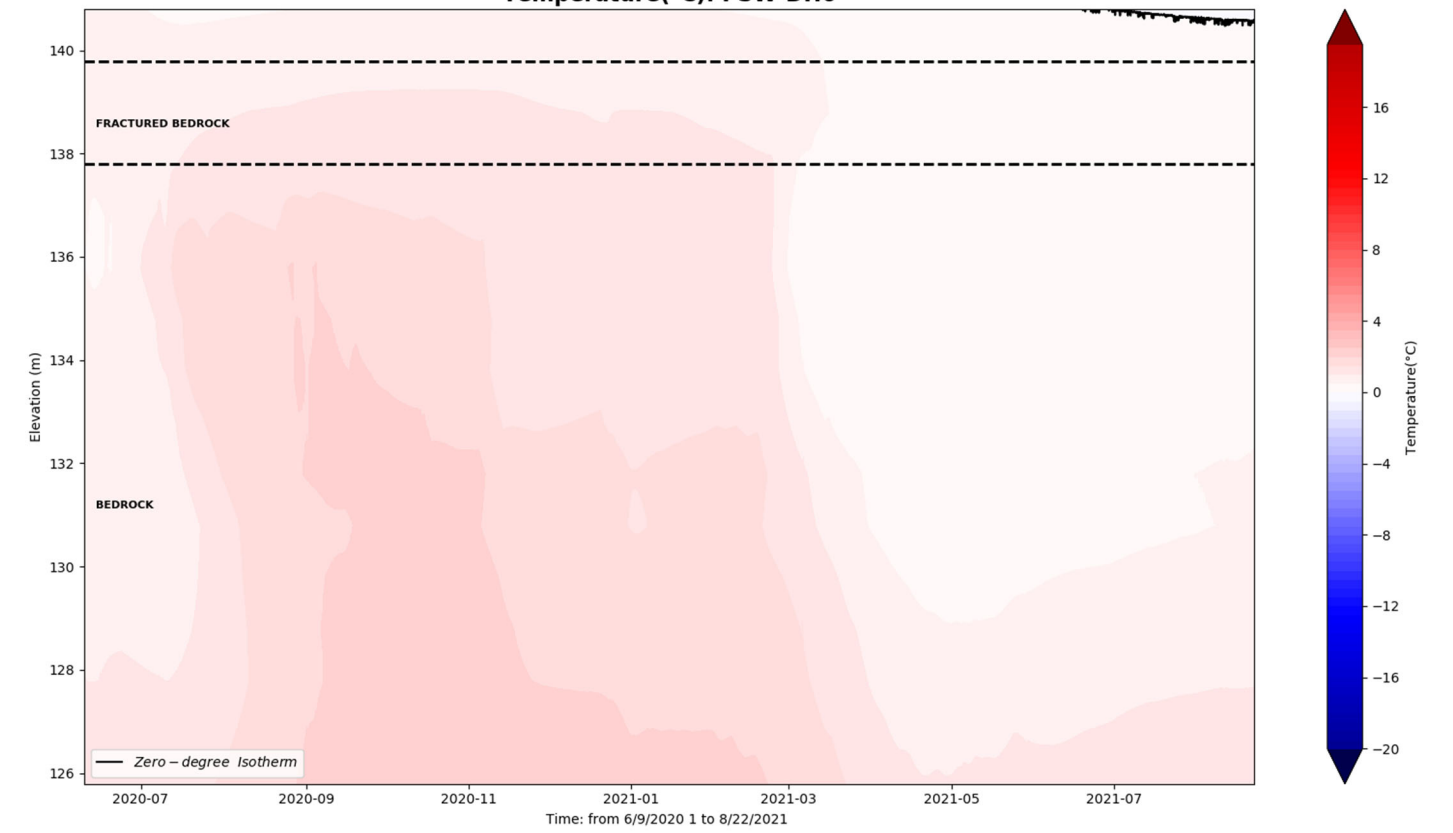
PSW – DH 6 TH



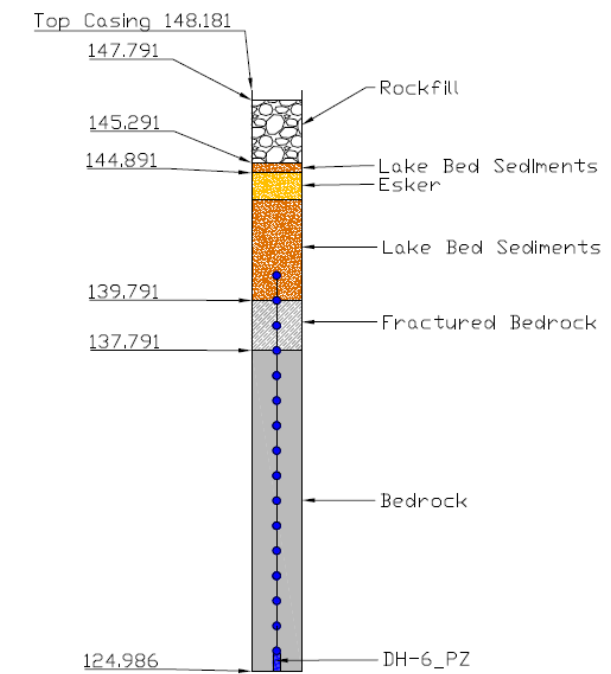
AMQ – PSW – DH06\_TH



Temperature(°C): PSW-DH6



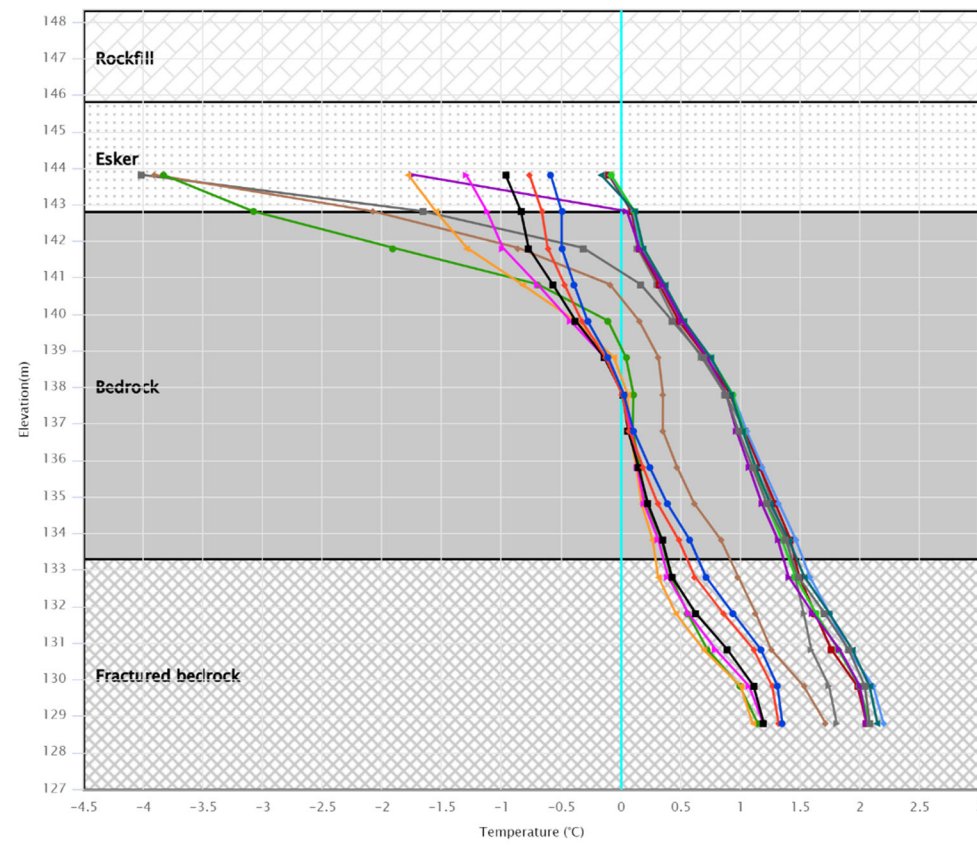
DH-6



PSW – DH 7 TH

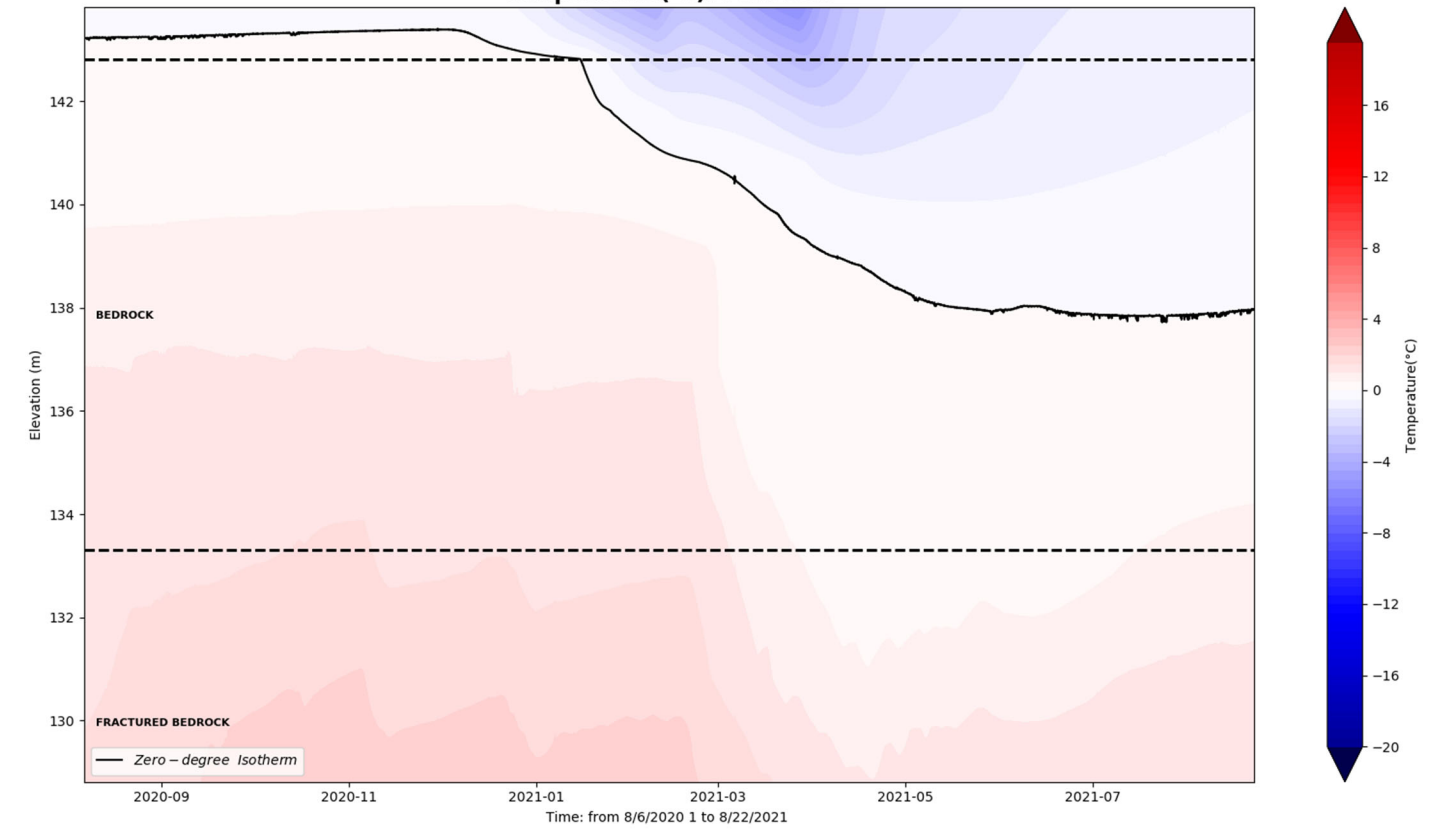


AMQ – PSW – DH07\_TH

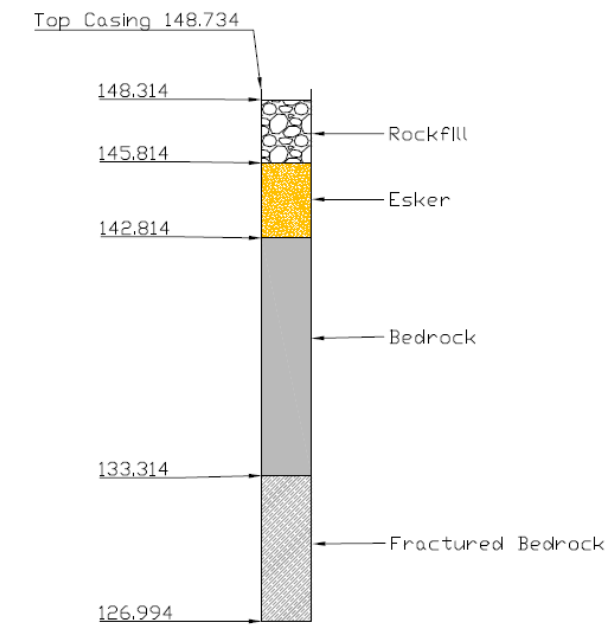


- 2021-08-22 15:00
- 2021-07-25 15:00
- 2021-06-27 15:00
- 2021-05-30 15:00
- 2021-05-02 15:00
- 2021-04-04 15:00
- 2021-03-07 15:00
- 2021-02-07 15:00
- 2021-01-10 15:00
- 2020-12-13 15:00
- 2020-11-15 15:00
- 2020-10-18 15:00
- 2020-09-20 15:00
- 2020-08-23 15:00
- 2020-07-26 15:00
- 2020-07-01 15:00
- 2020-06-09 18:00
- Limit Profile

Temperature(°C): PSW-DH7



DH-7

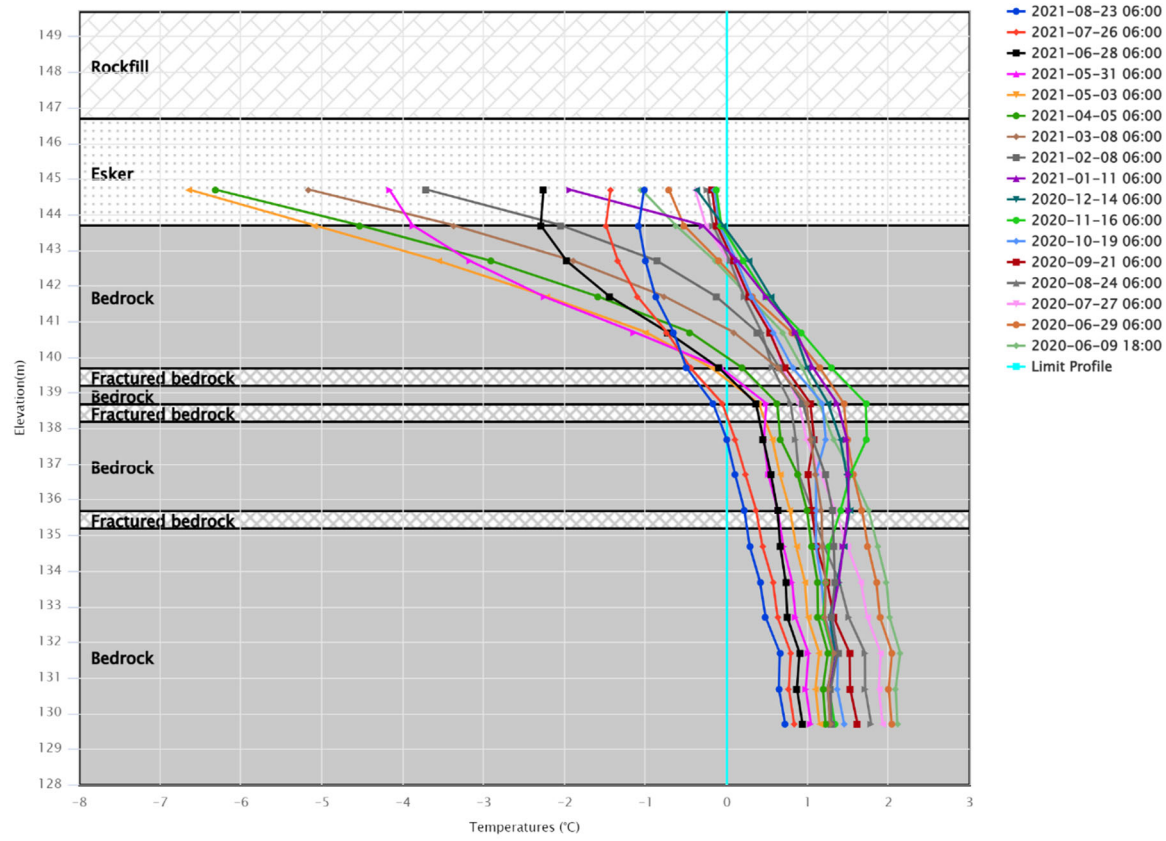
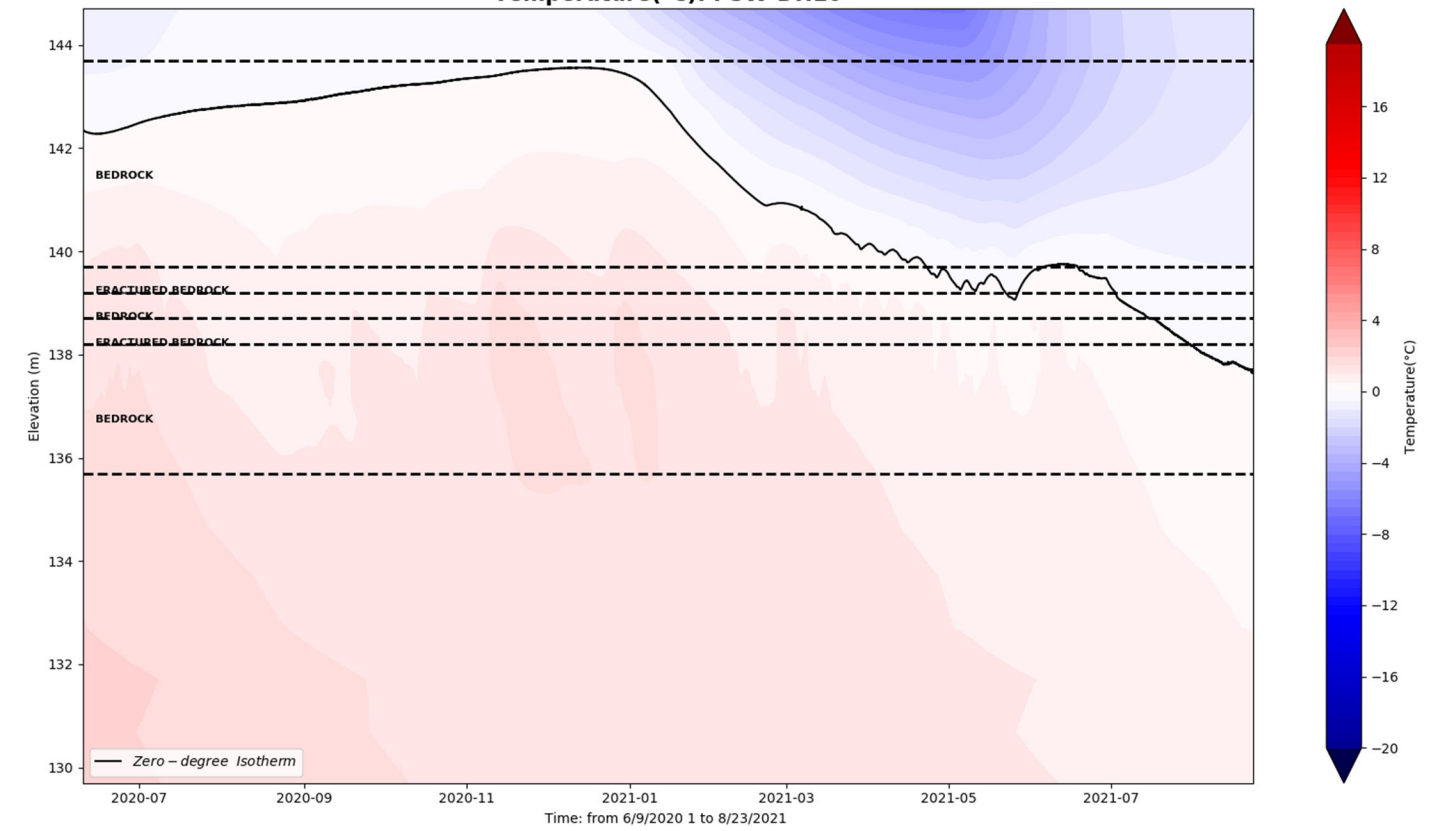


PSW – DH 10 TH

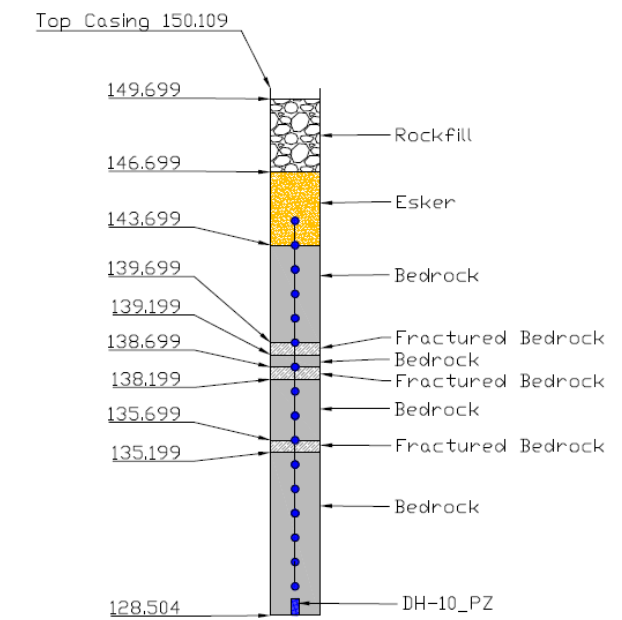


AMQ – PSW – DH10\_TH

Temperature(°C): PSW-DH10



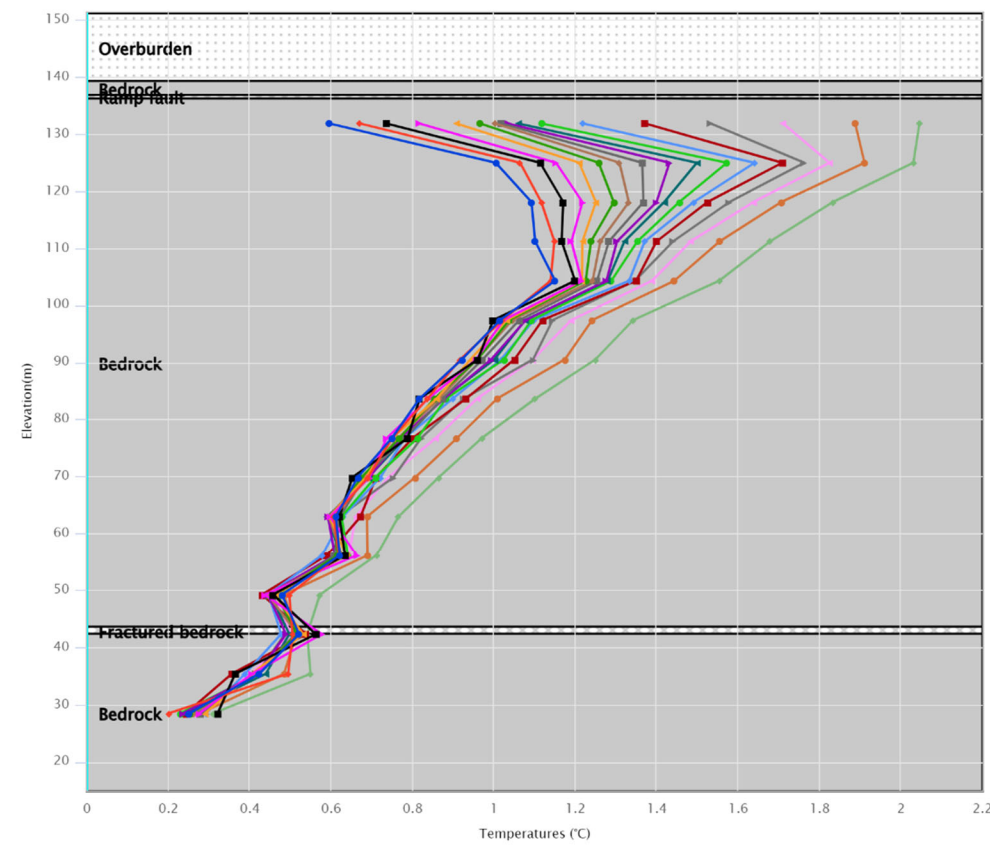
DH-10



PSW – DH 11 TH

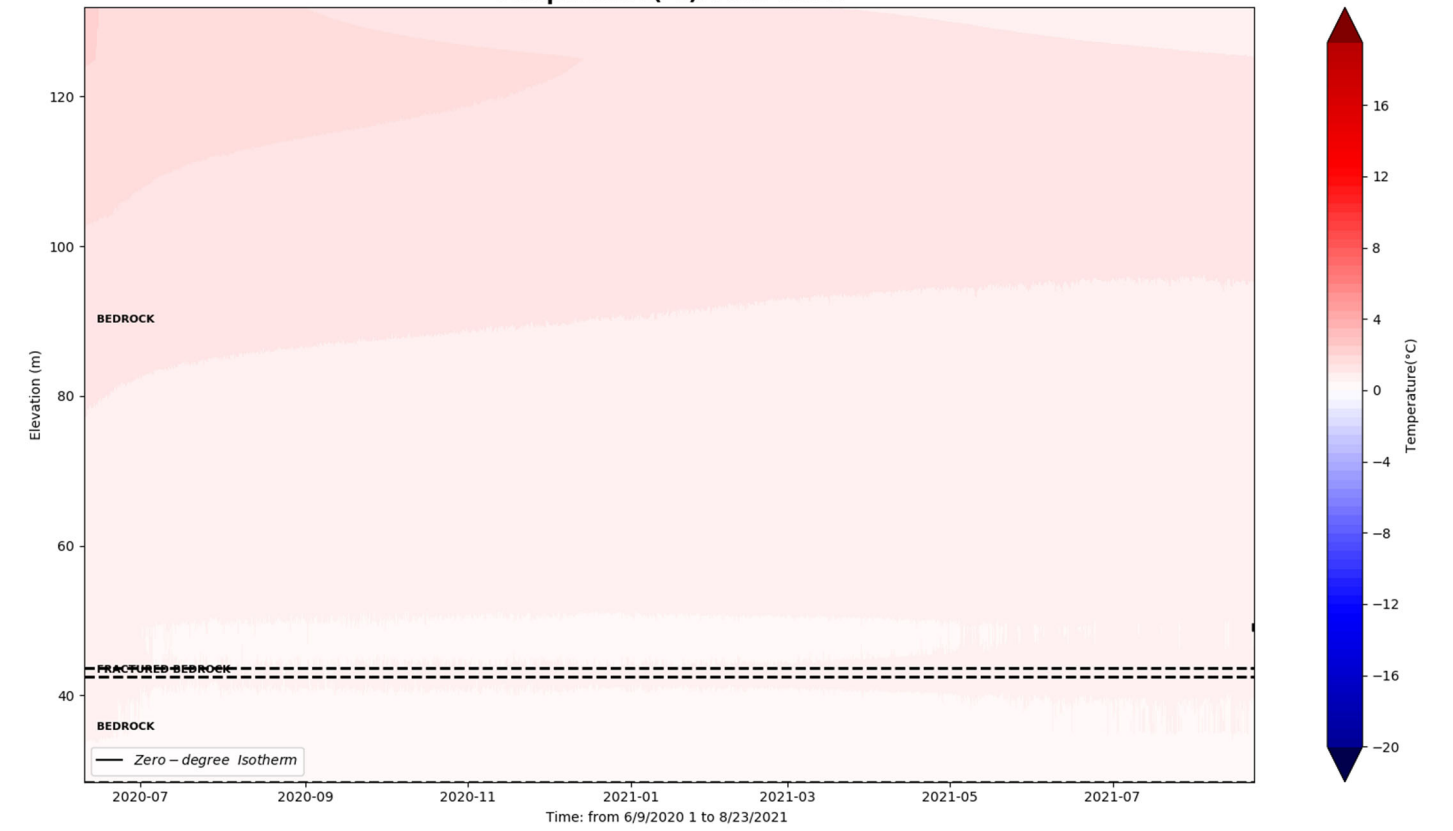


AMQ – PSW – DH11\_TH

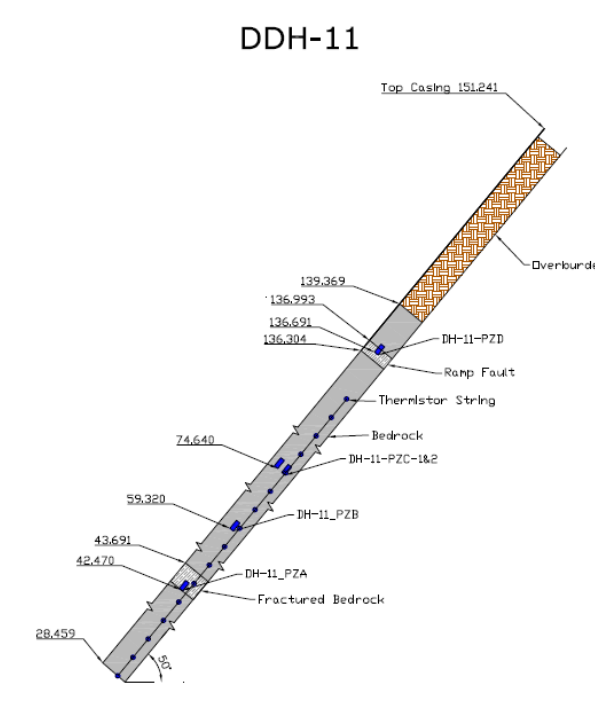


- 2021-08-23 06:00
- 2021-07-26 06:00
- 2021-06-28 06:00
- 2021-05-31 06:00
- 2021-05-03 06:00
- 2021-04-05 06:00
- 2021-03-08 06:00
- 2021-02-08 06:00
- 2021-01-11 06:00
- 2020-12-14 06:00
- 2020-11-16 06:00
- 2020-10-19 06:00
- 2020-09-21 06:00
- 2020-08-24 06:00
- 2020-07-27 06:00
- 2020-06-29 06:00
- 2020-06-09 18:00
- Limit Profile

Temperature(°C): PSW-DH11



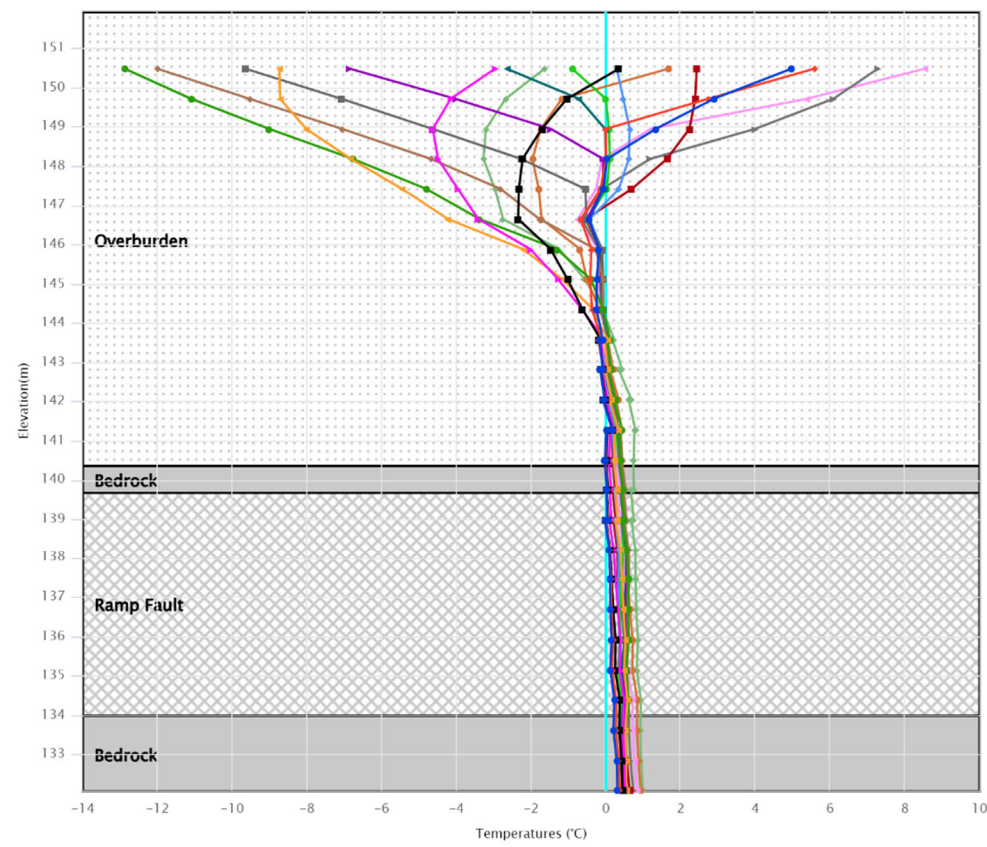
DDH-11



PSW – DH 12 TH

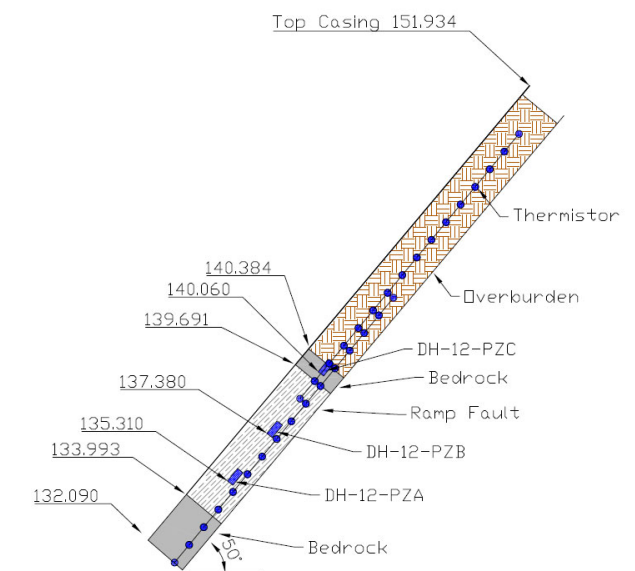
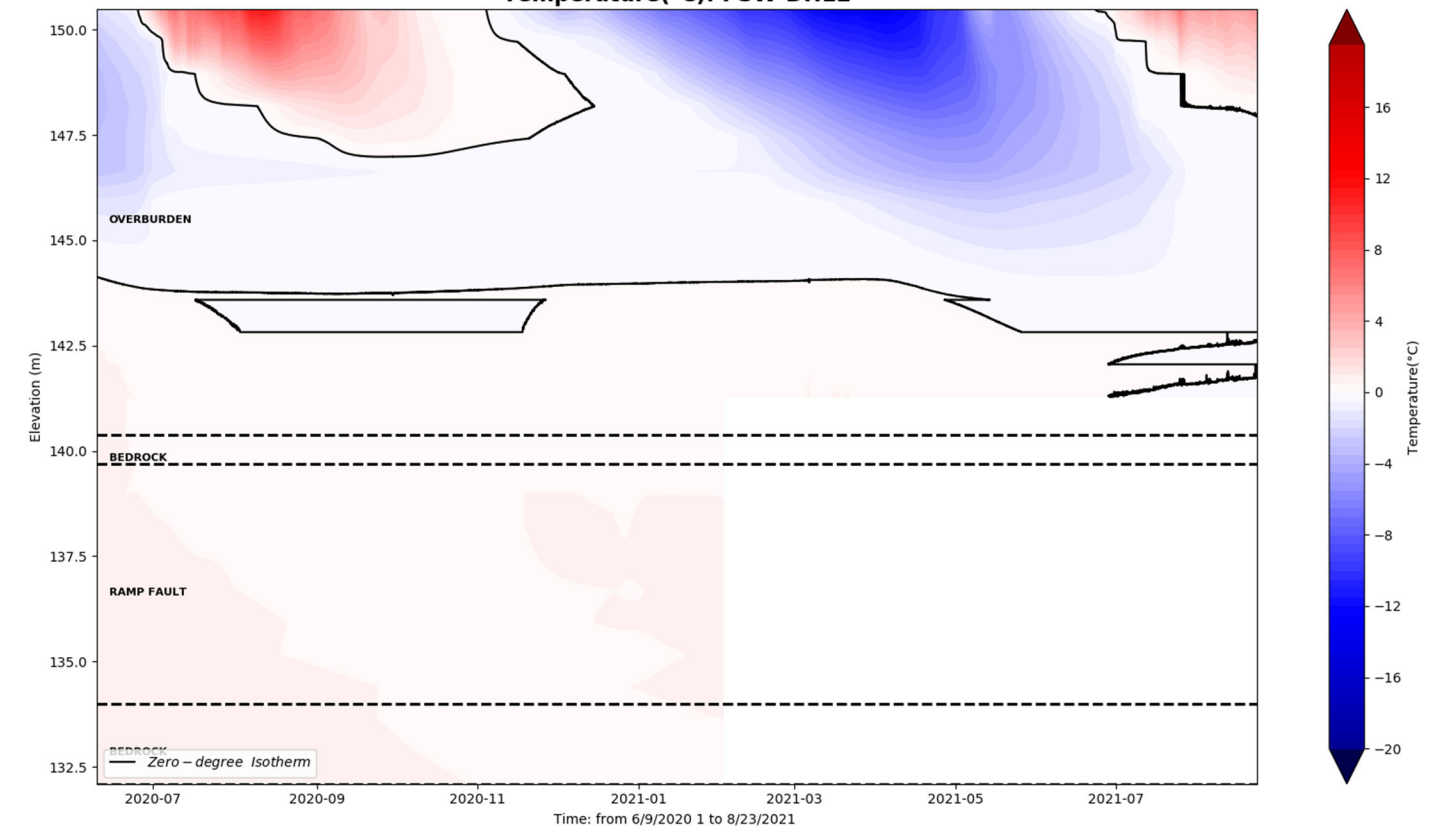


AMQ – PSW – DH12\_TH



- 2021-08-23 06:00
- 2021-07-26 06:00
- 2021-06-28 06:00
- 2021-05-31 06:00
- 2021-05-03 06:00
- 2021-04-05 06:00
- 2021-03-08 06:00
- 2021-02-08 06:00
- 2021-01-11 06:00
- 2020-12-14 06:00
- 2020-11-16 06:00
- 2020-10-19 06:00
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- 2020-06-29 06:00
- 2020-06-09 18:00
- Limit Profile

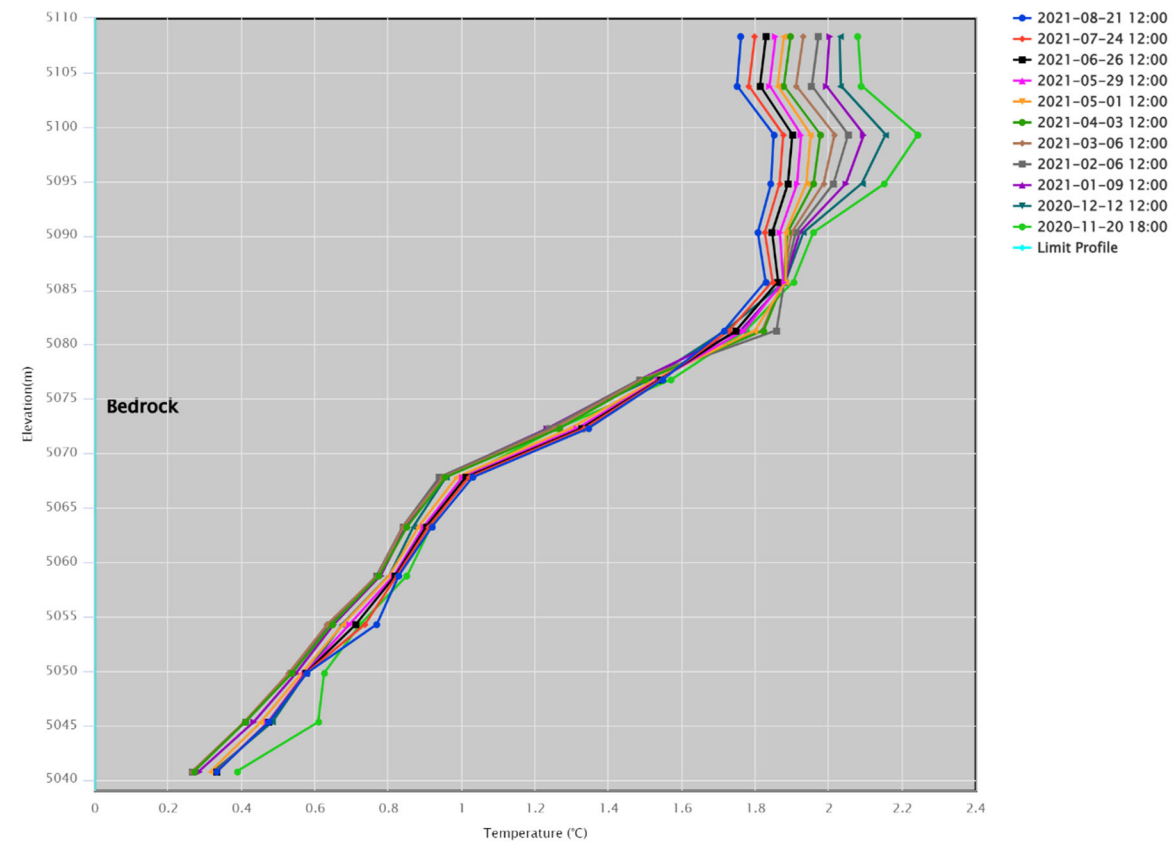
Temperature(°C): PSW-DH12



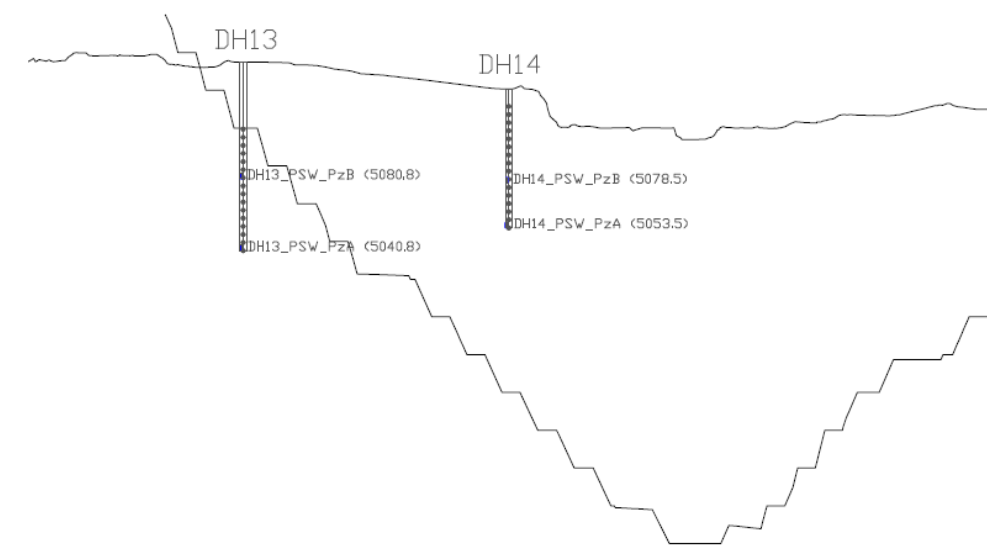
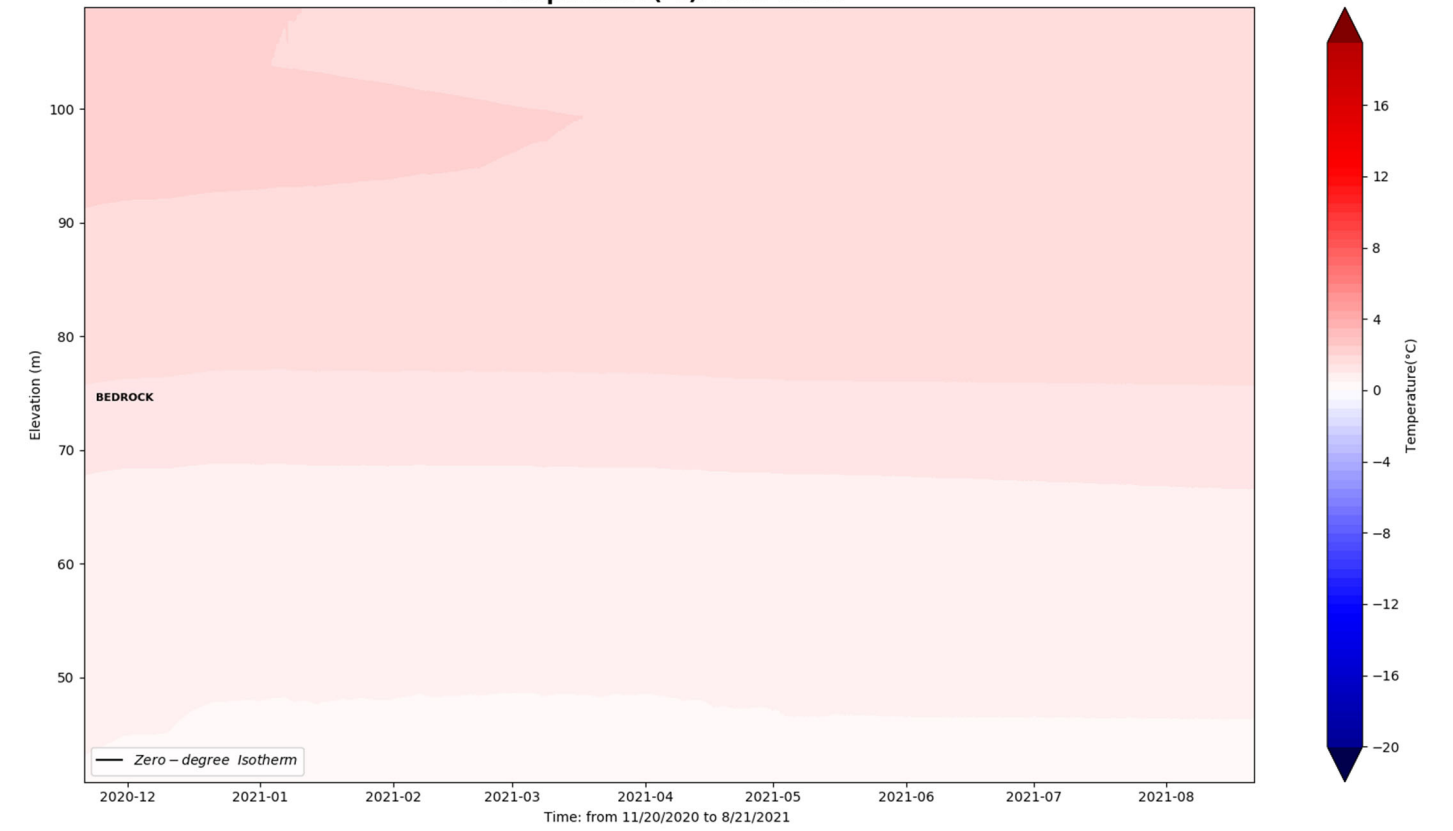
PSW – DH 13 TH



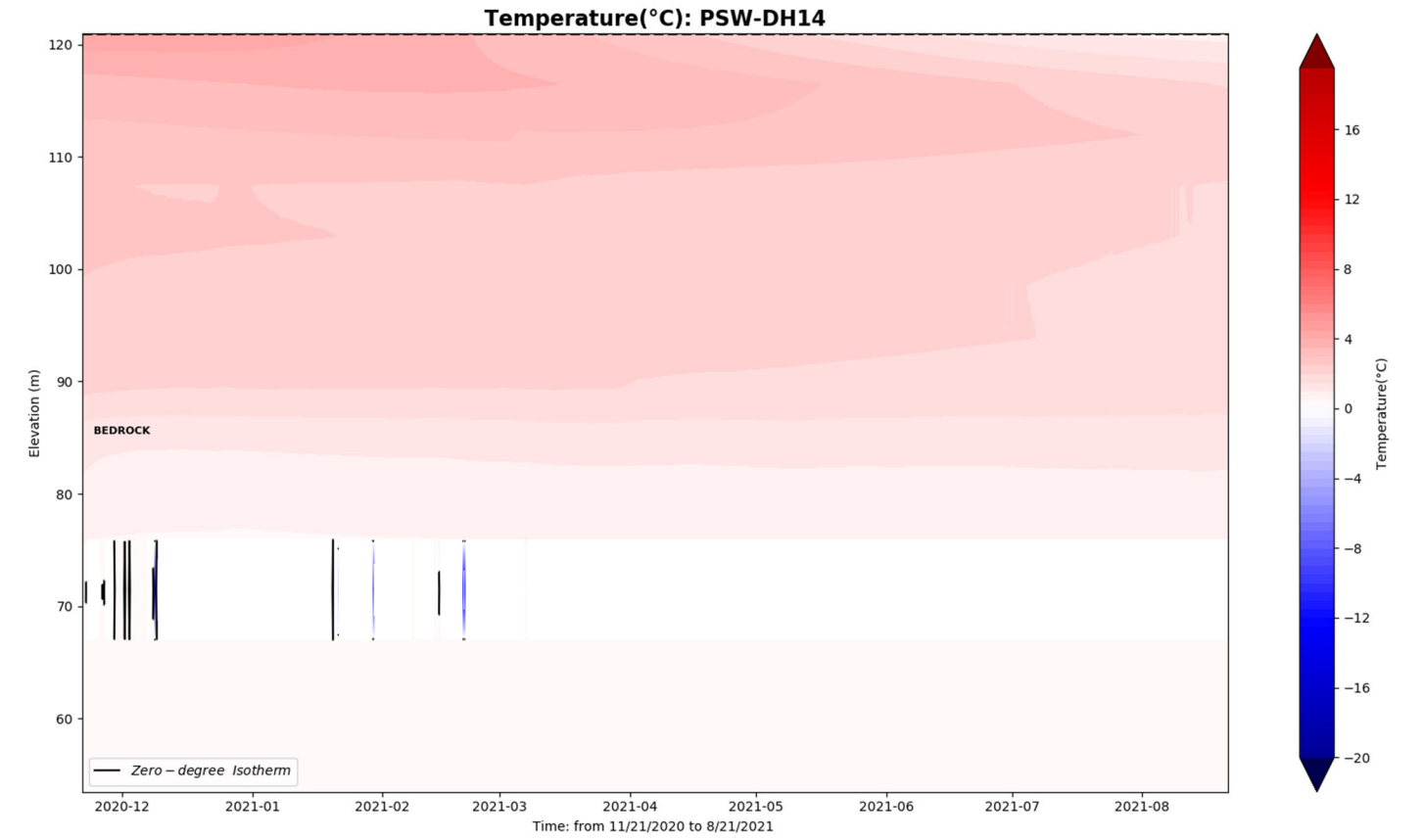
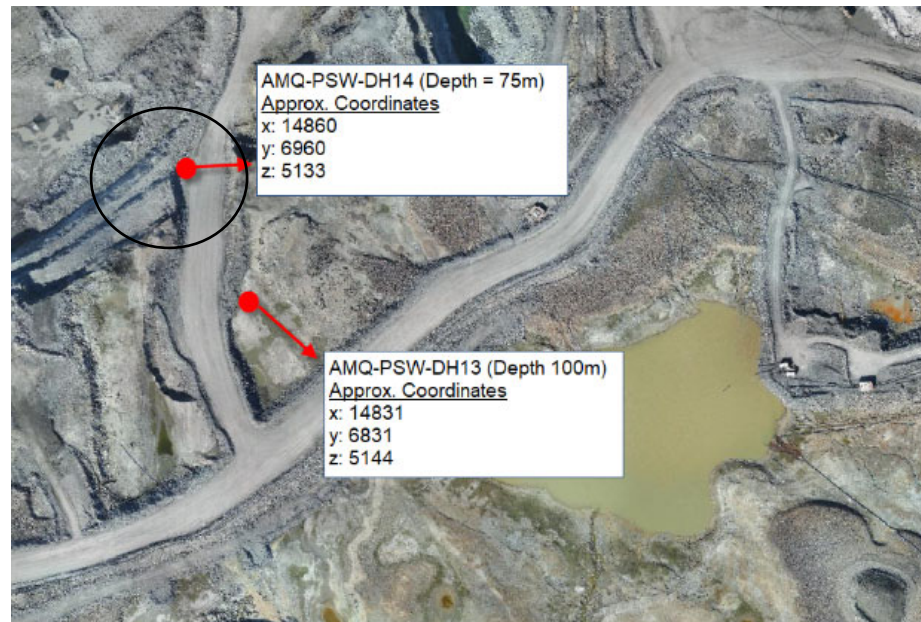
AMQ – PSW – DH13\_TH



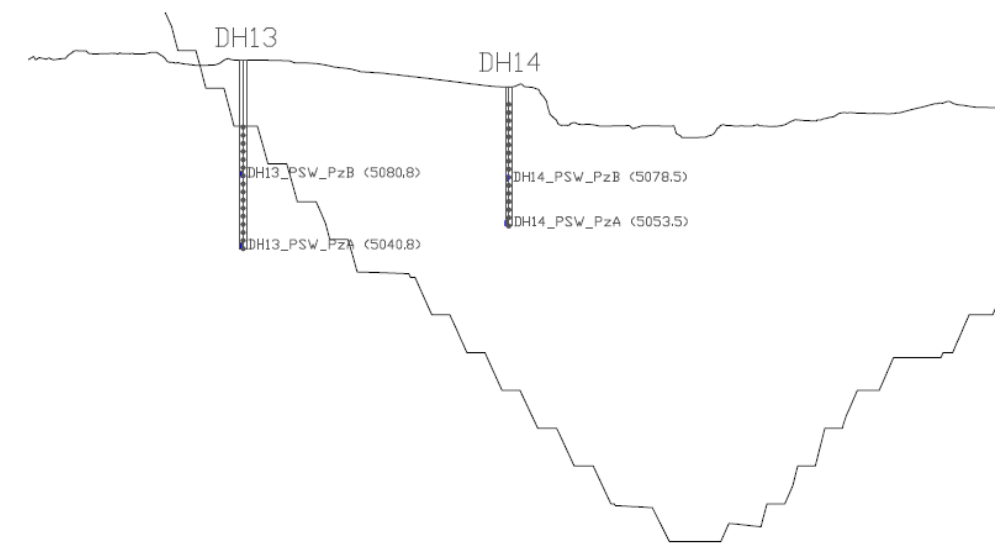
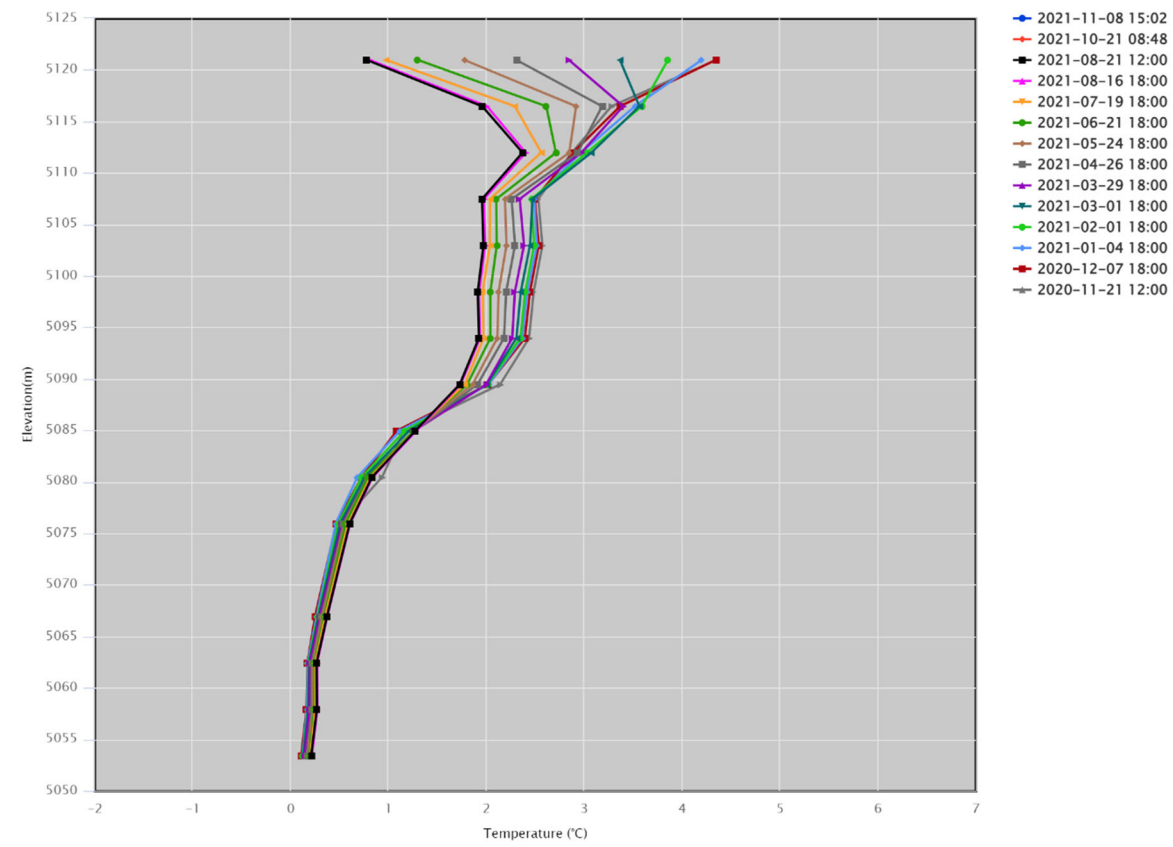
Temperature(°C): PSW-DH13



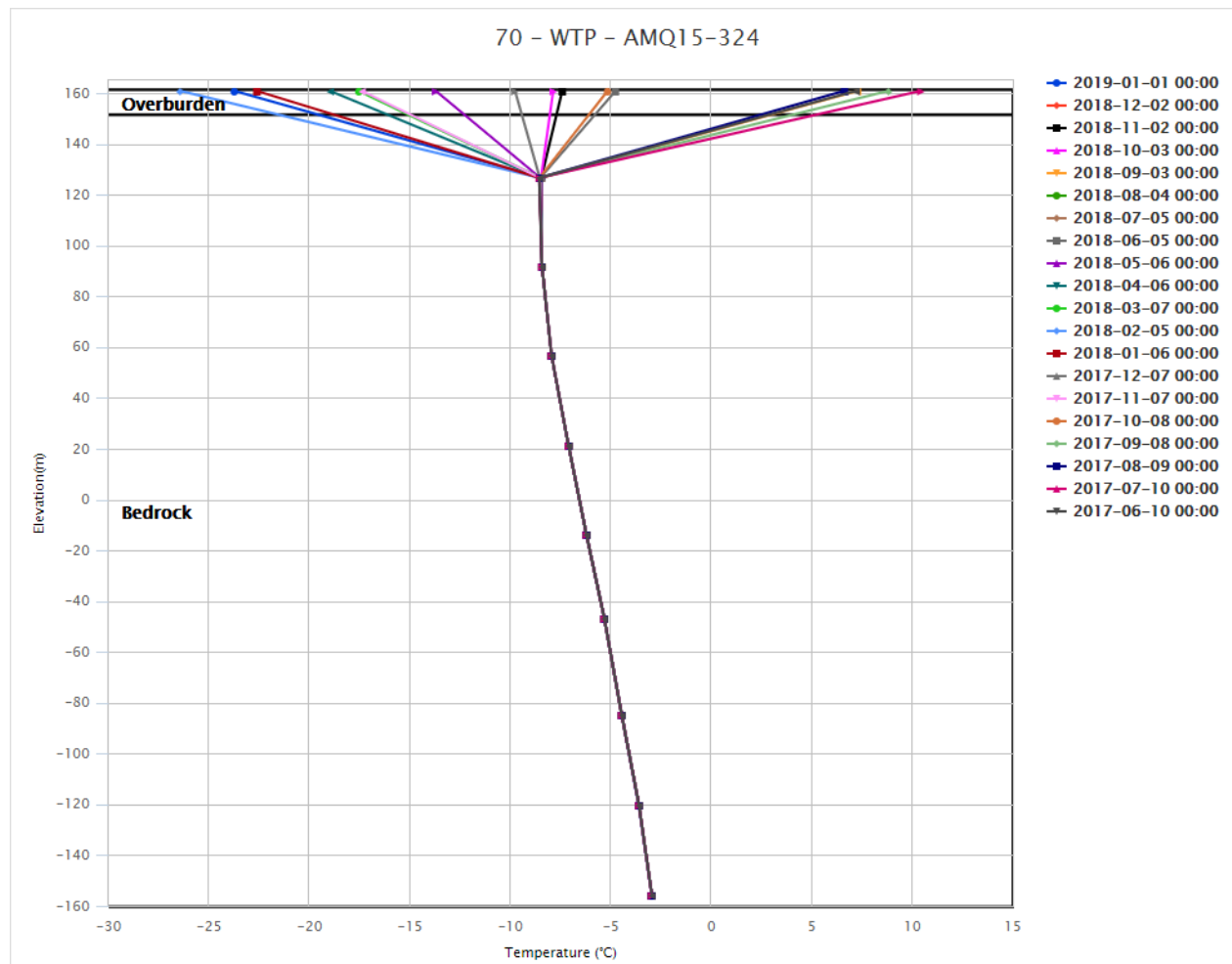
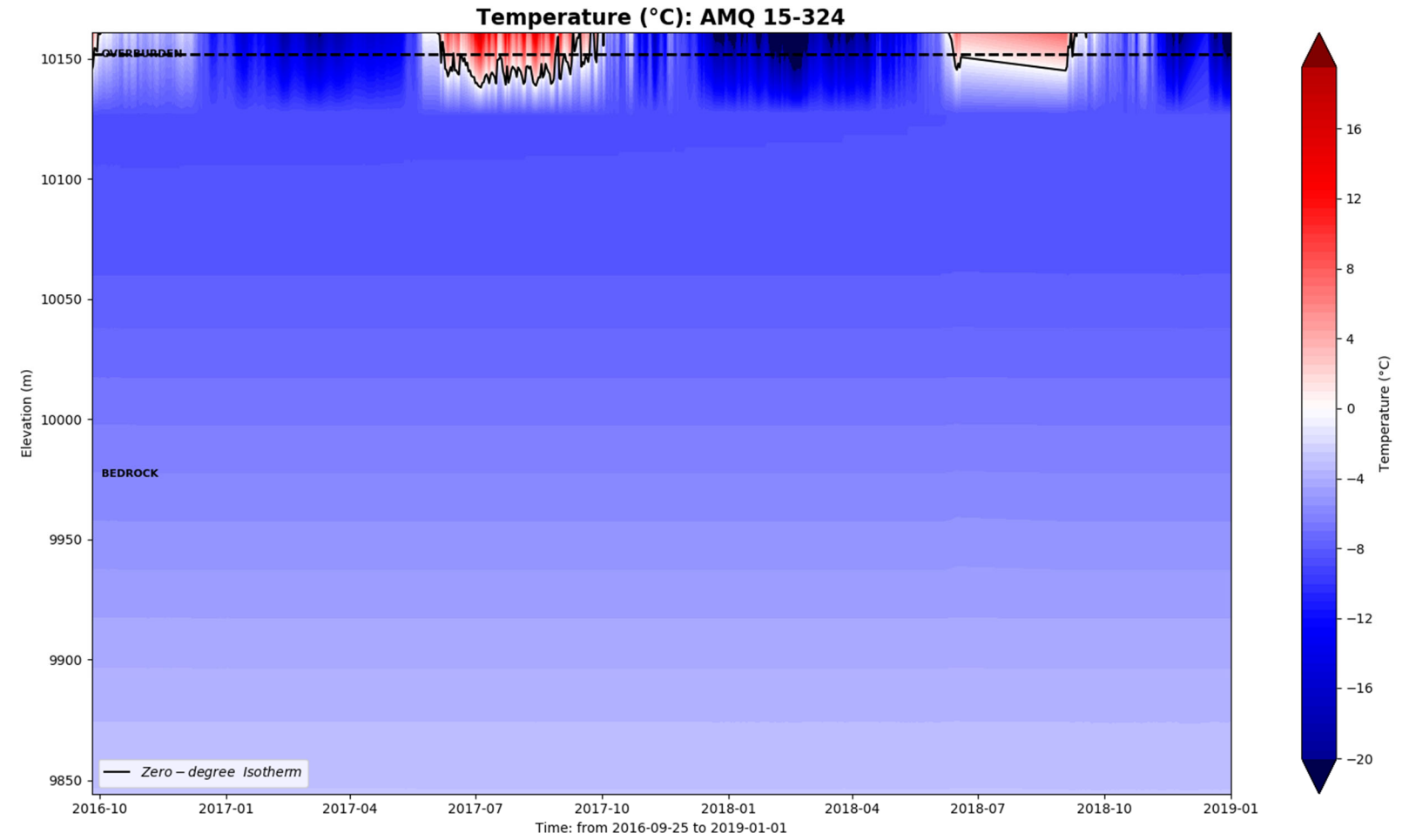
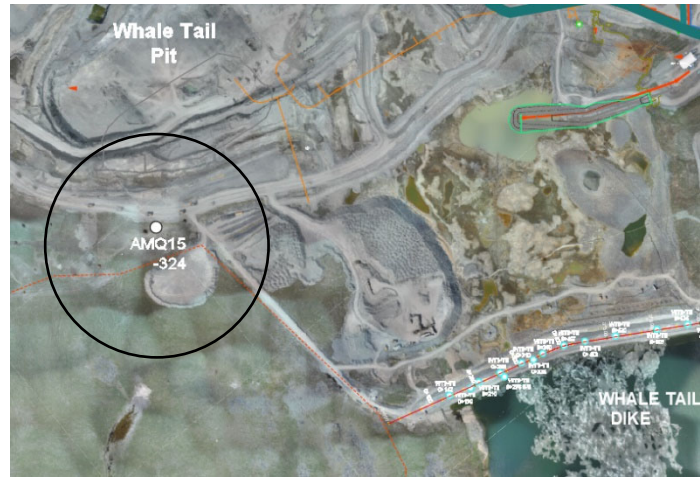
PSW – DH 14 TH



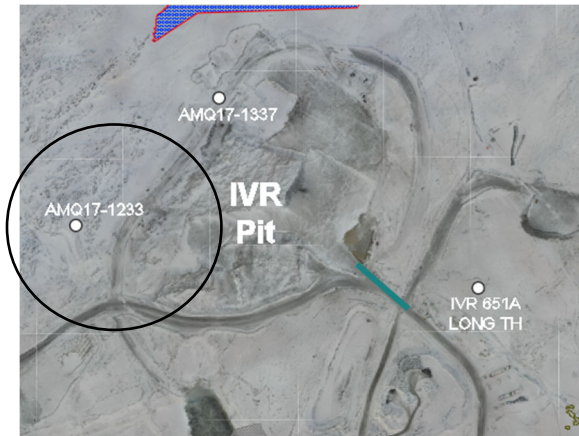
AMQ – PSW – DH14\_TH



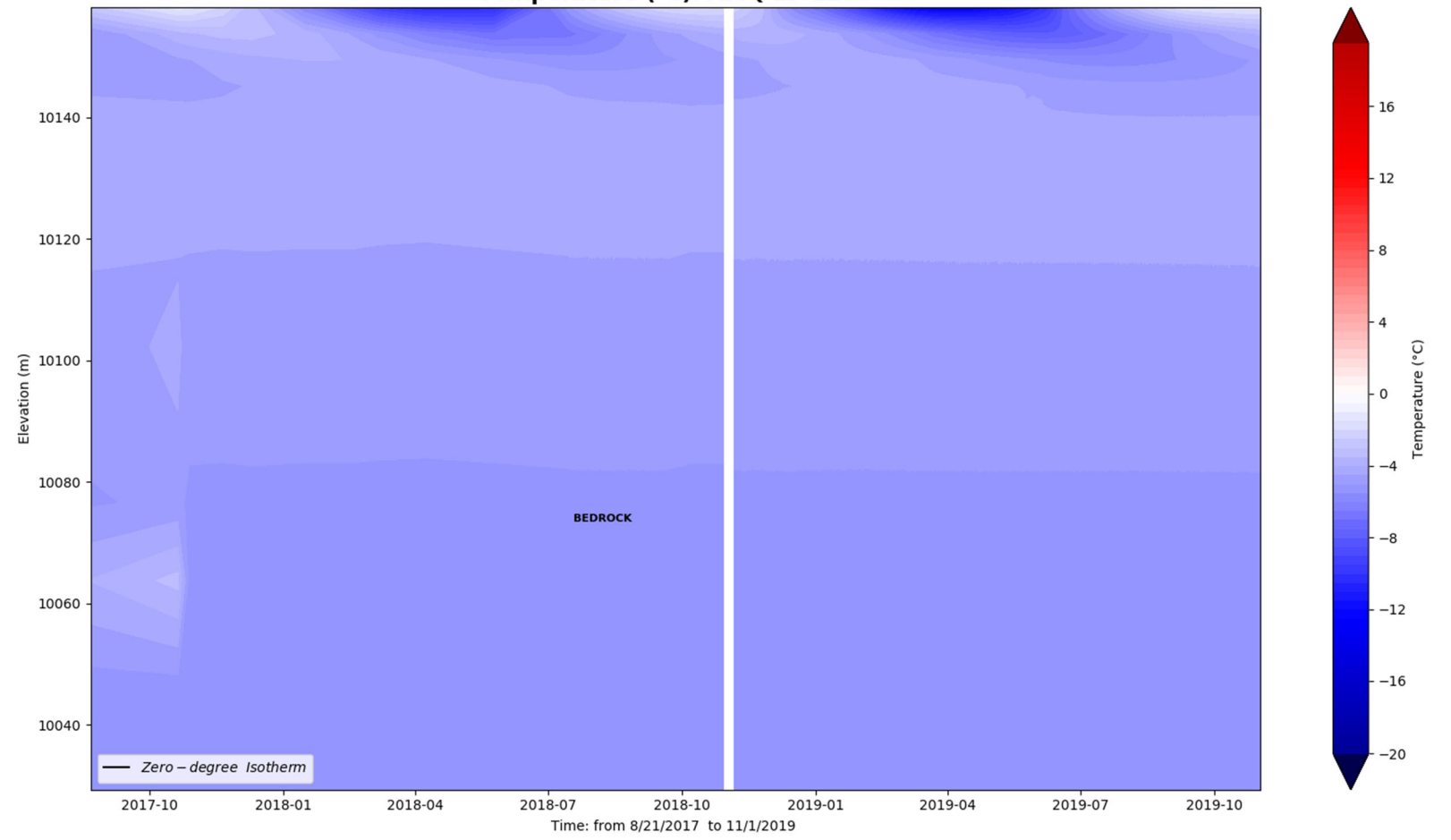
AMQ 15-324



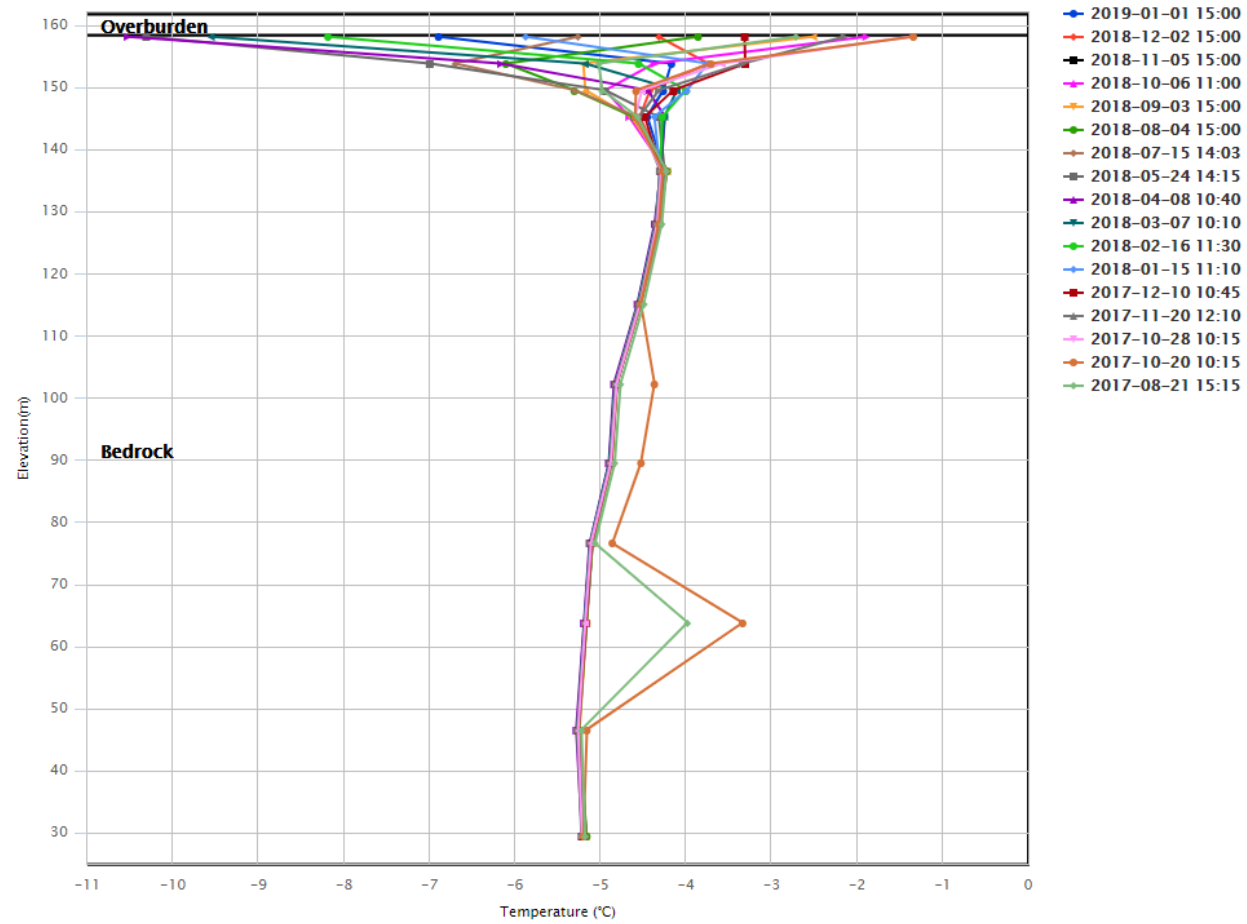
### AMQ 17-1233



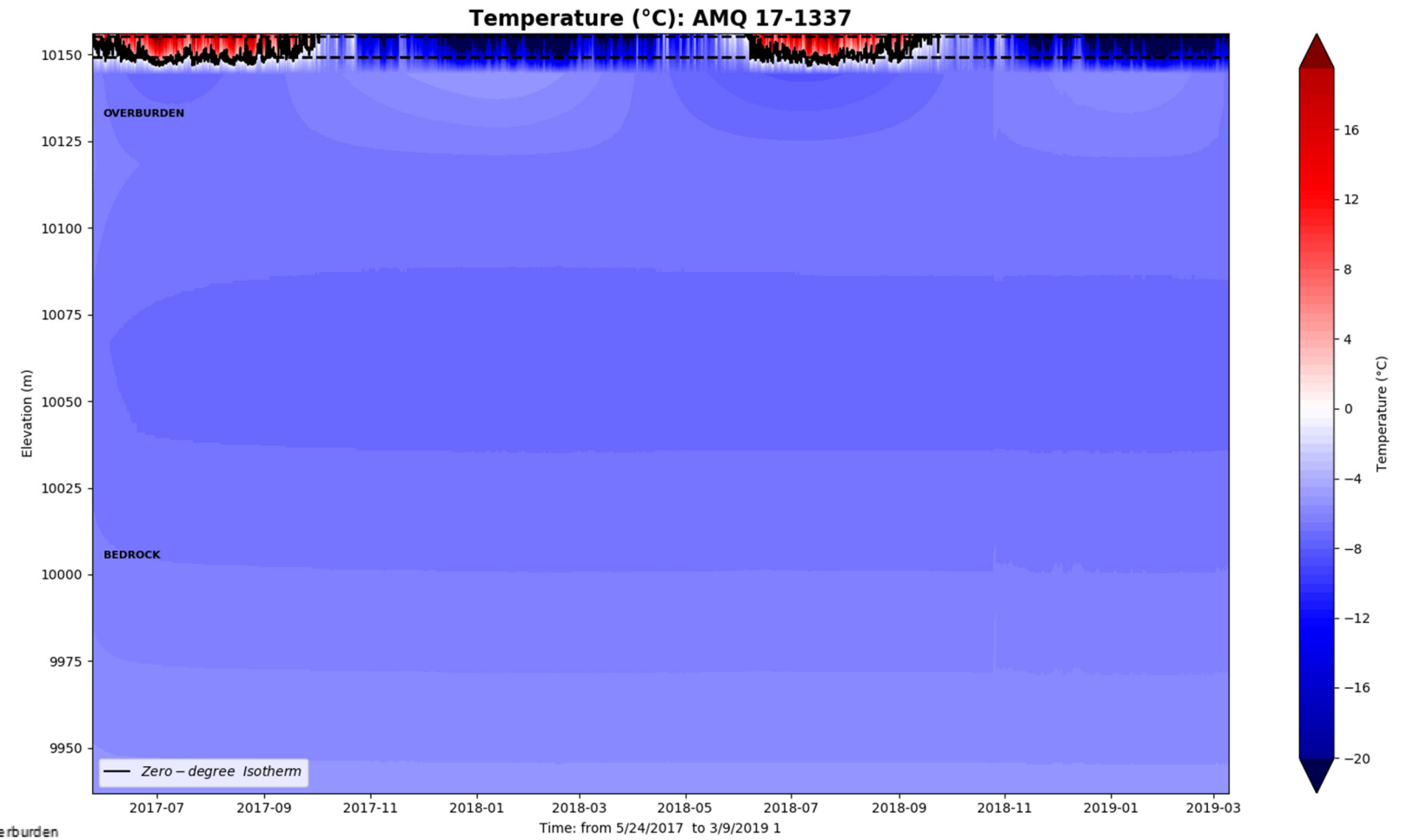
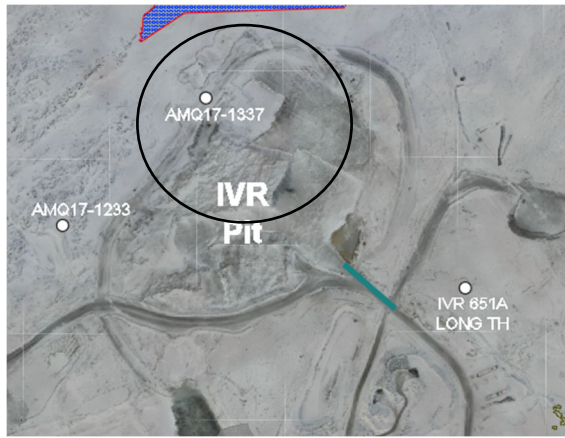
Temperature (°C): AMQ 17-1233



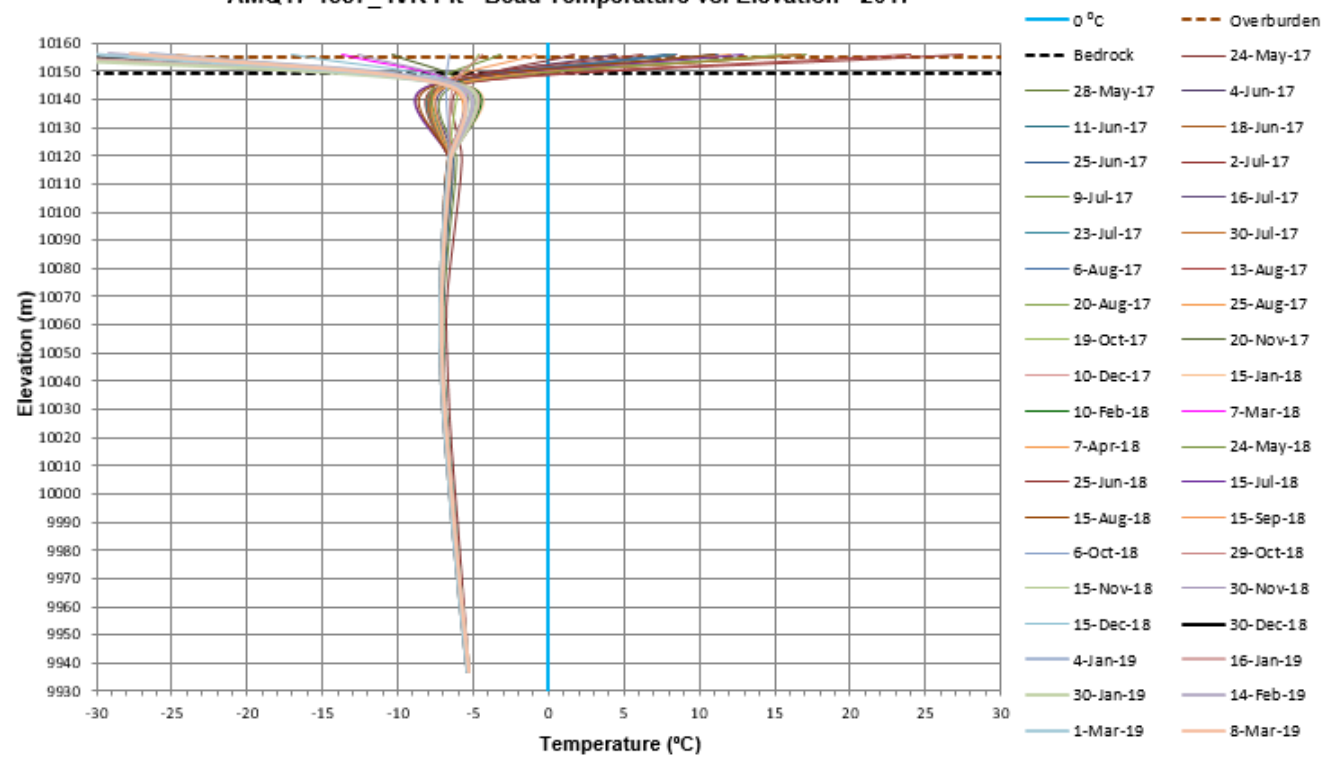
70 - IVR - AMQ17-1233



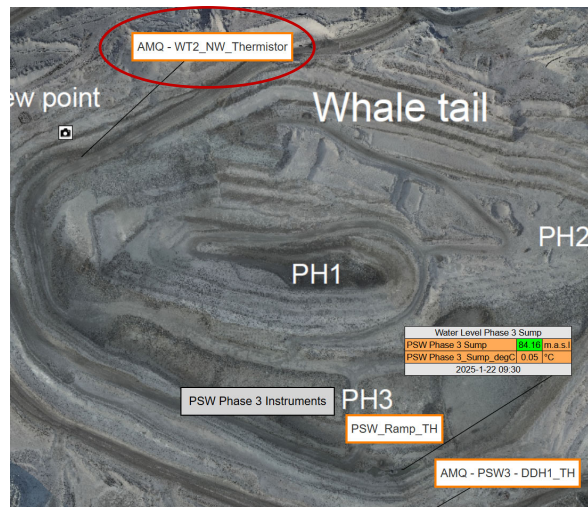
### AMQ 17-1337



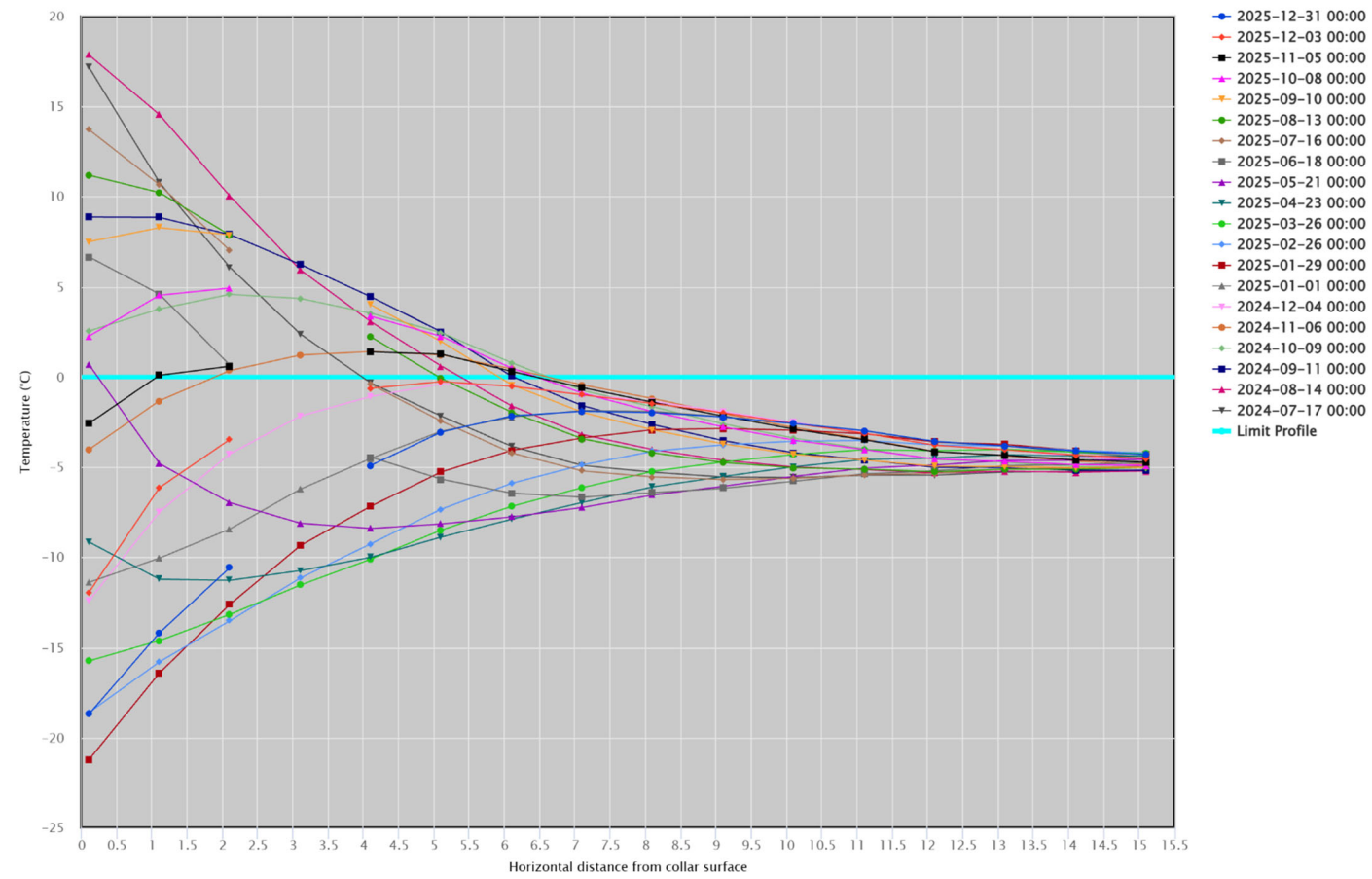
AMQ17-1337\_IVR Pit - Bead Temperature vs. Elevation - 2017



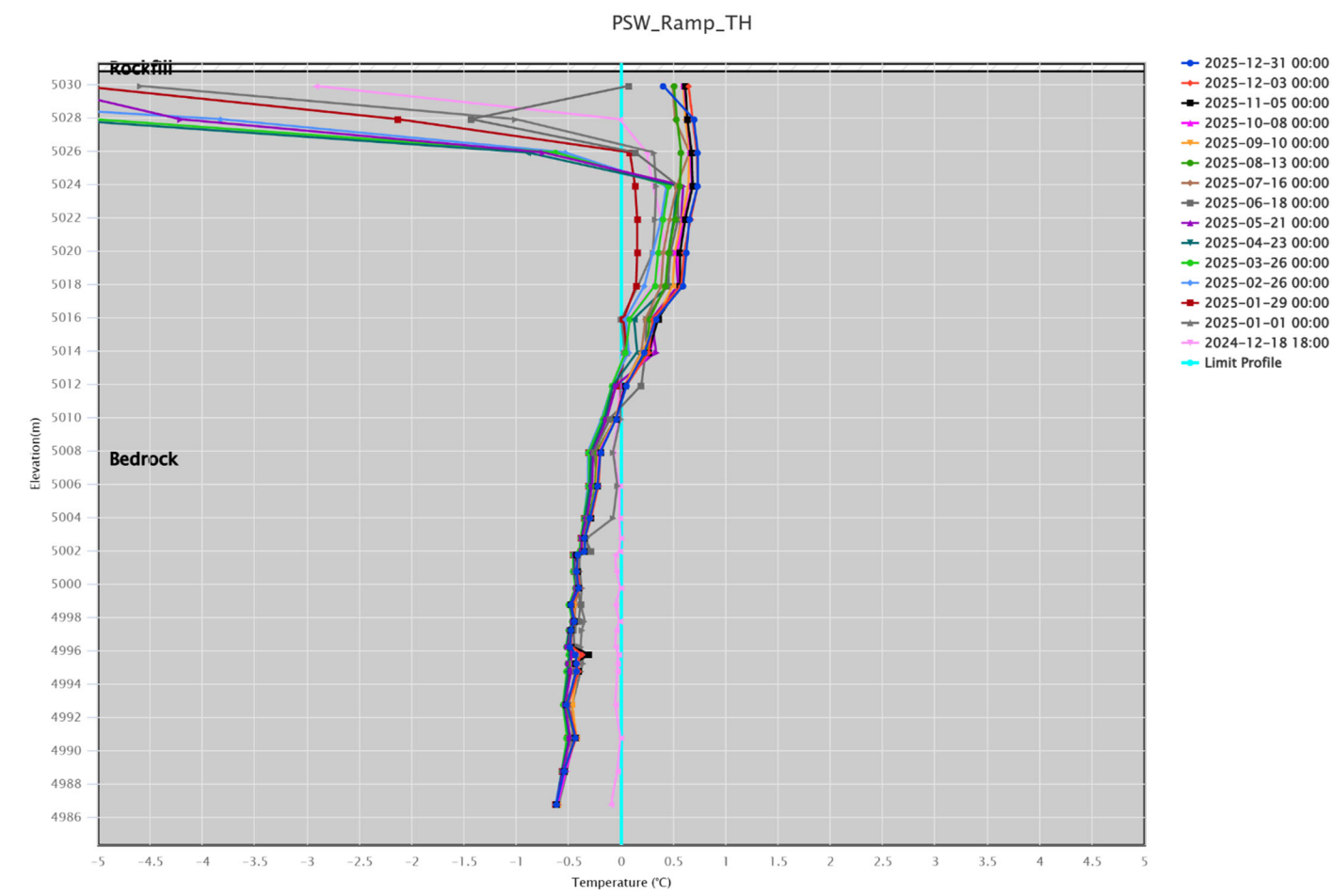
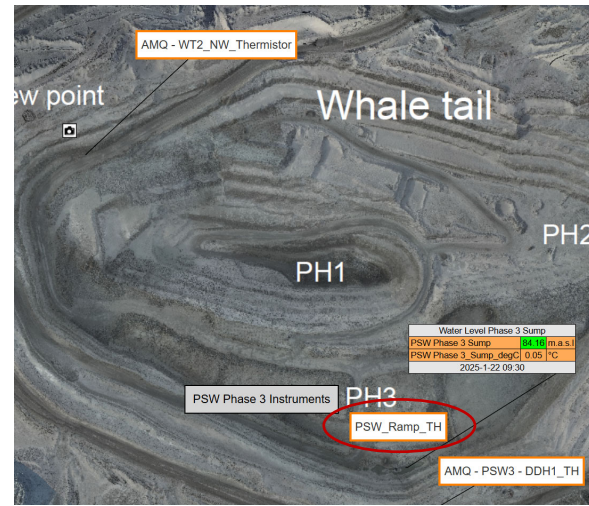
### AMQ – WT2\_NW\_TH



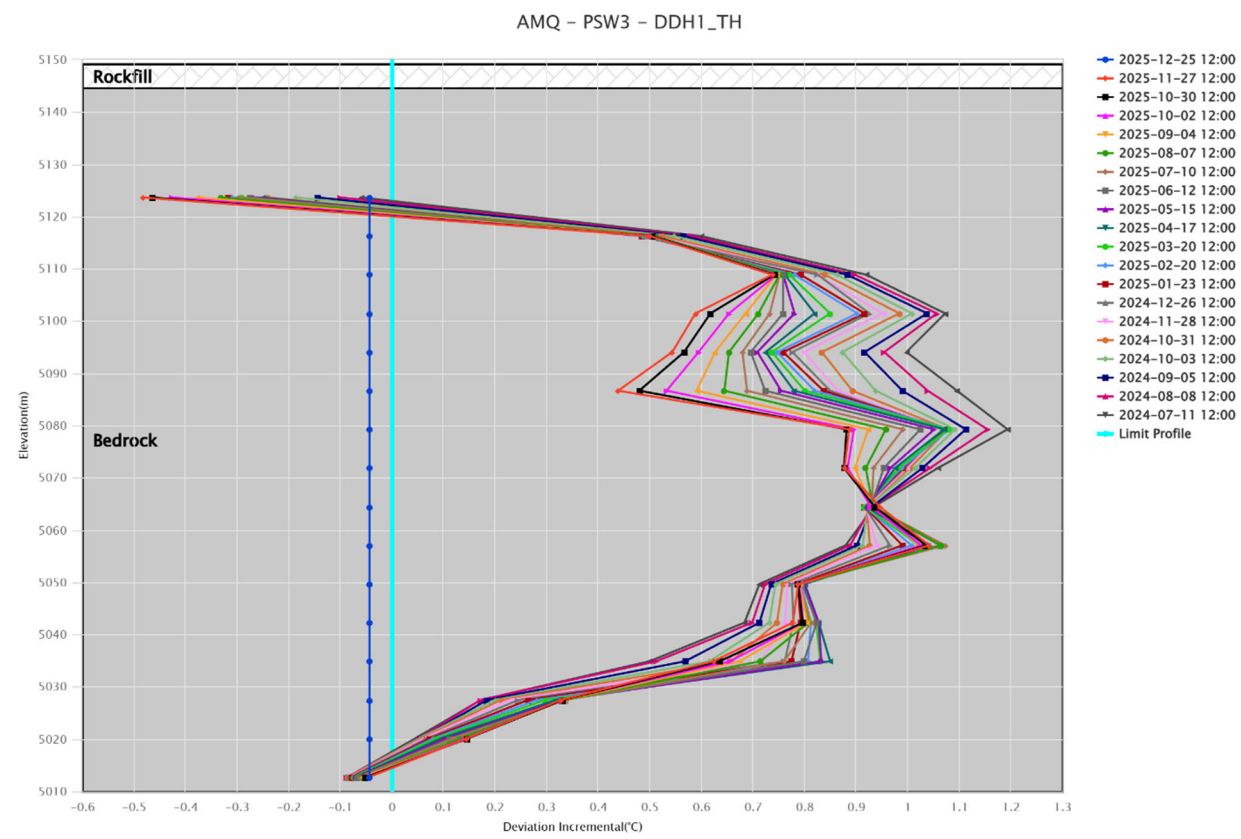
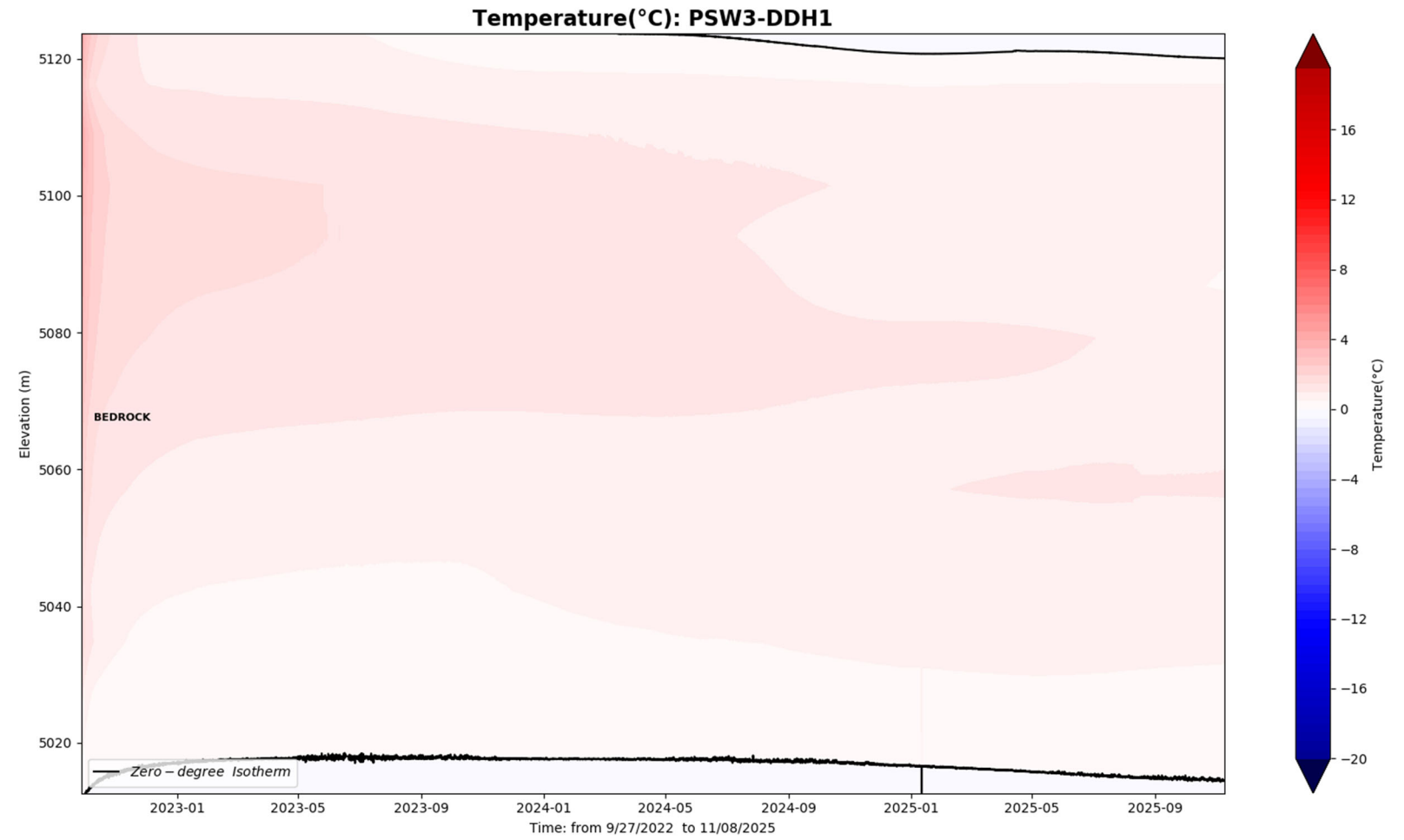
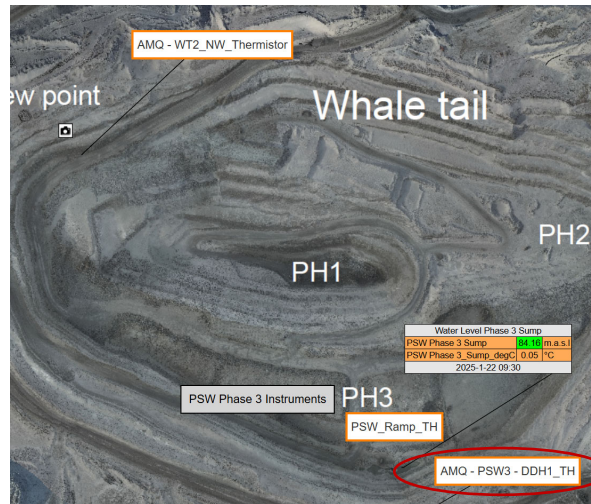
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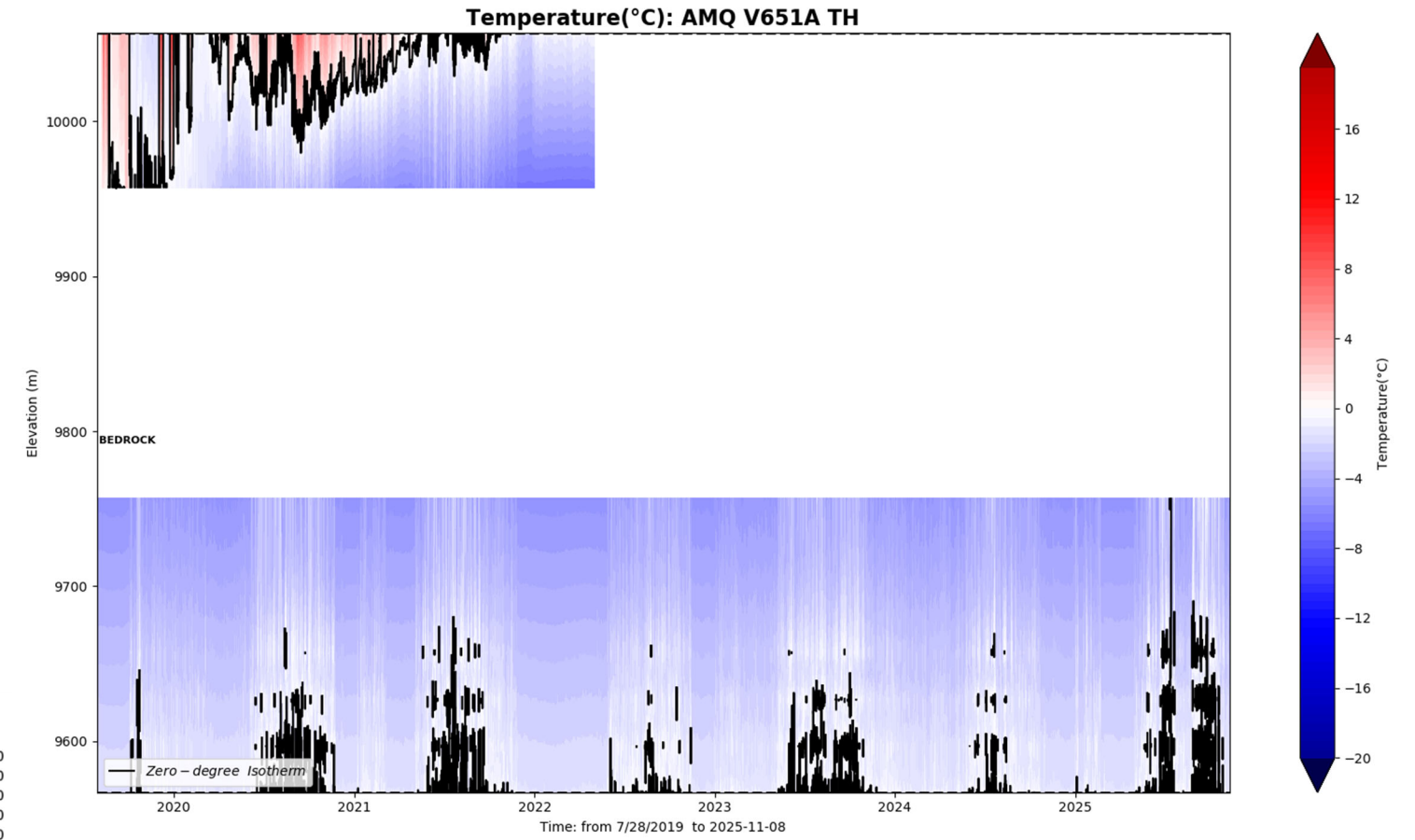
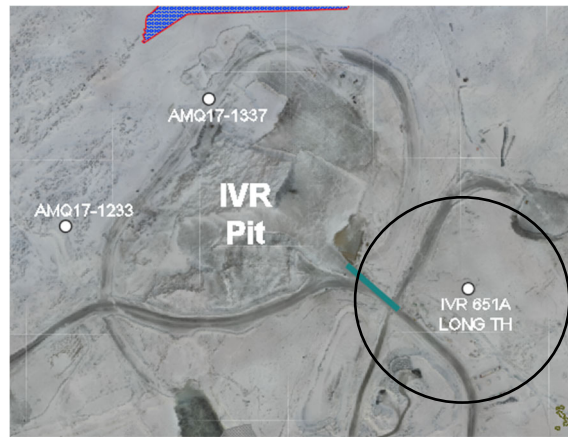
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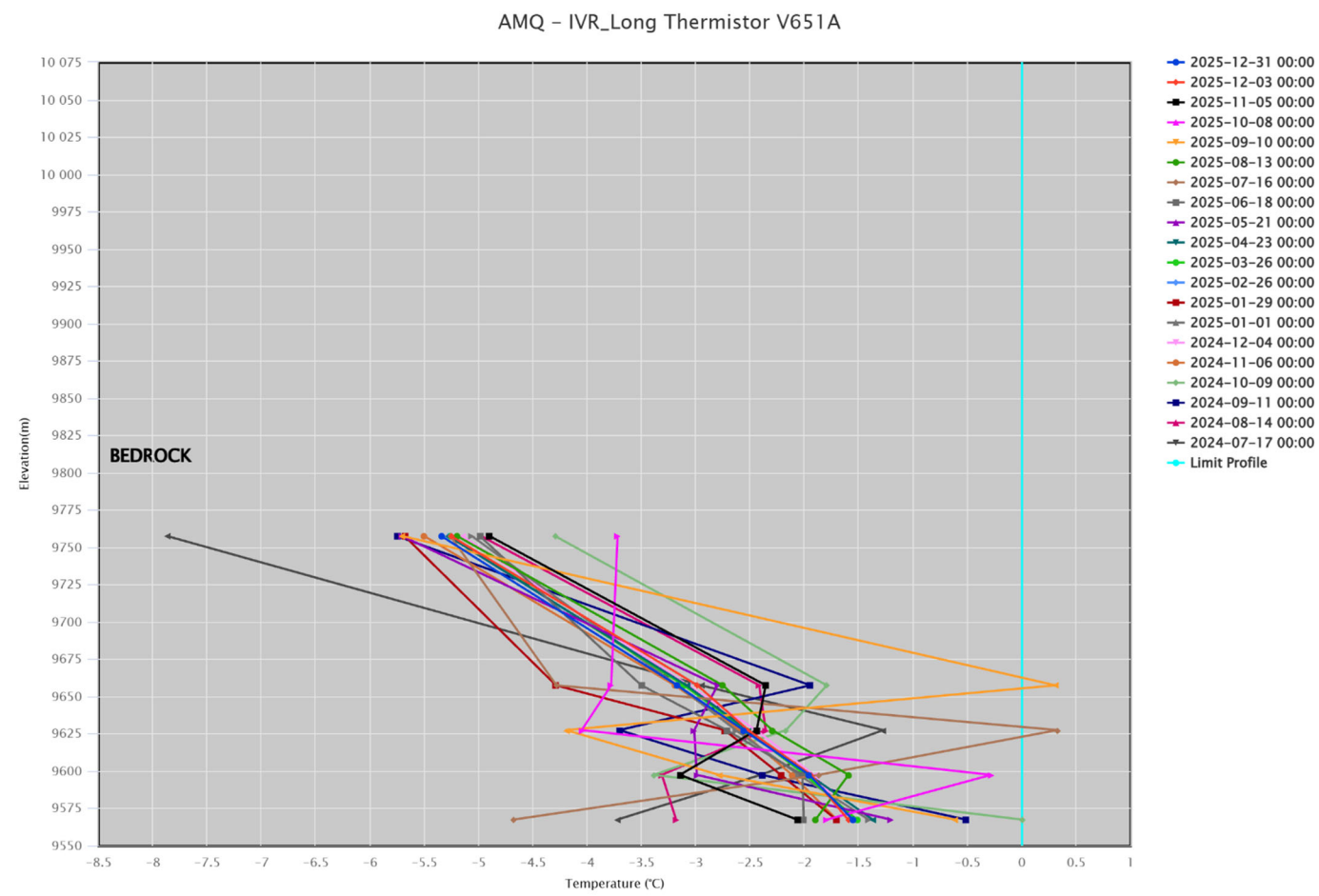
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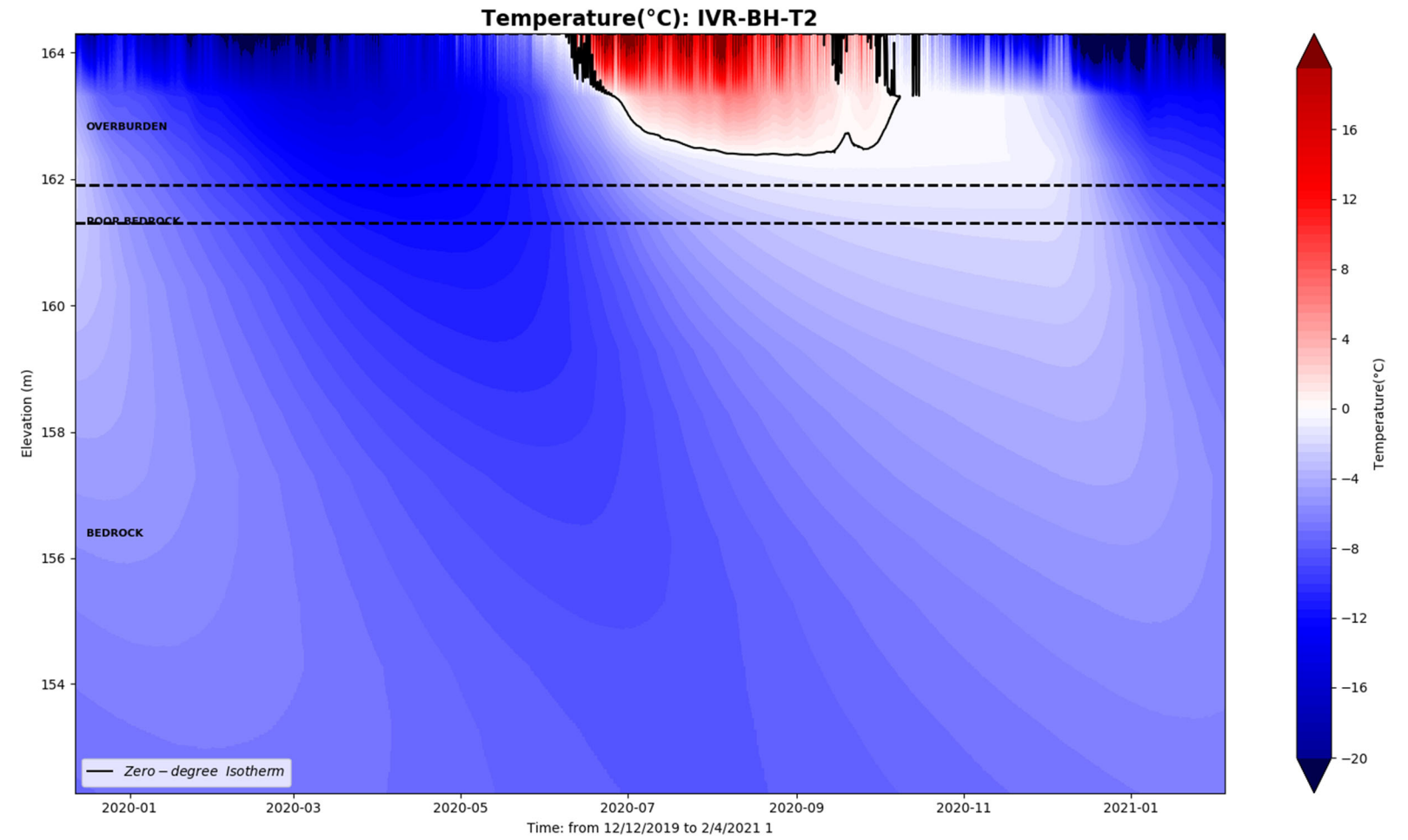
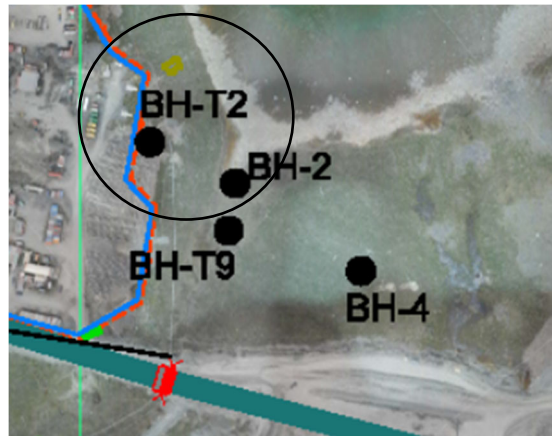
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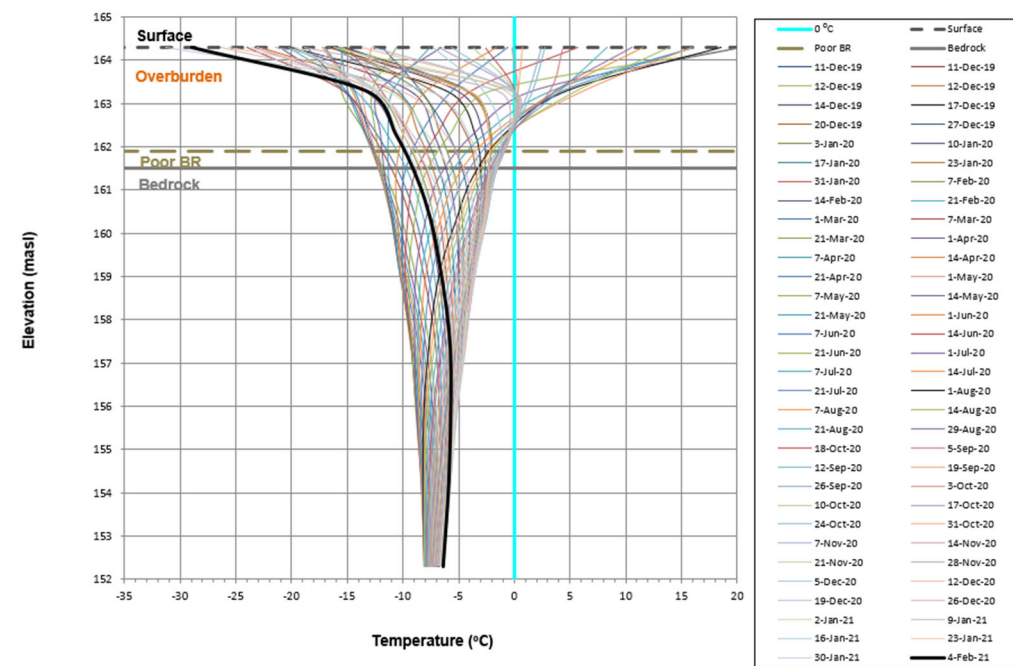
Note that readings are unstable and many beads are not functional



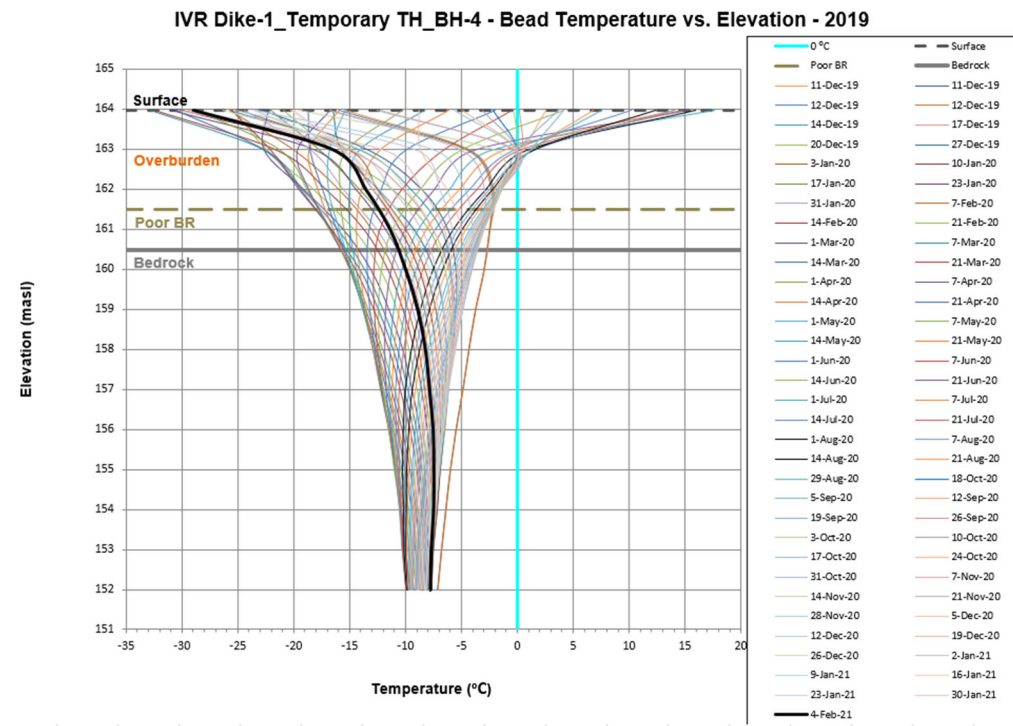
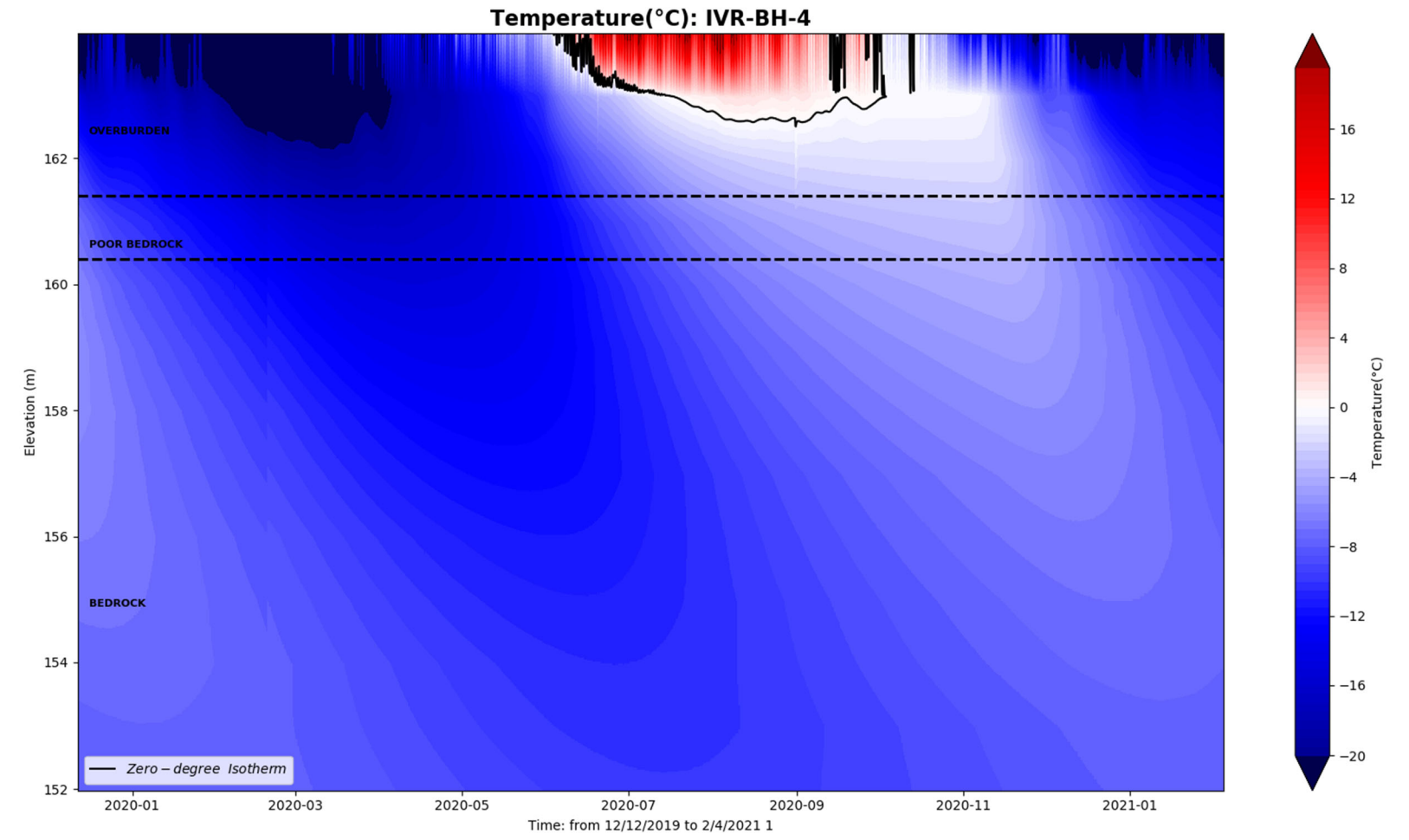
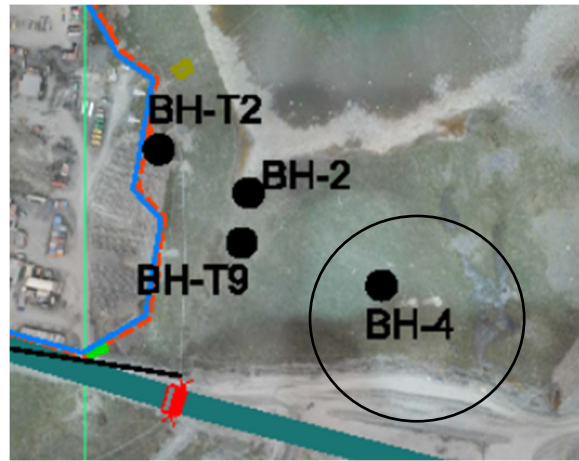
IVR-BH-T2



IVR Dike-1\_Temporary TH\_BH-T2 - Bead Temperature vs. Elevation - 2019

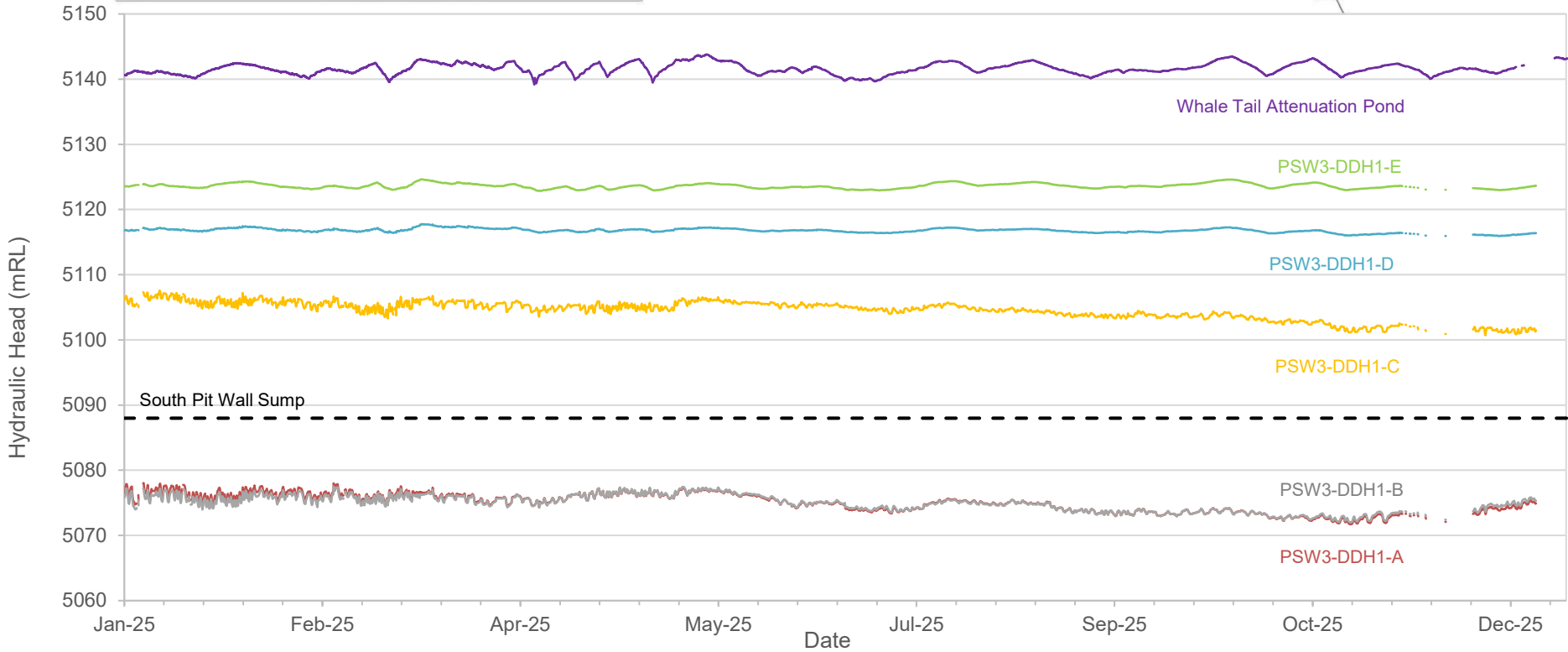
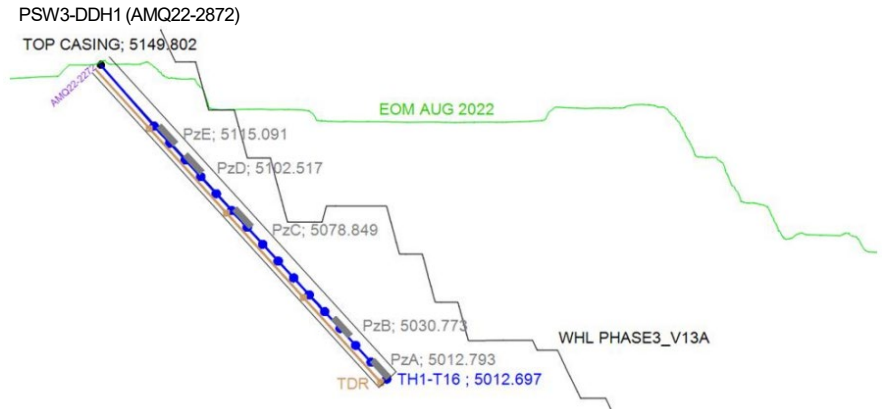
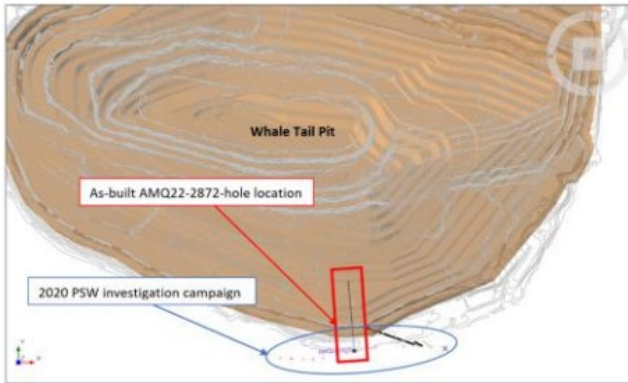


IVR-BH-4



**ATTACHMENT C**

**2025 Piezometric Data**



**Notes:**

- 1) Borehole AMQ22-2872 (PSW3-DDH1) is instrumented with five multilevel piezometers (Pz), (A (deep) through E (shallow).
- 2) mRL – metres relative level (mine grid elevation)
- 3) PSW3-DDH1A, -B, -C, -D and -E hydraulic head data unavailable between January 4 to 5, 2025, and between November 19 to December 7, 2025, due to equipment malfunction related to operations.
- 4) Whale Tail Pit permanent sump (ST-WT-4) located at 4990 mRL and South Pit Wall sump located at 5088 mRL.

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PROJECT

2025 GROUNDWATER MONITORING PROGRAM  
WHALE TAIL PIT PROJECT, NUNAVUT

TITLE

**WHALE TAIL PIT SOUTH WALL AND WHALE TAIL  
ATTENUATION POND HYDRAULIC HEAD DATA, JANUARY  
TO DECEMBER 2025**

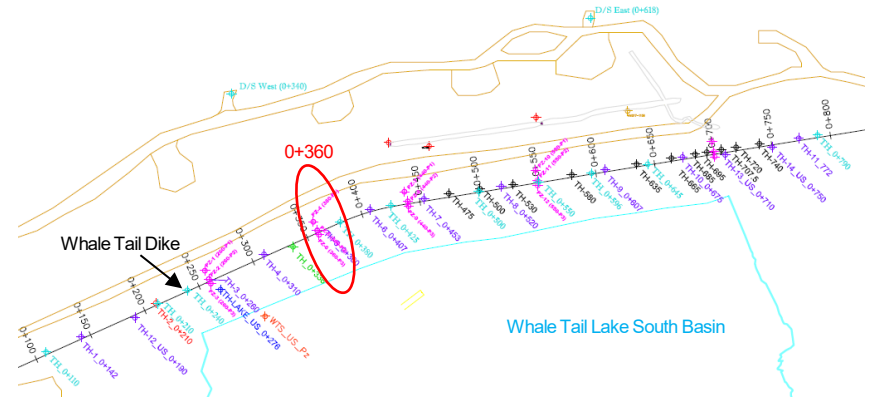
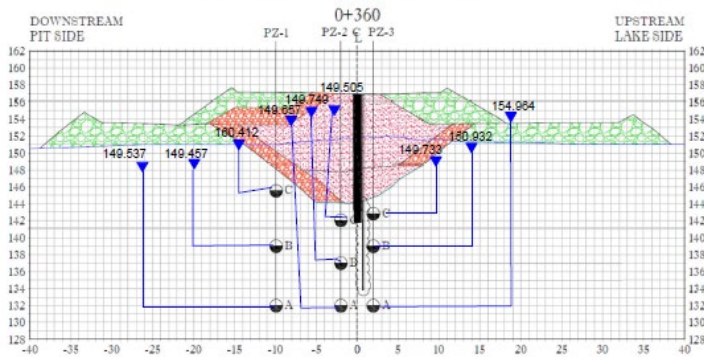
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DOC. MBK2026\_001

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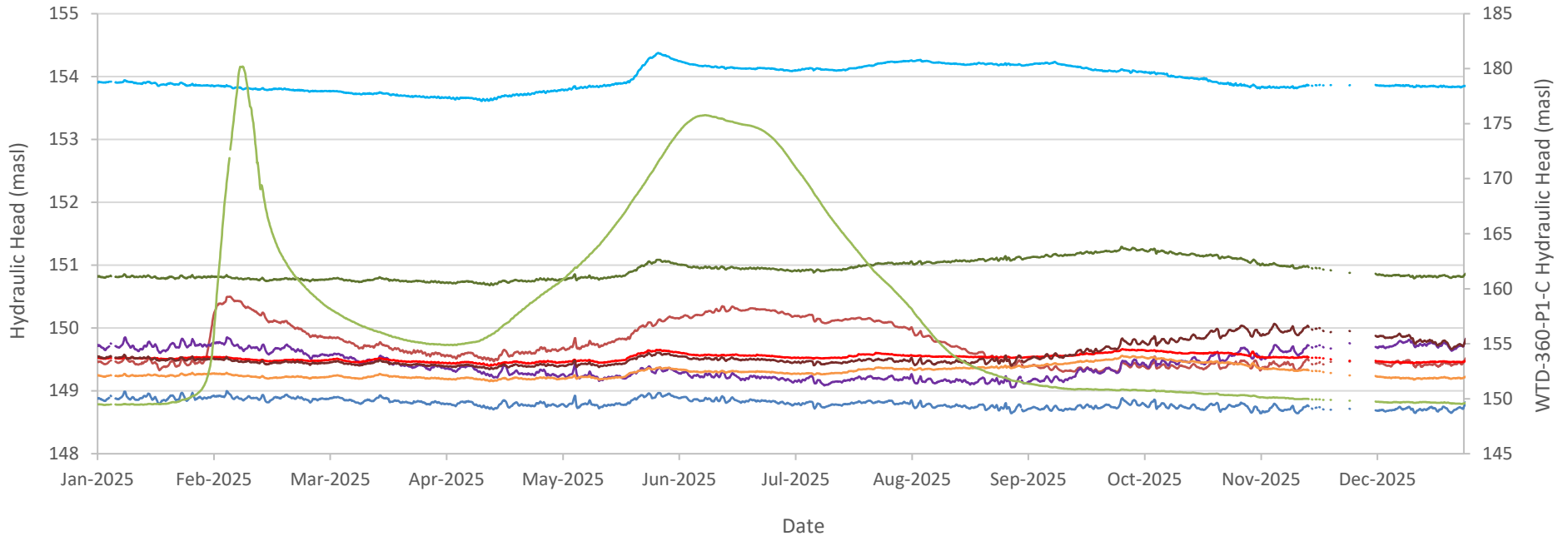
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### Whale Tail Dike - Section 0+360



- WTD-360-P1-A
- WTD-360-P1-B
- WTD-360-P2-A
- WTD-360-P2-B
- WTD-360-P2-C
- WTD-360-P3-A
- WTD-360-P3-B
- WTD-360-P3-C
- WTD-360-P1-C



Notes:  
 1) WTD-360-P1-A, -B, and -C, WTD-360-P2-A, -B, and -C, and WTD-360-P3-A, -B, and -C hydraulic head data unavailable between January 4 to 5, 2025, and between November 19 to December 7, 2025, due to equipment malfunction related to operations.



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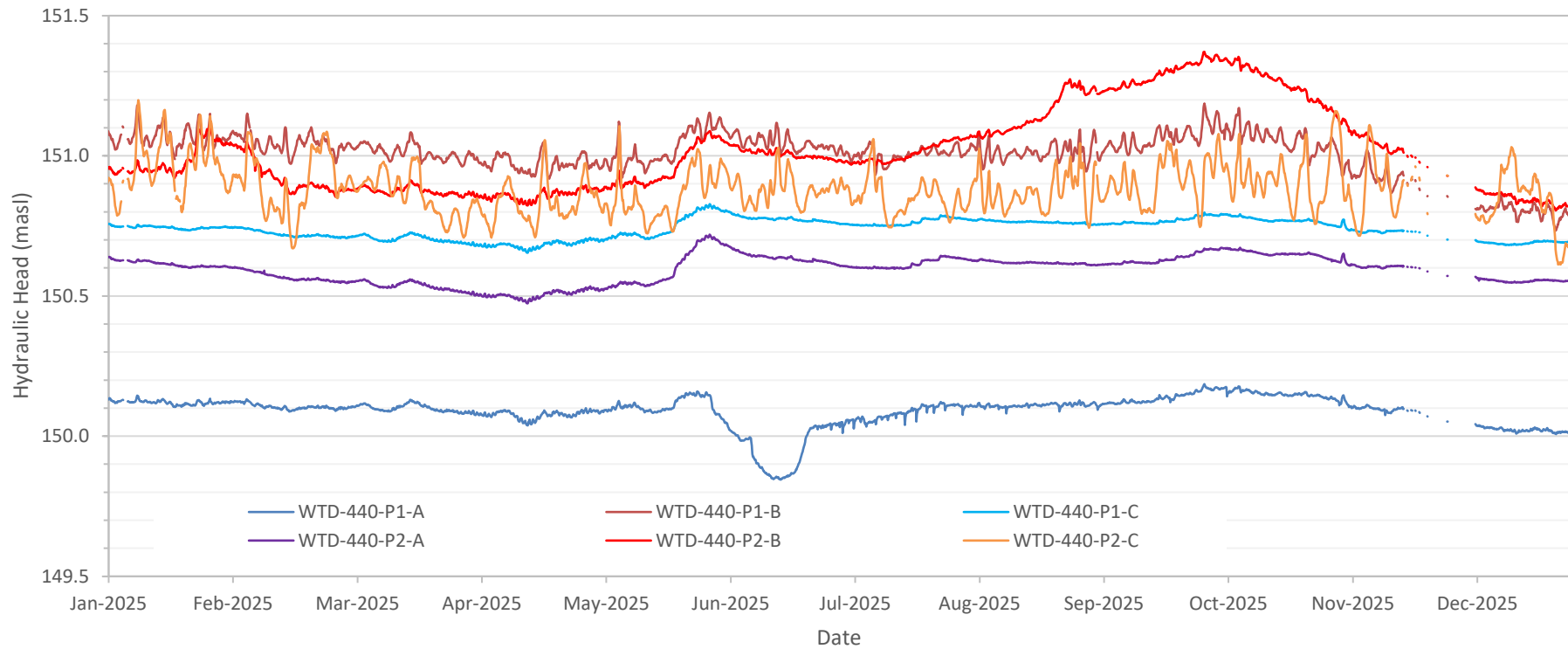
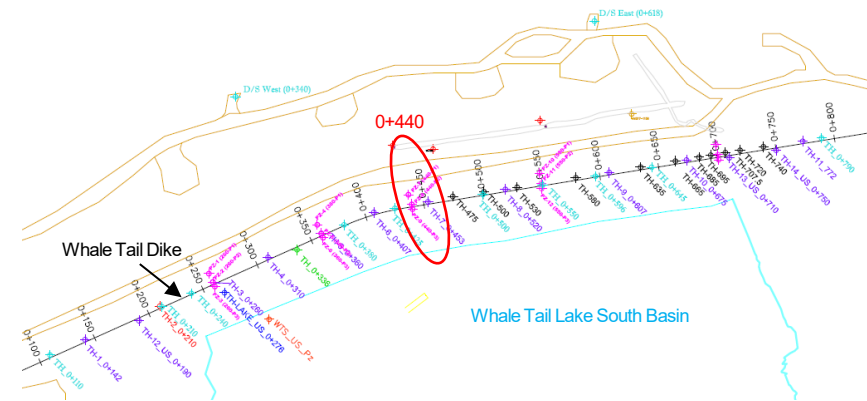
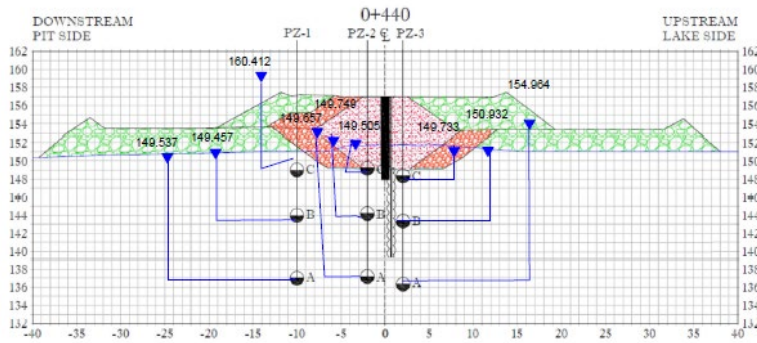
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 REVIEW            DH  
 APPROVED        JL

PROJECT  
 2025 GROUNDWATER MONITORING PROGRAM  
 WHALE TAIL PIT PROJECT, NUNAVUT

TITLE  
**HYDRAULIC HEADS MEASURED AT WTD-360 SERIES  
 PIEZOMETERS, JANUARY TO DECEMBER 2025**

PROJECT No.     DOC.     Rev.  
 CA0054001.6953     MBK2026\_001     0

### Whale Tail Dike - Section 0+440



Notes:  
 1) WTD-440-P1-A, -B, and -C, and WTD-440-P2-A, -B, and -C hydraulic head data unavailable between January 4 to 5, 2025, and between November 19 to December 7, 2025, due to equipment malfunction related to operations.



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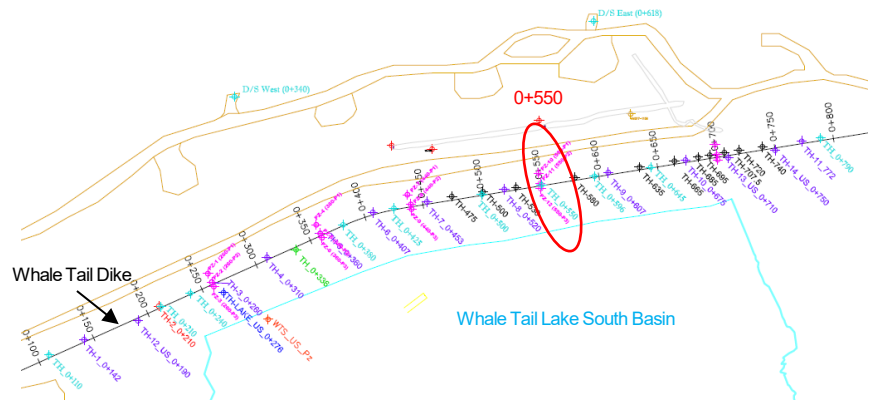
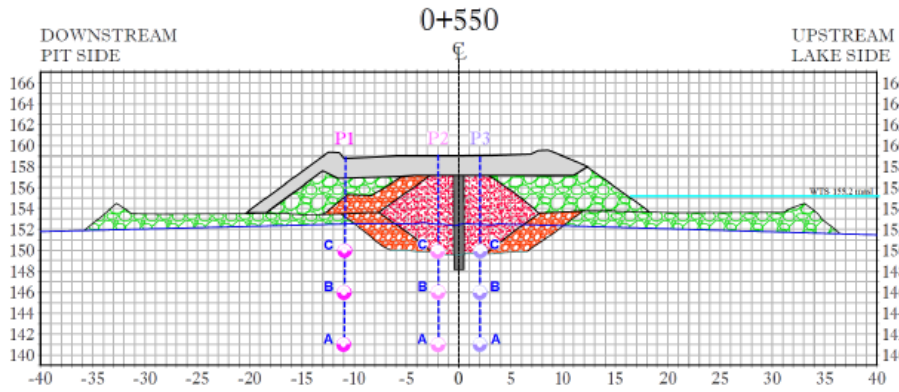
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 YYYY-MM-DD 2026-01-28  
 PREPARED NU  
 DESIGN --  
 REVIEW DH  
 APPROVED JL

PROJECT  
**2025 GROUNDWATER MONITORING PROGRAM  
 WHALE TAIL PIT PROJECT, NUNAVUT**

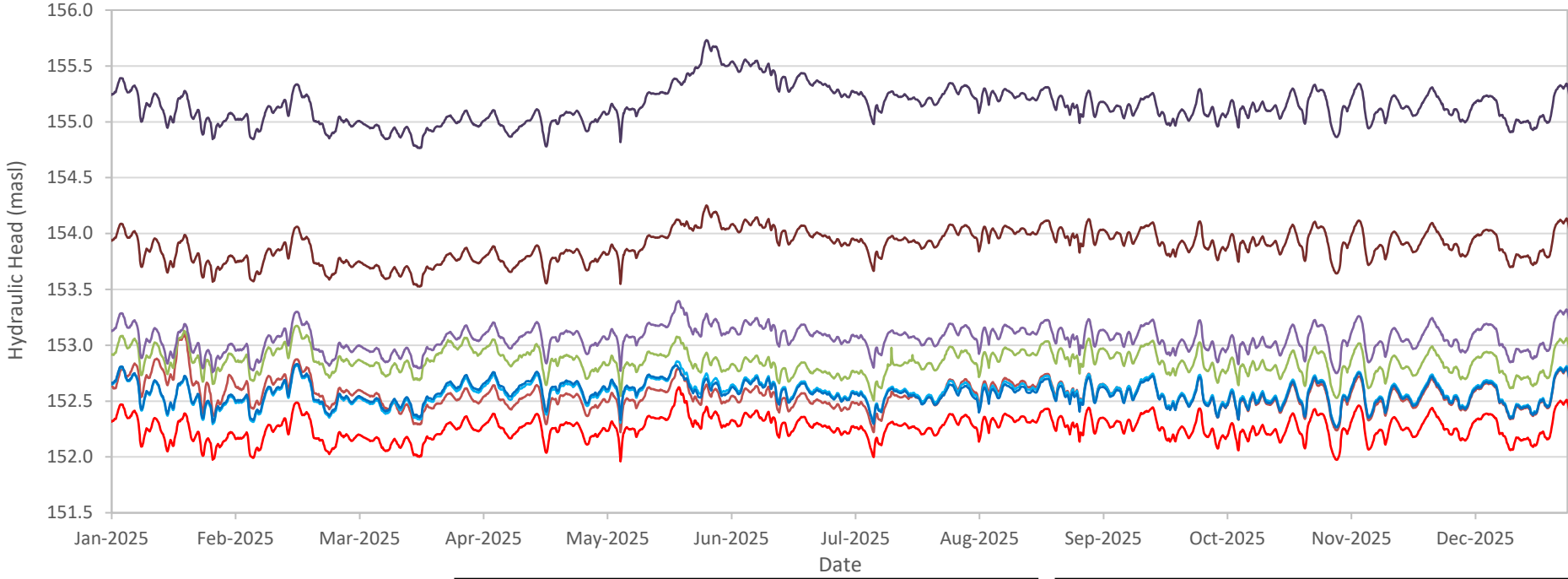
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 PIEZOMETERS, JANUARY TO DECEMBER 2025**

PROJECT No. CA0054001.6953  
 DOC. MBK2026\_001

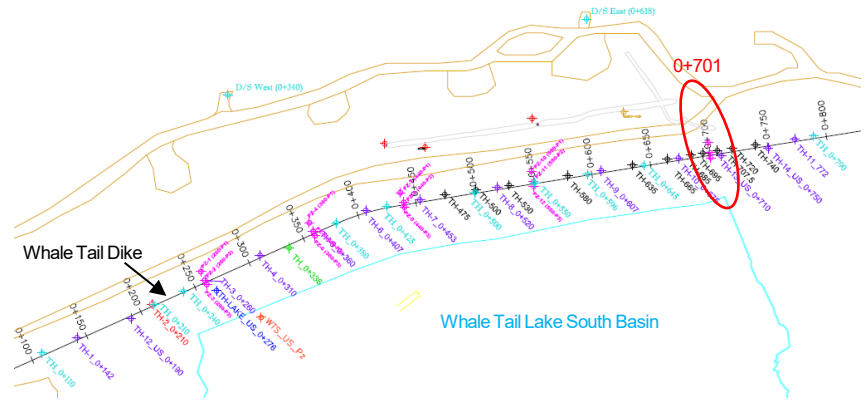
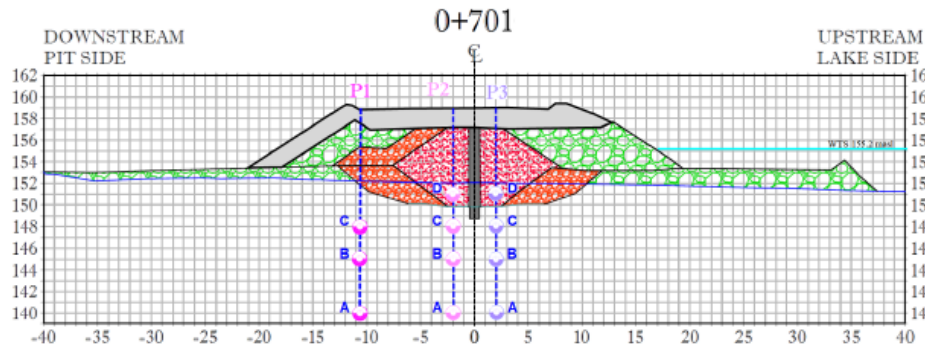
Rev. 0



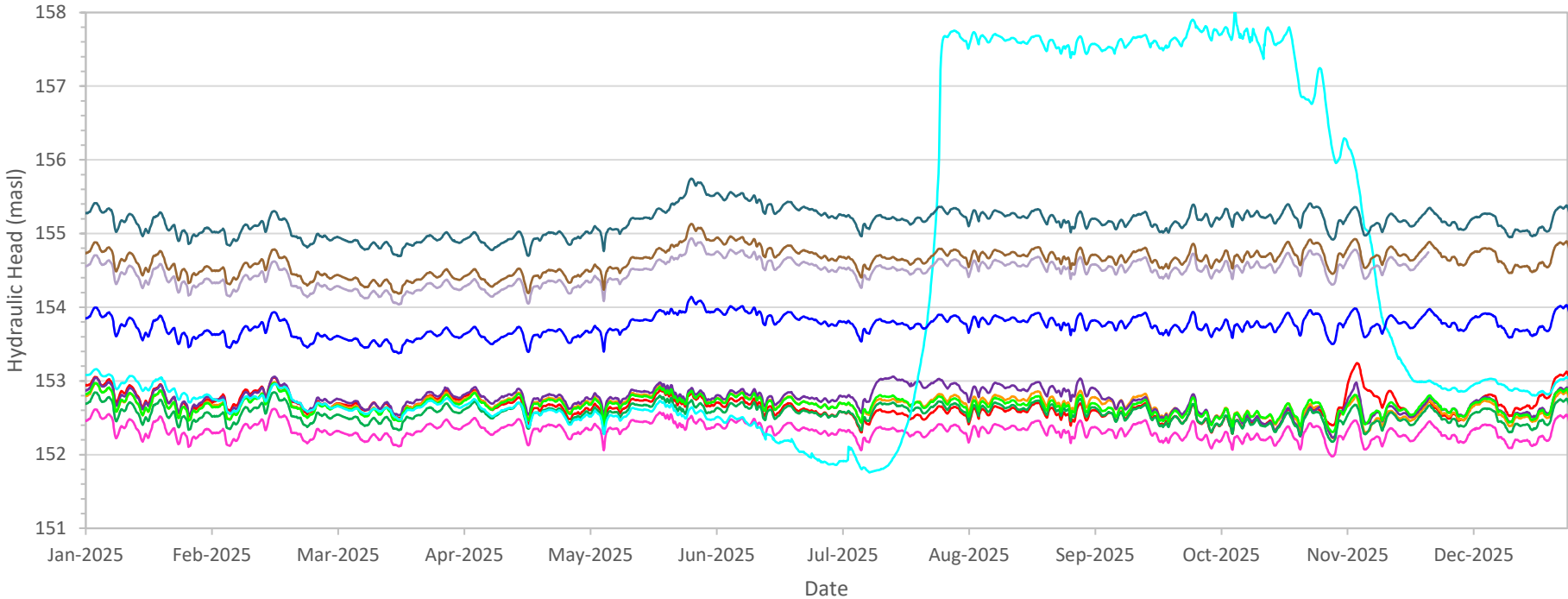
- WTD Upstream
- WTD-550-P1-A
- WTD-550-P1-B
- WTD-550-P1-C
- WTD-550-P2-A
- WTD-550-P2-B
- WTD-550-P2-C
- WTD-550-P3-A
- WTD-550-P3-C



<p>CLIENT</p> <p><b>AGNICO EAGLE</b></p> <p>CONSULTANT</p>	<p>AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION</p> <p>YYYY-MM-DD     2026-01-28</p> <p>PREPARED        NU</p> <p>DESIGN            --</p> <p>REVIEW            DH</p> <p>APPROVED        JL</p>	<p>PROJECT</p> <p>2025 GROUNDWATER MONITORING PROGRAM WHALE TAIL PIT PROJECT, NUNAVUT</p> <p>TITLE</p> <p><b>HYDRAULIC HEADS MEASURED AT WTD-550 SERIES PIEZOMETERS, JANUARY TO DECEMBER 2025</b></p> <p>PROJECT No.     DOC.     Rev.</p> <p>CA0054001.6953   MBK2026_001     0</p>
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- WTD-701-P1-A
- WTD-701-P1-B
- WTD-701-P1-C
- WTD-701-P2-A
- WTD-701-P2-B
- WTD-701-P2-C
- WTD-701-P2-D
- WTD-701-P3-A
- WTD-701-P3-B
- WTD-701-P3-C
- WTD-701-P3-D



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PROJECT  
 2025 GROUNDWATER MONITORING PROGRAM  
 WHALE TAIL PIT PROJECT, NUNAVUT



CONSULTANT  
 YYYY-MM-DD 2026-01-28  
 PREPARED NU  
 DESIGN --  
 REVIEW DH  
 APPROVED JL

TITLE  
**HYDRAULIC HEADS MEASURED AT WTD UPSTREAM AND  
 WTD-701 SERIES PIEZOMETERS, JANUARY TO DECEMBER  
 2025**

PROJECT No. CA0054001.6953    DOC. MBK2026\_001    Rev. 0

**ATTACHMENT D**

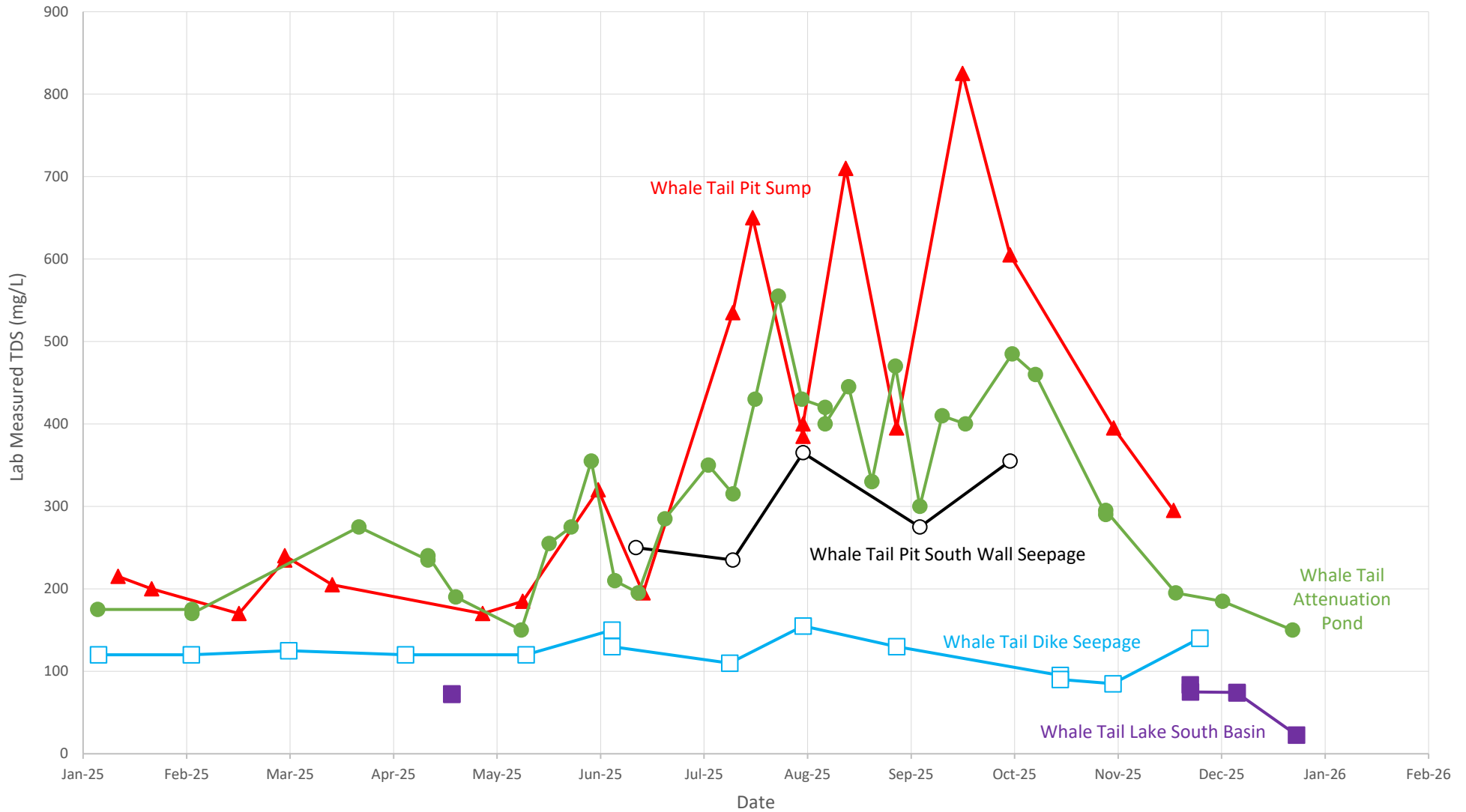
**2025 Seepage Survey  
Photograph (provided by Agnico  
Eagle)**



**Photo 1: Seepage along Whale Tail Pit south wall December 2025.**

**ATTACHMENT E**

**2025 Supplemental Water Quality Data  
(provided by Agnico Eagle)**



ST-GW-WT-1    
  ST-WT-4    
  ST-WT-1    
  ST-WT-17    
  WTSE-1

**Notes:**

- <sup>1</sup> Water quality samples collected by Agnico Eagle and analyzed by analytical laboratory Bureau Veritas.
- <sup>2</sup> Calculated TDS is shown for the Whale Tail Lake South Basin as samples are not analyzed for TDS. TDS may be biased for
- <sup>3</sup> Whale Tail Lake South Basin (WTSE-1) as lab analysis did not include calcium, magnesium, potassium and sodium. Duplicates water quality results also shown for ST-WT-1, ST-WT-4, ST-WT-17 and WTSE-1.
- <sup>4</sup> Whale Tail South Wall seepage location inaccessible January through May and November through December 2025.



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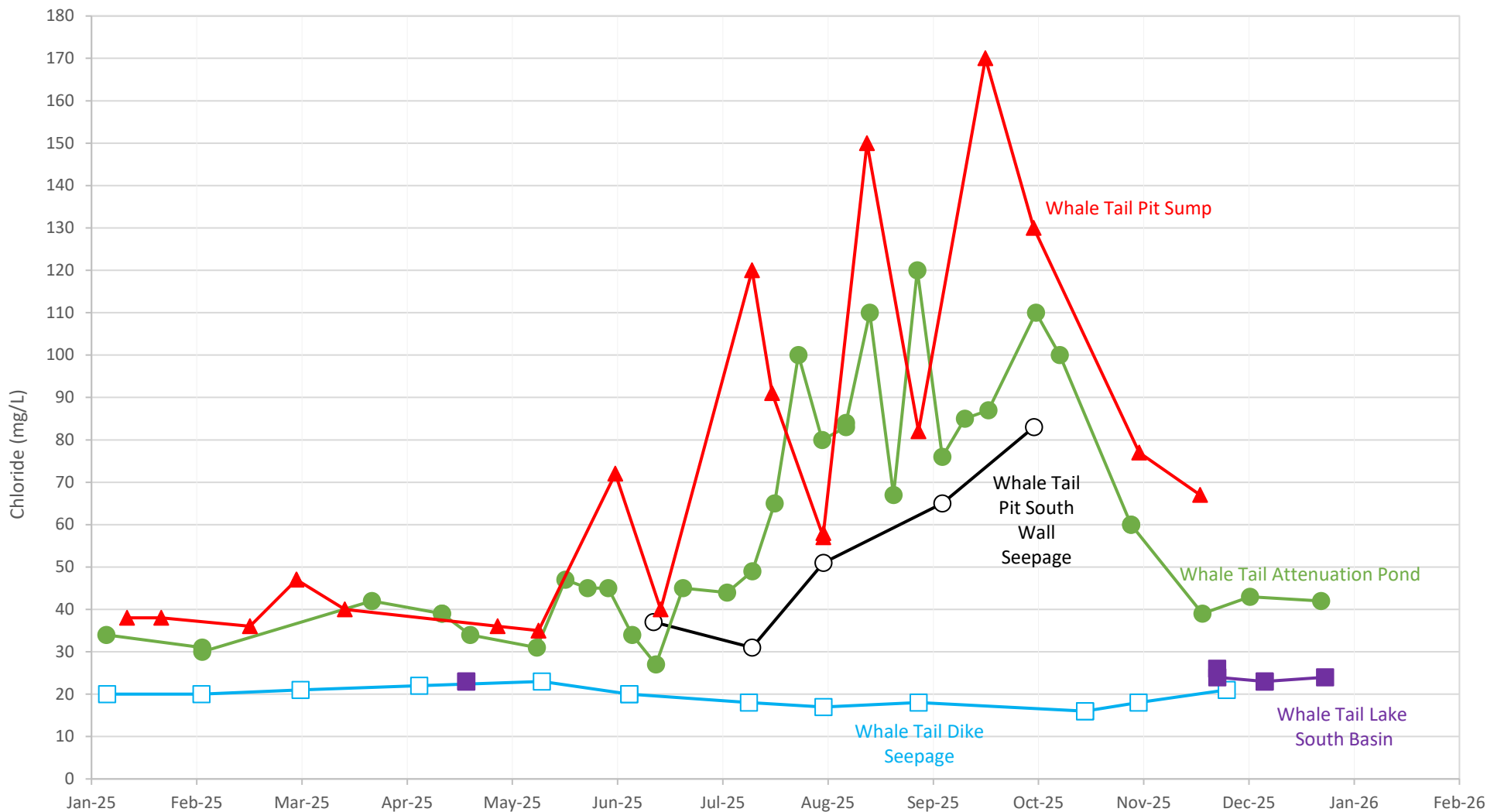
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 REVIEW     DH  
 APPROVED     JL

PROJECT  
2025 GROUNDWATER MONITORING PROGRAM  
WHALE TAIL PIT PROJECT, NUNAVUT

TITLE  
**TOTAL DISSOLVED SOLIDS (TDS) CONCENTRATIONS,  
JANUARY TO DECEMBER 2025**

PROJECT No.     DOC.  
CA0054001.6953     2026MBK\_001

Rev.  
0



○— ST-GW-WT-1

●— ST-WT-1

▲— ST-WT-4

□— ST-WT-17

■— WTSE-1

Notes:

- <sup>1</sup> Water quality samples collected by Agnico Eagle and analyzed by analytical laboratory Bureau Veritas.
- <sup>2</sup> Duplicates water quality results also shown for ST-WT-1, ST-WT-4, ST-WT-17 and WTSE-1.

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YYYY-MM-DD	2026-02-04
PREPARED	NU
DESIGN	-
REVIEW	DH
APPROVED	JL

PROJECT

2025 GROUNDWATER MONITORING PROGRAM  
WHALE TAIL PIT PROJECT, NUNAVUT

TITLE

**CHLORIDE CONCENTRATIONS, JANUARY TO DECEMBER  
2025**

PROJECT No.	DOC.
CA0054001.6953	2026MBK_001

Rev.	0
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**ATTACHMENT F**

# 2022 Whale Tail Groundwater Model Update (Lorax 2023)

## TECHNICAL MEMORANDUM

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**To:** Marie-Pier Marcil, Eric Haley (Agnico Eagle) **Date:** Feb 22, 2023  
**Cc:** Angie Arbaiza (Agnico Eagle)  
**From:** Laura-Lee Findlater, Joseph Xu, Justin Bourne (Lorax) **Project #:** A634-8  
**Subject:** 2022 Whale Tail Groundwater Model Update

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### 1. Introduction

Agnico Eagle Mines Limited (Agnico Eagle) operates the Meadowbank Complex, a gold operation approximately 110 km north of Baker Lake by road in the Kivalliq District of Nunavut. Ore is mined from the Whale Tail site and processed at the Meadowbank mine site. The Whale Tail mine site is operated under Water Licence No. 2AM-WTP1830.

A numerical groundwater flow and transport model was initially developed in 2016 for Whale Tail Pit project assessment and permitting applications (Golder 2016). The model provided predictions of groundwater inflow and total dissolved solids (TDS) concentrations during operations and closure. The model was updated in 2019 to support the Expansion Project comprising a new underground development (Golder 2019a). The groundwater model update incorporated the revised mine plan and additional hydrogeological and thermal data and analyses compiled since 2016.

In accordance with the mine's Groundwater Monitoring Plan (GWMP), observed groundwater inflow rates are compared to model predictions in the Groundwater Management Monitoring Report appended to the Annual Report each year. In the most recently published Annual Report, WSP Golder (2022) indicates that 2021 winter inflow to the Whale Tail Pit was trending 50% higher than predictions (from Golder 2019a). This triggered a review and update of the groundwater model per the following conditions outlined in Section 5 of the GWMP:

- Groundwater inflow quantity to the mine, based on rolling monthly average of inflow over six consecutive months, is 20% higher than predicted groundwater inflow.

This memorandum briefly summarizes methods and results of the 2022 groundwater model update which comprised the following tasks:

- Rebuilding of the groundwater model to refine mesh in the area of interest and incorporate as-built mine extents;
- Calibration of the groundwater model to 2021 flow and water level data;
- Validation of the groundwater model; and,
- Predictions of future mine operations (2022-2025).

Areas where the 2022 groundwater model assumptions/parameterization differ from the 2019 groundwater model are discussed below. No transport simulations were undertaken under this mandate.

## 2. Numerical Methods

The 2022 groundwater model has been updated using the finite element modeling software FEFLOW (v.7.2) (DHI, 2022) which is the same modeling platform used to develop the 2019 groundwater model (Golder 2019a). The updated groundwater model domain covers similar lateral extents as the 2019 groundwater model except for a slight truncation of the model domain along the southwest margin. The model domain is divided into 35 layers of thickness ranging from 2 m to 80 m. The horizontal mesh size varies from approximately 12.5 m near the mine site to 25 m in more distal areas. Overall, the 2022 model has higher discretization than the 2019 model.

The 2022 groundwater model utilizes an updated permafrost distribution simulated by Golder which incorporated temperature data from more recent underground drillholes and expanded coverage into the northeast end of Kangislulik Lake (Golder 2021a) (Figure 1). The position of open and closed taliks did not change markedly between the 2021 thermal model and the 2019 version used to inform the 2019 groundwater model (Golder 2019b). The position of the closed talik extending into Whale Tail Pit was manually adjusted in the 2022 groundwater model to more accurately reflect temperature profiles measured from thermistors installed along the Whale Tail Pit south wall in 2020 (Figure 1).






Groundwater simulations were undertaken for current conditions and future operations. Mine extents for current operations (October 2021 and January 2022) were provided by Agnico Eagle. BBA Consultants provided end-of-year snapshots for 2022 through 2025 for future operations simulations. The model was run in steady-state mode for 2021 and 2022 simulations. For years 2023 through 2025, the model was run transiently to quantify groundwater released from aquifer storage to the underground.

For all 2021 through 2025 model runs, specified head boundary conditions of 155.5 m asl and 142 m asl were applied to the Whale Tail South Basin and Whale Tail Attenuation Pond, respectively. Of note, the top of the model domain has incorporated topographic data and Whale Tail Lake bathymetric data. The specific head boundary conditions were applied across multiple layers as dictated by lake depth. In contrast, the 2019 groundwater model assumed a uniform ground surface elevation of 148 m asl with specified head boundary conditions for the Whale Tail Lake and Attenuation Pond applied to the top layer only.



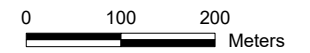
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

**LEGEND**

-  Vibrating Wire Piezometer/Thermistor
-  Westbay Installation
-  Wall Seepage
-  Sump (Flow and Water Quality)
-  Drillhole Trace

Coordinate System: NAD 1983 UTM Zone 14N  
 Projection: Transverse Mercator  
 Datum: North American 1983  
 Units: Meter

1:8,000



DATE SAVED: Jan 31, 2023

DRAWN BY: GM

REVIEWED: LF

VERSION: 1

CLIENT:



**AGNICO EAGLE**



PROJECT:

**2022 Whale Tail  
 Groundwater Model  
 Update**

TITLE:

Whale Tail Pit Monitoring Stations  
 Informing Groundwater Model

PROJECT #:

A634-8

FIGURE:

1

### 3. Model Calibration and Validation

The 2022 groundwater model calibration benefitted from operational data not available for the 2019 model. Mining of the Whale Tail Pit, combined with prior dewatering of the north Whale Tail Lake basin, has served as a large-scale hydraulic stress upon which hydraulic parameters can be estimated.

The calibration data include 2021 average winter pumping rates from the Whale Tail Pit sump (Table 1) and November 2021 groundwater pressures measured at Westbay AMQ16-262 (Figure 1, Table 2). The groundwater model was calibrated in a steady-state simulation using the October 2021 pit extents, noting that the underground mining extents were limited to frozen ground and not interacting with the groundwater system. Since pit extents for earlier snapshots in 2021 were not readily available, the flow target used to calibrate the model was an average of flows measured between January-March and October-December 2021. This equated to an average target flow rate of 2059 m<sup>3</sup>/d.

**Table 1:  
Volumes Pumped from the Whale Tail Pit Sump (2020-2021)**

Month	Total Pumped Volume <sup>1</sup> (m <sup>3</sup> )	Average Daily Pumping Rate (m <sup>3</sup> /day)
Oct-20	57,836	1,866
Nov-20	44,744	1,491
Dec-20	57,945	1,869
Jan-21	62,721	2,023
Feb-21	43,703	1,561
Mar-21	71,320	2,301
Apr-21	48,680	1,623
May-21	49,484	1,596
Jun-21	126,825	4,228
Jul-21	121,399	3,916
Aug-21	135,056	4,357
Sep-21	124,540	4,151
Oct-21	74,035	2,388
Nov-21	75,828	2,528
Dec-21	48,161	1,554
Jan-March , Oct-Dec 2021 Average		2,059

**Notes:**

1. 2020 volumes from Golder (2021b), 2021 volumes from WSP Golder (2022).

**Table 2:**  
**Simulated and observed November 2021 freshwater elevations at Westbay AMQ16-626**

Port	Port Position (m bgs)	Port Position (m asl)	Water Level Elevation (m asl)		Residual (Simulated-Observed) (m)
			Observed <sup>1</sup>	Simulated	
6*	257.9	-103.4	147.6	146.61	-0.99
5	289.7	-124.8	148.2	147.16	-1.04
4	326.3	-171.8	150.1	147.95	-2.15
3	356.2	-201.7	150.0	148.31	-1.69
2	411.7	-257.2	149.8	149.50	-0.30
1	455.9	-301.4	150.0	150.05	0.05

**Notes:**

mbgs = metres below ground surface (vertical down from surface); m asl = metres above sea level; -- = not measured

\*Port 6 is suspected to be located within or near the cryopeg, which may influence measured hydraulic head (WSP Golder 2022).

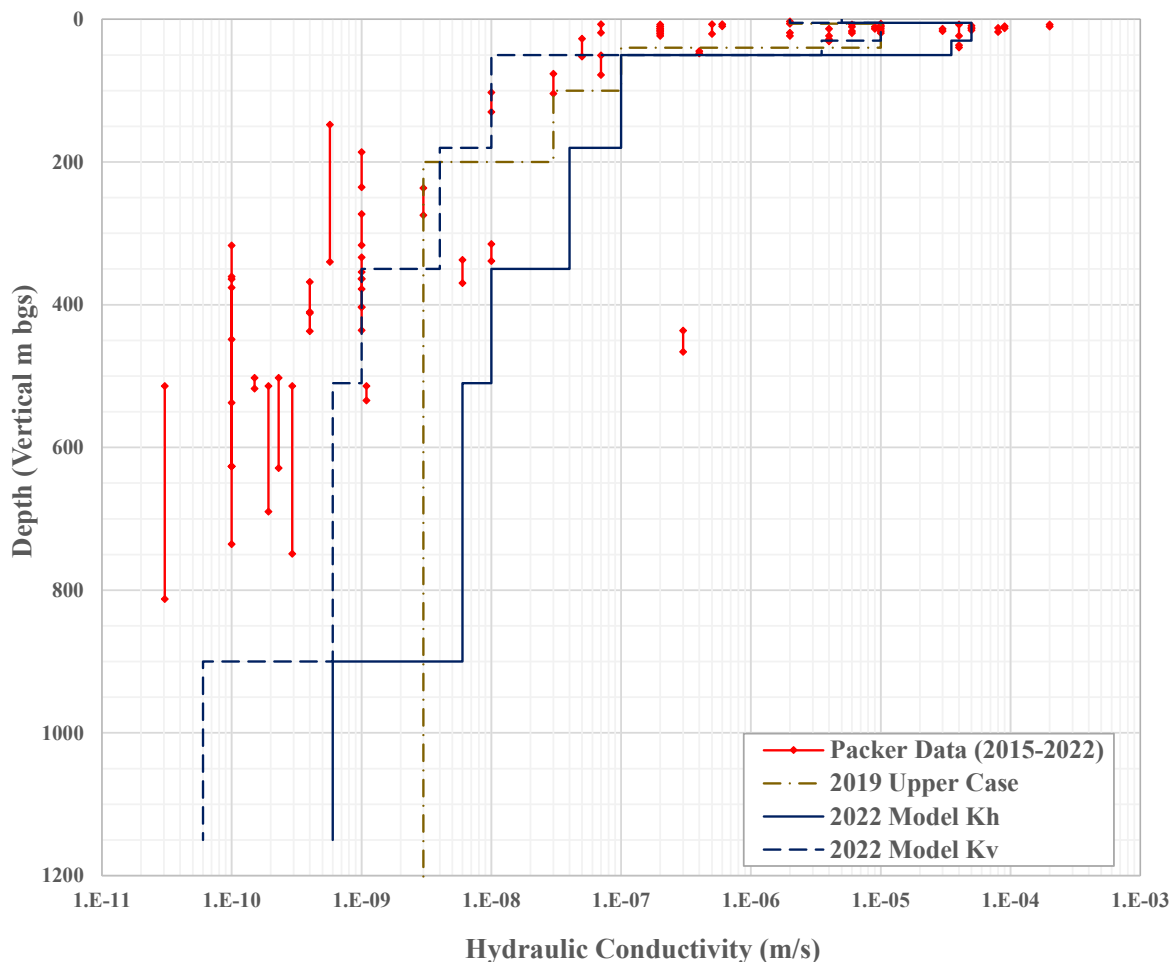
1. Estimated freshwater hydraulic heads compute from November 2, 2021 pore pressure measurements. Reported in WSP Golder (2022).

Bedrock hydraulic conductivity was adjusted until the average pit inflow rate and Westbay water levels were reasonably approximated, based on modeler professional judgement. The 2022 calibrated hydraulic conductivity distribution is shown in Figure 2 with parameters listed in Table 3. Through the calibration process, it was found that the difference in water levels measured between Westbay ports supported the use of anisotropy in bedrock hydraulic conductivity values, hence the two lines representing horizontal ( $K_h$ ) and vertical hydraulic conductivity ( $K_v$ ) in Figure 2. Both lines represent the Base Case hydraulic conductivity distribution determined in the 2022 groundwater model update. The ratio of horizontal to vertical hydraulic conductivity ranges from 2.5-fold to 10-fold (Table 3). The 2019 groundwater model assumed isotropic hydraulic conductivity ( $K_h=K_v$ ). The Upper Case hydraulic conductivity distribution from 2019 is also shown in Figure 2.

Both the 2019 and 2022 models simulate a trend of decreasing hydraulic conductivity with depth and do not differentiate between lithological units (*i.e.*, hydraulic conductivity for the layer is uniform across the model domain). In addition, neither model version simulates enhanced permeability zones as hydraulic testing information at the time of model development had not indicated widespread occurrence of such features.

The 2022 groundwater model simulates a 2021 Whale Tail Pit winter inflow rate of 2,058 m<sup>3</sup>/d, which essentially matches the observed average winter flow rate target of 2,059 m<sup>3</sup>/d (<0.05% difference). Simulated water levels at Westbay AMQ16-262 agree within 2.2 m of observed values. (Table 2). For this time period, flows reporting to the Whale Tail Pit sump are approximately 30% derived from the Whale Tail Attenuation Pond and 70% derived from moderately deep groundwater (10 m to approximately 200 m) draining the Whale Tail South

Basin. No groundwater originating from deeper bedrock (>200 m) is simulated to report to the Whale Tail Pit sump. The 2019 groundwater model predicted a higher proportion of flow (~80%) originating from the attenuation pond.



**Figure 2: Simulated hydraulic conductivity distribution used in the 2019 and 2022 groundwater models.**

#### 4. Model Validation

The 2022 groundwater model was validated against four different data sources:

- i. Flow rates measured from a drillhole advanced near the Whale Tail Pit Seep #1 (ST-WT-GW-1) in November 2021;
- ii. January 2022 Whale Tail Pit sump flow rates;
- iii. Baseline water levels collected at Westbay AMQ16-262; and
- iv. August 2021 water levels collected from vibrating wire piezometers (VWPs) installed along the south wall of the Whale Tail Pit.

**Table 3:**  
**Calibrated hydraulic parameters from the 2022 groundwater model**

Depth (mbgs)	2019 Model EA/Upper Case <sup>1</sup>	2022 Model				
	K (m/s)	K <sub>h</sub> (m/s)	K <sub>v</sub> (m/s)	K <sub>h</sub> :K <sub>v</sub>	Sy (-)	Ss (m <sup>-1</sup> )
2-6 (Overburden)	2.E-06	5E-06	2E-06	2.5	0.001	1E-04
6 – 30	1.E-05	5E-05	1E-05	5	0.01	1E-005
30 – 40	1.E-005	3.5E-05	3.5E-06	10	0.01	1E-05
40 – 50	1.E-07				0.01	1E-05
50 – 100	1.E-07	1E-07	1E-08	10	0.0006	1E-06
100 – 180	3.E-08				0.0006	1E-06
180 - 200	3.E-08	4E-08	4E-09	10	0.0006	1E-06
200 - 350	4.E-09				0.0006	1E-06
350 - 510	4.E-09	1E-08	1E-09	10	0.0006	1E-06
510 - 900		6E-09	6E-10	10	0.0006	1E-06
900 - 1150		6E-10	6E-11	10	0.0006	1E-06

**Notes:**

K= hydraulic conductivity, Sy = specific yield, Ss = specific storage

1. Per Golder (2019a)

**4.1 ST-WT-GW-1 Drillhole Flow Rates**

In an effort mitigate an ice wall which forms seasonally at the ST-WT-GW-1 seepage face, Agnico Eagle advanced an inclined borehole from the pit floor to concentrate the seepage. The borehole was drilled on October 21<sup>st</sup>, 2021, and flow rates measured on November 2<sup>nd</sup> and 8<sup>th</sup>, 2021 (Table 3, Figure 1). The drillhole was incorporated into the updated groundwater model and a steady state flow rate of 1,010 m<sup>3</sup>/d was simulated. The simulated value agrees within 10% observed values.

**Table 4:**  
**Whale Tail Pit South Wall Flowing Drillhole Data**

Borehole ID		ST-WT-GW-1 (DH1)
Drilled Date		October 21, 2021
Northing	m	7,255,424.88
Easting	m	606,877.59
Collar Elevation	m asl	140.91
Azimuth/Dip	degrees	180/30
Length	m	58.30
Flow Rate Nov 2, 2021	m <sup>3</sup> /d	936
Flow Rate Nov 8, 2021	m <sup>3</sup> /d	1,080

## 4.2 January 2022 Pit Inflow Rates

The January 2022 Whale Tail Pit extents were incorporated into a steady-state run of the updated groundwater model. The model simulated 2,354 m<sup>3</sup>/d inflow to Whale Tail Pit, about 6% higher than the observed flow rate of 2,226 m<sup>3</sup>/d.

## 4.3 Baseline Water Levels

Baseline water levels were measured at Westbay AMQ16-262 in November 2018, prior to the onset of lake dewatering and mining activities (Table 4). The updated groundwater model was configured to simulate baseline conditions with Whale Tail Lake occupying its pre-mine limits at an elevation 153 m. Simulated and observed water level elevations for Westbay AMQ16-262 are provided in Table 4 and agree within 0.31 m of observed levels.

**Table 5:**  
**Simulated and observed baseline freshwater elevations at Westbay AMQ16-626**

Port	Port Position (m bgs)	Port Position (m asl)	Water Level Elevation (m asl)		Residual (Simulated-Observed) (m)
			Observed <sup>1</sup>	Simulated	
6*	257.9	-103.4	154.0	153.69	-0.31
5	289.7	-124.8	--	153.64	N/A
4	326.3	-171.8	153.6	153.52	-0.08
3	356.2	-201.7	153.4	153.43	0.03
2	411.7	-257.2	152.9	152.93	0.03
1	455.9	-301.4	152.5	152.71	0.21

**Notes:**

mbgs = metres below ground surface (vertical down from surface); m asl = metres above sea level; -- = not measured

\*Port 6 is suspected to be located within or near the cryopeg, which may influence measured hydraulic head (WSP Golder 2022).

1. Estimated freshwater hydraulic heads compute from November 9, 2018 pore pressure measurements. Reported in WSP Golder (2022).

## 4.4 Whale Tail Pit South Wall VWP

A series of thermistor strings nested with vibrating wire piezometers (VWPs) were installed along the south wall of the Whale Tail Pit in 2020 (Figure 1). These instruments collected water level data between June 2020 and August 2021 (Table 6) and were decommissioned thereafter on account of pit expansion. The water level in most piezometers dropped by several meters over the period of record on account of mining of the Whale Tail Pit. The water levels in the piezometers track closely with that of the Whale Tail Attenuation Pond but also respond to blasting in the pit (WSP Golder 2022).

**Table 6:  
Simulated and observed water levels at Pit South Wall VWP**

Sensor	Collar Co-ordinates (m UTM)		Collar El. (m asl)	Dip	Az.	Approx. Sensor Depth <sup>1</sup> (v m bgs)	Sensor Elevation (m asl)	August 2022 Water Level Elevation	Simulated October 2022 Water Level Elevation (m asl)	Residual (Simulated- Observed) (m asl)
	Easting	Northing								
DH3_PZ	607,016	7,255,140	147.6	90	0	20.8	126.89	129.22	134.54	5.32
DH6_PZ	607,058	7,255,184	147.8	90	0	22.8	124.99	134.89	134.45	-0.44
DH10_PZA	607,142	7,255,272	150.7	90	0	22.2	128.50	136.34	135.82	-0.52
DH11_PZA	607,156	7,255,287	151.2	50	0	108.8	42.47	131.37	130.04	-1.33
DH11_PZB	607,156	7,255,287	151.2	50	0	91.9	59.32	134.17	130.33	-3.84
DH11_PZC	607,156	7,255,287	151.2	50	0	76.6	74.64	133.63	130.66	-2.97
DH11_PZD	607,156	7,255,287	151.2	50	0	14.6	136.69	136.98	136.19	-0.79
DH12_PZA	607,168	7,255,294	151.9	50	0	16.6	135.31	137.46	136.73	-0.73
DH12_PZB	607,168	7,255,294	151.9	50	0	14.6	137.38	137.48	136.76	-0.72
DH12_PZC	607,168	7,255,294	151.9	50	0	11.9	140.06	139.00	136.80	-2.20
DH13_PZA	n/a	n/a	145.4	90	0	103.2	40.80	128.00	120.14	-7.87
DH13_PZB	n/a	n/a	145.4	90	0	63.2	80.80	135.24	123.18	-12.06
DH14_PZA	n/a	n/a	130.8	90	0	79.5	53.50	109.41	97.10	-12.31
DH14_PZB	n/a	n/a	130.8	90	0	54.5	78.50	108.34	101.52	-6.82

**Notes:**

n/a = not available, v m bgs = vertical metres below existing ground surface, m asl = metres above sea level  
Wells in red were used to adjust shallow permafrost depth in 2022 groundwater model.

Observed August 2021 and simulated October 2021 water levels for the VWP are provided in Table 6. In comparing the simulated and observed water levels, it should be noted that the August measurements occur during a high flow period while the groundwater model simulates a low flow period. Thus, the comparison is not truly a model validation, rather it is an independent check that the model is reasonably approximating water levels in this area. The simulated water levels are predominantly lower than the observed values, which is to be expected given the disparate flow seasons represented.

## 5. Model Predictions (2022-2025)

Simulated Whale Tail Pit and underground dewatering rates for future operations are provided in Table 7 and Table 8, respectively. Upper case predictions from the 2019 groundwater model are shown for reference. Overall, groundwater inflows to Whale Tail Pit are predicted to stabilize in 2023 as pit expansion is limited to frozen ground. Conservatively, neither the 2019 nor 2022 groundwater models simulate permafrost aggradation into the Whale Tail Pit south wall during this time, although experience at Meadowbank suggests that this is a possibility.

The 2022 groundwater model predicts pit inflow rates that are essentially double the 2019 Upper Case estimates (Table 7). This is attributed to a variety of factors, including higher hydraulic conductivity values (particularly Kh) used in the 2022 model over the upper 200 m interval (Figure 2); differences in pit representation on account of a higher resolution mesh in the 2022 model, adjustments to the depth of the closed talik in the pit (Section 2) and differences lake boundary condition implementation between the two models (Section 2).

The proportion of pit inflow derived from the Whale Tail South Basin and Attenuation Pond also differs between the 2019 and 2022 models (Table 7). The 2022 model predicts that most flow to the pit (~65-67%) is derived from the Whale Tail South Basin, which the 2019 model predicted to contribute 15% or less flow to the pit. Of the total flow the 2022 model predicts to report to the pit, 10% of this travels from the Whale Tail South Basin to the Attenuation Pond then onto the pit. This flow component is included in the portion of flow originating from the Whale Tail South Basin (columns 5 and 6 of Table 7). Using 2025 as an example, of the 2,438 m<sup>3</sup>/d that is derived from the Whale Tail South Basin, 375 m<sup>3</sup>/d (10% of 3,750 m<sup>3</sup>/d) total pit inflow first reports to the Whale Tail Attenuation Pond, and then travels to the pit.

The underground dewatering rates predicted by 2022 groundwater model are generally lower than those predicted by the 2019 groundwater model (Table 8). This difference is attributed to a combination of factors, including lower vertical hydraulic conductivity and higher mesh refinement used in the 2022 model as well as modifications to the mine plan.

**Table 7:  
Simulated Whale Tail Pit Inflow for Future Operations (2022-2025)**

Year	2022 Groundwater Model - Base Case					2019 Groundwater Model – Upper Case <sup>2</sup>				
	Whale Tail Pit Inflow	Inflow from Whale Tail Attenuation Pond		Inflow From Whale Tail South Basin <sup>3</sup>		Whale Tail Pit Inflow	Inflow from Whale Tail Attenuation Pond		Inflow From Whale Tail South Basin	
	(m <sup>3</sup> /d) <sup>1</sup>	%	m <sup>3</sup> /d	%	m <sup>3</sup> /d	m <sup>3</sup> /d	%	m <sup>3</sup> /d	%	m <sup>3</sup> /d
2022	3,070	33%	1,013	67%	2,057	1,360	81%	1,102	9%	122
2023	3,740	35%	1,309	65%	2,431	1,360	82%	1,115	12%	163
2024	3,750	35%	1,313	65%	2,438	1,350	82%	1,107	14%	189
2025	3,750	35%	1,313	65%	2,438	1,350	82%	1,107	15%	203

**Notes:**

1. Year 2022 simulated as a steady-state run using the end of year snapshot. All other years simulated in transient runs using end of year snapshots; inflow values represent and average of the year and include release from storage.
2. Per Golder (2019a).
3. Approximately 10% of the inflow to Whale Tail Pit travels from the Whale Tail South Basin to the Whale Tail Attenuation Pond and then on to the pit. This flow is included in the percentage/flow rate originating from the Whale Tail South Basin.

**Table 8:  
Simulated Whale Tail Underground Inflow for Future Operations (2022-2025)**

Year	Underground Inflow (m <sup>3</sup> /d)	
	2022 Groundwater Model – Base Case <sup>1</sup>	2019 Groundwater Model – Upper Case <sup>1</sup>
2022	10	250
2023	30	420
2024	60	410
2025	290	340

**Notes:**

1. Year 2022 simulated as a steady-state run using the end of year snapshot. All other years simulated in transient runs using end of year snapshots; inflow values represent an average of the year and include release from storage.
2. Per Golder (2019a).

## 6. Summary

The Whale Tail groundwater model was updated in 2022 to improve model performance against observed winter inflows to the Whale Tail Pit. The model update comprised refinement of the model mesh and incorporation of an updated permafrost surface determined by the 2021 thermal model update and observations from thermistors installed along the pit the south wall in 2020. The model was calibrated to winter 2021 flows (January-March and October-December) and November 2021 Westbay water levels while simulating the October 2021 as-built mine extents. The model essentially reproduces observed flows (2,058 m<sup>3</sup>/d) and reasonably simulates Westbay water level data. The data supported the use of anisotropy in hydraulic conductivity, with Kh exceeding Kv by 2.5 to 10 times. In contrast, the 2019 groundwater model utilized isotropic hydraulic conductivity (Kh = Kv).

The 2022 model was validated against flow rates measured at a drillhole advanced near pit seep ST-WT-GW-1 in November 2021, January 2022 pit inflow rates (simulated with January 2022 pit extents) and baseline Westbay water levels. Model performance was also checked using open water season water levels at Whale Tail Pit south wall VWP. The model provided acceptable results for all validation metrics.

The model predicts that open pit dewatering rates will stabilize around 3,750 m<sup>3</sup>/d in 2024 while underground inflow rates are predicted to climb from 10 m<sup>3</sup>/d in 2022 to 290 m<sup>3</sup>/d in 2025. Flow reporting to the Whale Tail Pit is mostly derived the Whale Tail South Basin with the Whale Tail Attenuation Pond providing the balance of the flow. This is a reversal from the 2019 groundwater model which found the majority of flow to Whale Tail Pit originated from the Whale Tail Attenuation Pond. The differences in flow predictions between the 2019 and 2022 models can be attributed to a number of factors including the updated hydraulic conductivity distribution, refinements in model mesh and mine plan implementation, closed talik position in Whale Tail Pit, and differences in implementation of lake boundary conditions.

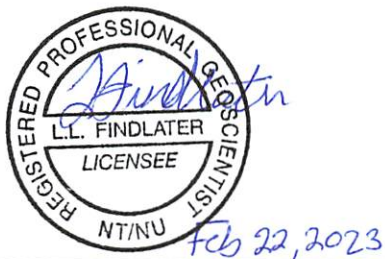
**7. Closure**

This memorandum has been prepared Lorax Environmental Services Ltd. (Lorax) for the exclusive use of Agnico Eagle. If any clarification or additional information is required, please contact the undersigned.

Yours very truly,

**Lorax Environmental Services Ltd.**

per:




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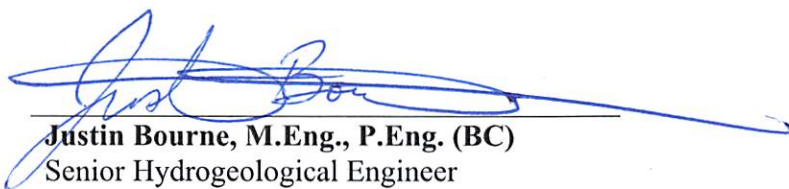
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<b>PERMIT TO PRACTICE</b>	
LORAX ENVIRONMENTAL SERVICES LTD.	
Signature	
Date	Feb 22, 2023
<b>PERMIT NUMBER: P 1487</b>	
NT/NU Association of Professional Engineers and Geoscientists	

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