AGNICO EAGLE

WHALE TAIL PIT PROJECT

Thermal Monitoring Plan

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EXECUTIVE SUMMARY

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is proposing an expansion to the Whale Tail Pit and Haul Road Project (Approved Project), a Meadowbank satellite deposit located on the Amaruq property. As an expansion to the Approved Project (NIRB PC No. 008 and NWB 2AM-WTP1826) Agnico Eagle is proposing to expand and extend the Whale Tail Pit operations to include a larger Whale Tail open pit, development of the IVR open pit, and underground operations (referred to as the Expansion Project) while continuing to operate and process ore at the Meadowbank Mine.

The deposits will be mined as open pits (i.e., Whale Tail Pit and IVR Pit) and underground operations mainly under the Whale Tail and IVR Pits, with ore hauled by truck to the approved facilities at Meadowbank Mine for processing. Ore will be mined from the Whale Tail Pit and processed over a three to four-year mine life. The Expansion Project proposes mining of additional ore from the expanded Whale Tail Pit, the IVR Pit and underground operations.

This document presents a Thermal Monitoring Plan in accordance with Terms and Conditions No. 14 included in the Project Certificate, and incorporates the new facilities planned as part of the Expansion Project.

This plan has been updated for the Expansion Project in support of the Nunavut Water Board (NWB) Type A Water License Amendment Process.

DISTRIBUTION LIST

AEM – Engineering Superintendent

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AEM – Environment Superintendent

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DOCUMENT CONTROL

Version	Date (YMD)	Section	Revision
1	2018-05-04	All	To address Project Certificate No. 008. T&C 14
2_NIRB	2018-11-15	All	Updated for the Expansion Project in support of the Nunavut Impact Review Board review process
2_NWB	2019-05-12	All	Updated for the Expansion Project in support of the Nunavut Water Board (NWB) Type A Water License Amendment Process

TABLE OF CONTENTS

1 INTRODUCTION

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is proposing an expansion to the Whale Tail Pit and Haul Road Project (Approved Project), a Meadowbank satellite deposit located on the Amaruq property. As an expansion to the Approved Project (NIRB PC No. 008 and NWB 2AM-WTP1826), Agnico Eagle is proposing to expand and extend the Whale Tail Pit operations to include a larger Whale Tail open pit, development of the IVR open pit, and underground operations (referred to as the Expansion Project) while continuing to operate and process ore at the Meadowbank Mine.

The Amaruq property is a 408 km^2 site located on Inuit Owned Land approximately 150 km north of the hamlet of Baker Lake and approximately 50 km north of Meadowbank Mine in the Kivalliq Region of Nunavut.

Construction upgrades to support the Expansion Project will begin as soon as approval and permits for the amendment applications are received (anticipated for early 2020). The operational phase (Approved and Expansion Projects) will span from Year 1 (2019) to Year 7 (2025). Mining activities are expected to end in Year 7 (2025) and ore processing is expected to end during Year 8 (2026). Closure will occur from Year 8 (2026) to Year 24 (2042) after the completion of mining and will include removal of the non-essential site infrastructure and flooding of the mined-out open pits and underground mining, as well as reestablishment of the natural Whale Tail Lake water level. Post-closure and monitoring phases will commence after closure is completed in Year 24 (2042) and will continue until it is shown that the site and water quality meet regulatory closure objectives.

This document presents a Thermal Monitoring Plan prepared for the following proposed mine facilities and natural locations:

- Waste rock storage facility (WRSF): Whale Tail WRSF, IVR WRSF, and Underground WRSF.
- Major water management facilities: Whale Tail Dike, Mammoth Dike, Whale Tail WRSF Dike, IVR Dikes, Whale Tail WRSF pond, Whale Tail Attenuation Pond, IVR Attenuation Pond, and Groundwater Storage Ponds (GSPs).
- Whale Tail and IVR pits
- Whale Tail Lakeshore areas affected by temporary rising of lake level
- Underground mining infrastructure (e.g., openings, ramps and portal)

The Thermal Monitoring Plan provides general descriptions of the different facilities, describes the anticipated impacts of operation of the facilities on the permafrost, and presents general guidelines that are used to define instrumentation needs for each facility. This document is not intended to provide detailed specifications for the instrumentation program, which will be defined as mining progresses and infrastructures are built. The detail thermal monitoring plan of such infrastructure are provided as part of the construction detail report referred in the Part D Conditions 1 and 2 of the approved water license 2AM-WTP 1826. The Thermal Monitoring Plan will be reviewed periodically to account for the dynamics of mine construction and operation, and to adjust the monitoring strategy defined for each facility as needed.

Agnico Eagle shall periodically review the plan as required by changes in operation and/or technology and modify the Plan. If needed Agnico Eagle may submit updates in the form of Addendum to this Plan. This plan has been updated for the Expansion Project in support of the Nunavut Water Board (NWB) Type A Water License Amendment Process.

Figure 1 shows a general site layout with the proposed facilities included in the Approved Project and Expansion Project.

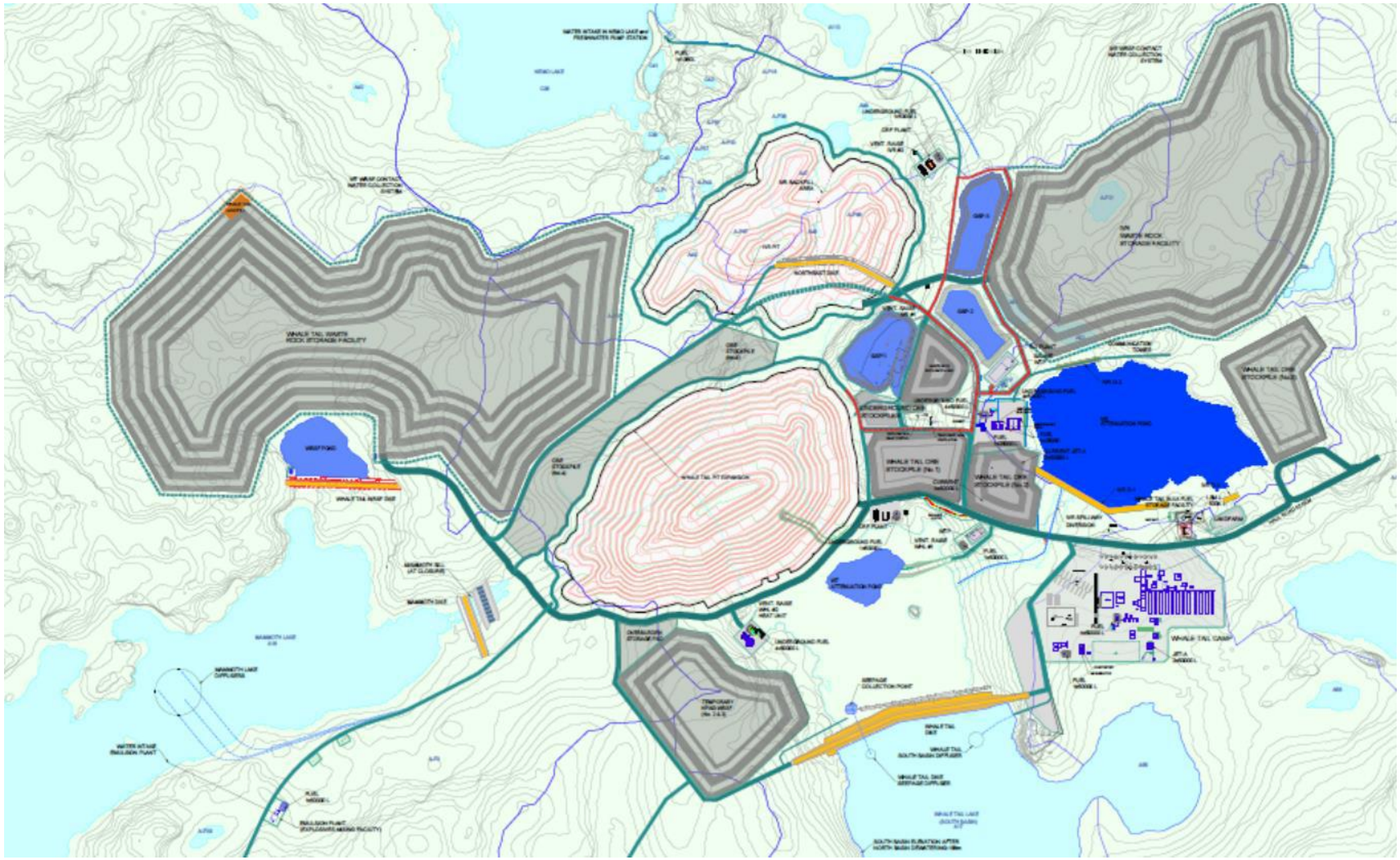
1.1 OBJECTIVES

The primary objective of the Thermal Monitoring Plan is to document and monitor ground thermal conditions at the Project site and identify impacts to the permafrost, if any, that could be associated with development, operation and closure of the different mine facilities. This will be done through the implementation of a monitoring program designed to assess variations in the ground thermal conditions and a data analysis program that will compare results obtained to baseline conditions prior to mine development.

The monitoring program will allow for identification of affected permafrost zones and for comparison between the anticipated and observed effects of the mine facilities on the permafrost. The results of the monitoring program will also be used to guide activities that might be required in the future to document the development and/or evolution of permafrost at the site.

In certain areas, effects of mine operations on the permafrost are anticipated to be temporary and normal conditions are expected to restore progressively upon closure of the mine. The monitoring plan will constitute a means to assess and validate this assumption, and monitoring results will be used to determine if mitigation actions are required and to define actions for specific locations, as needed.

Figure 1. Site Layout with Proposed Facilities



2 BACKGROUND

2.1 CLIMATE ENVIRONMENT

The Project site has the following mean climate characteristics (Agnico Eagle 2016):

- Mean annual air temperature of -11.3 °C
- In summer months from June through September, the mean monthly air temperature ranges from 4.9 to 11.6 °C. In winter months from October to May, the mean monthly air temperature ranges from -6.4 to -31.3 °C
- Mean annual total rainfall of 168 mm
- Mean annual total snowfall (water equivalent) of 160 mm

2.2 REGIONAL PERMAFROST

The Project area is in a zone of continuous permafrost. Permafrost refers to subsurface soil or rock where temperatures remain at or below 0ºC for at least two consecutive years. This is synonymous to perennially cryotic ground, which may be frozen, partially frozen, or non-frozen depending on the ice/water content of the ground, and the salinity of the groundwater. The base of the permafrost is expected to be an undulating surface and the actual depth to permafrost is variable.

The land surface of the Project is underlain by permafrost except under portions of Whale Tail Lake where water is too deep to freeze to the bottom during winter. Taliks (areas of unfrozen ground) are expected beneath a water body where the water depth is greater than the ice thickness. Closed talik formations show a depression in the permafrost table below relatively shallow and small lakes. Open talik formations that penetrate through the permafrost and connect the lake waterbody with the sub-permafrost regime are to be expected for relatively deeper and larger lakes in the Project area.

2.3 GEOLOGY

The Whale Tail deposit is located in the northern portion of the Whale Tail Lake, and the IVR deposit is located to the north end of Whale Tail Lake and across a few small lakes. Based on previous site investigation data, soils in the project area are typically medium to coarse grained glacial till and colluvium with high coarse fragment content overlying bedrock at shallow depths (less than 1m). Saturated soil layers overlying frozen layers have been observed on site. A review of the records of the six thermistor boreholes (refer to Section 2.4) indicates soil thicknesses varying from 6.1 to 12.4 m. Underlying the soil, bedrock in the area generally consists of a stratigraphic sequence of greywacke, iron formation and komatiite, with varying thicknesses.

2.4 BASELINE FIELD INVESTIGATIONS

The Project site permafrost conditions were initially assessed by Knight Piésold (2015) between June and October of 2015 which included the installation of six thermistors near Whale Tail Lake to collect ground temperature data.

Golder Associates completed an additional thermal assessment for the Whale Tail Lake in 2017 (Golder 2017a) and installed four thermistors within the vicinity of Whale Tail Lake.

Additional investigations and thermistor installations were carried out by SNC-Lavalin in 2016 and 2017 for dike design.

A Westbay well was installed on-site between March and April in 2016 where groundwater samples were collected from multiple intervals (Golder 2016a). A first estimation of the thickness of the permanently frozen permafrost was made based on information collected from the Westbay well. In December 2018, a groundwater monitoring program (Golder 2019) of the Westbay was conducted. The results of this monitoring program were used to indirectly confirm the estimations about the thickness of the permanent frozen permafrost in the Whale Tail study area.

2.4.1 Existing Instrumentation on-Site

A total of 14 thermistors have been installed at Whale Tail Site project area between 2015 and 2018. Data from these thermistors have been used to estimate the site permafrost and talik conditions (Golder 2017a, 2018a). Ten of the 14 thermistors are currently active.

The location and installation summary of the 10 active thermistors within the Project site are presented in Table 1. Figure 1 shows locations of active and inactive thermistors. Data are collected from the thermistor by data loggers or using manual readout units.

Results of each of these active and inactive thermistors are presented in Appendix A.

Figure 2. Historic Locations of Thermistors in the Project Site

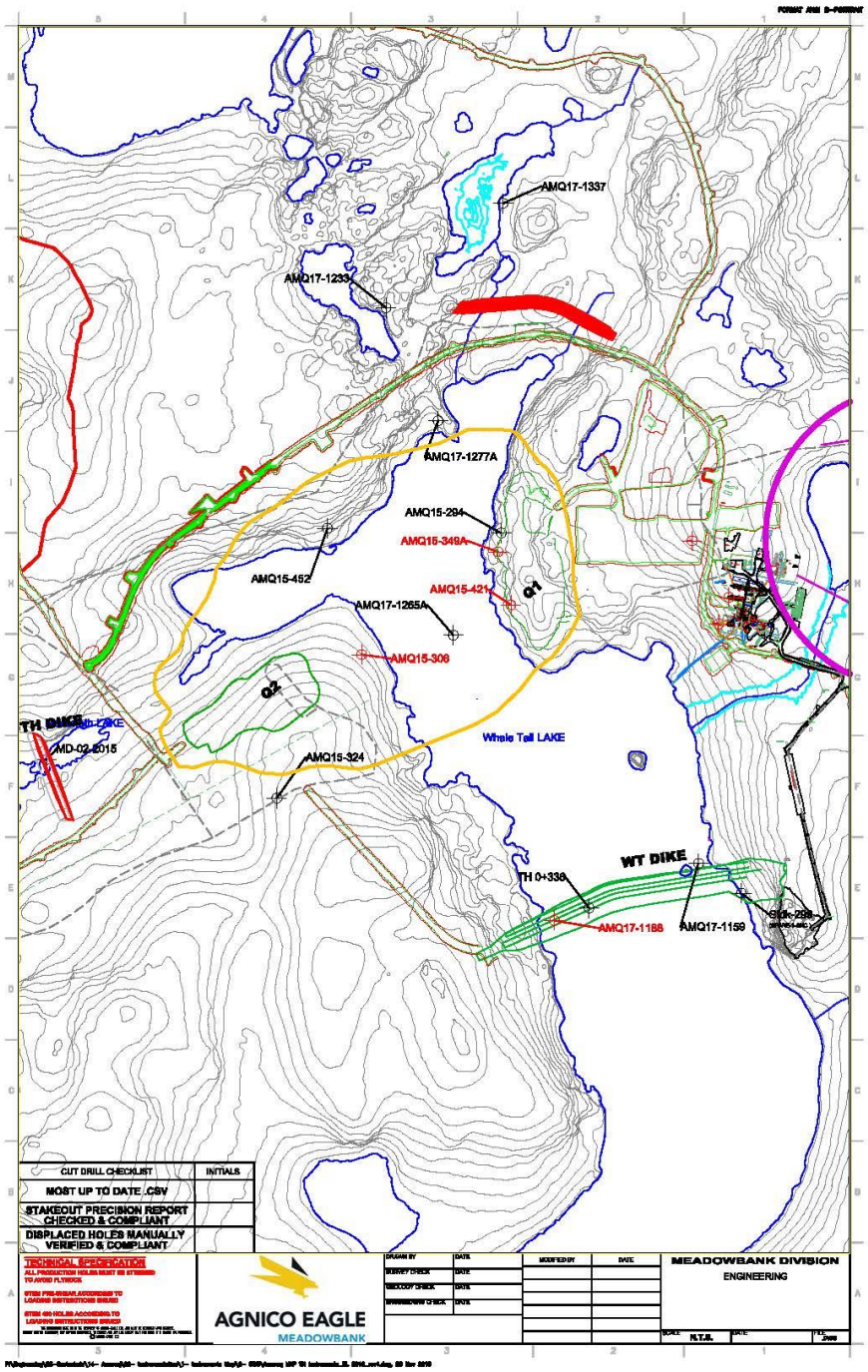


Table 1: Summary of Active Thermistors within the Project Site

Borehole	Year Installed	Location	Collar Coordinates					Depth Below Ground Surface (m)	Reading Mode
			Northing	Easting	Elevation (m)	Inclination (deg)	Azimuth (deg)		
AMQ15-294	2015	Whale Tail Pit, at East Lake Shore (Approved Project)	607,073.2	7,255,676.1	155.9	-45.18	322.7	144.4	Data Logger
AMQ15-306	2015	Whale Tail Pit, at West Lake Shore (Approved Project)	606,714.8	7,255,363.8	154.9	-45.41	96.3	141.5	Data Logger
AMQ15-324	2015	To the southwest of Whale Tail Pit, at West Lake Shore (Approved Project)	606,496.8	7,254,995.2	161.8	-55.46	325.5	317.4	Data Logger
AMQ15-452	2015	Whale Tail Pit, at Northwest Lake Shore (Approved Project)	606,627.2	7,255,687.9	156.2	-49.98	159.5	382.3	Data Logger
AMQ17-1265A	2017	Within Whale Tail Lake and Whale Tail Pit (Approved Project)	606,950.1	7,255,413.6	152.5	-80.0	196.0	349.6 (depth below lake level)	Manual Reading
AMQ17-1233	2017	IVR Pit, at East Shore of Lake A49	606,777.7	7,256,253.8	161.9	-59.06	252.7	132.4	Manual Reading
AMQ17-1337	2017	IVR Pit, at East Shore of Lake A47 (Expansion Project)	607,078.4	7,256,522.0	155.2	-59.62	260.4	218.0	Data Logger
AMQ17-1277A	2017	Whale Tail Pit, at North Lake Shore (Approved Project)	606,911.1	7,255,963.6	153.2	-60.17	193.1	217.4	Data Logger
MD-02-2015	2015	Mammoth Dike	605,906.1	725,5094.5	NA	NA	NA	15	Manual Reading
AMQ17-1159	2017	Whale Tail Dike (Approved Project)	607,580.2	725,4827.6	NA	NA	NA	20	Manual Reading

Borehole	Year Installed	Location	Collar Coordinates					Depth Below Ground Surface (m)	Reading Mode
			Northing	Easting	Elevation (m)	Inclination (deg)	Azimuth (deg)		
AMQ17-1188	2017	Whale Tail Dike (Approved Project)	607,209.9	725,4681.3	NA	NA	NA	50	Data Logger
TMRCK-3	2017	Whale Tail Dike (Approved Project)	607,638.3	725,4906.5	NA	NA	NA	20	Data Logger
Stkd299	2017	Whale Tail Dike (Approved Project)	607,689.9	725,4751.0	NA	NA	NA	15	Manual Reading

NA=data not available.

2.5 PREVIOUS THERMAL MODELLING

Several thermal modelling exercises have been conducted to predict variations in the thermal regime of the permafrost. Modelling results are presented in the following reports:

- 2015 Site Permafrost Characterization by Knight Piésold (2015).
- 2017 Whale Tail Lake Thermal Assessment by Golder (2017a).
- 2017 and 2018 Golder Whale Tail Waste Rock Storage Facility thermal analyses for cover design by Golder (2017b, 2018b).
- 2018 Pit Lake Post Closure Thermal Assessment by Golder (2018a).
- 2018 Dike Thermal Assessment by SNC-Lavalin (2018).
- 2019 Whale Tail Lake Thermal Assessment (2D Thermal Model and 3D Block model) by Golder (2019)

Results obtained from some of these studies have been used to define and reassess the permafrost baseline conditions summarized in Section 2.6. Results of modelling exercises associated with operation and closure of the different facilities will be used as reference to support detailed design of the instrumentation program for each facility.

2.6 SUMMARY OF CURRENT PERMAFROST CONDITIONS

Current permafrost conditions on the Project site were estimated as follows based on thermistor data up to October 2017 and previous works.

- The depth of permafrost in the project site is estimated to be in the order of 452 to 522 m based on thermal gradients and ground temperatures at the lowest portions of the thermistor strings.
- The extrapolated mean annual ground surface temperature is estimated to be in the range of -3.4 to -9.9 °C.
- The estimated depths of zero amplitude from temperature profiles measured by the existing thermistors range from 18 m to 35 m.
- The temperatures at the depths of zero amplitude are in the range of -3.1 °C to -8.6 °C.
- The geothermal gradient estimated based on the lowest 70 to 100 m of the thermistor strings is in the range of 0.004 °C/m (AMQ15-294) to 0.052 °C/m (AMQ15-306).
- Based on the measured salinity concentration of 0.3% to 0.4% from groundwater samples collected on site, a freezing point depression of about 0.2 °C is estimated, which may reduce the frozen ground depth by approximately 20 m.

Ground thermal conditions under Whale Tail Lake were estimated by both thermal assessment and thermistor data. The results indicate the following:

- Under the northern portion of the lake including under the proposed pit location and along the proposed ramp area, there is likely a closed talik formation.
- An open talik is expected in the southern portion of the lake where it becomes wider and deeper.

- Data from the thermistor AMQ17-1265A installed within the lake (near southeast side of the Pit) suggests the talik depth at this location is about 112 m from the lake water level. Permafrost is present beneath the talik at that location to a depth of about 343 m.

3 THERMAL MONITORING PLAN

This section presents a general description of each facility, the expected thermal effects on the permafrost, planned thermal monitoring and results documentation. The monitoring program will allow for evaluation of the actual impacts on the permafrost thermal regime during construction, operations, and closure of the facilities, as well as for the post-closure period.

The information presented herein will be reviewed periodically during operations to reflect the actual site conditions.

3.1 WASTE ROCK STORAGE FACILITIES

3.1.1 Facility Description

Waste rock storage facilities in the Project site will include: Whale Tail WRSF, IVR WRSF, and Underground WRSF. The Whale Tail WRSF is located north-west of the open pit and includes an area for storage of NPAG rock. The IVR WRSF is located east of the IVR Pit for storage of waste rock from mining of IVR Pit. The currently approved Underground WRSF (Licence No. 2BB-MEA1828) will be expanded to the north to accommodate additional storage from the underground operations.

Waste rock and overburden will be trucked to the WRSF throughout mine operations, with distribution between the different waste rock storage facilities based on the operational mine plan.

NPAG low leachability waste rock may be used for construction activities. The remaining NPAG waste rock and overburden material will be hauled to the Whale Tail WRSF.

Construction of the Whale Tail WRSF will incorporate 20-m high benches composed of four 5-m thick layers. Each bench toe will start at a setback distance of 20 m from the crest of the previous bench to form an overall side slope of 2.5H:1V. A similar design approach will be adopted for the IVR WRSF and Underground WRSF.

The diorite and south greywacke material, which are both non-acid generating and non-metal leaching, represent approximately 17% of the waste rock to be mined from the open pit and can be used as cover material for the WRSF. Closure of the WRSF will begin when practical as part of the progressive reclamation program. As part of the Whale Tail Pit – Waste Rock Management Plan (Agnico Eagle 2018), the Whale Tail, IVR, and Underground WRSFs will be covered with non-potentially acid generating and non-metal leaching (NPAG/NML) waste rock to promote freezing of the piles as a control strategy to prevent acid generation and transport of contaminants.

3.1.2 Expected Thermal Effects on Permafrost

Construction of the Whale Tail, IVR, and Underground WRSFs on the permafrost is expected to result in aggradation of permafrost into the piles. The permafrost under the piles 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 located within the waste rock piles.

The waste rock piles are expected to freeze back with time and have an active layer formed within the thermal rock cover placed on top of the facilities according to the thermal assessment on the Whale Tail WRSF by Golder (2018b). Thermal responses in the IVR is expected to be like the

Whale Tail WRSF. Waste rock from the Underground WRSF will be used in operation as underground backfill material, this location will be reclaimed during the closure period.

Climate change in the long-term is expected to increase temperatures in the piles, but the thick waste rock piles 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 source, the upper portion of the permafrost foundation could be impacted.

3.1.3 Thermal Monitoring

Currently there are no thermistors installed in the footprints of the proposed Whale Tail and IVR WRSFs, nor in the existing Underground WRSF area due to operational constraints that make it difficult to install instruments at individual rockfill benches that are under construction.

Thermistors will be installed progressively through the waste rock and underlying permafrost during construction of the piles to monitor the evolution of temperature profiles with time and to evaluate if the process of permafrost aggradation is developing as anticipated. During construction of the piles, thermistors will be installed in completed benches, and additional thermistors will be installed on top of the piles upon the end of operations and installation of the rock cover for closure of the facilities. Thermistors installed after placement of the thermal cap on top of the facilities will be used to assess whether the defined cover thickness of 4.7 m (Golder 2018b) is effective to maintain the PAG waste rock away from the active zone subject to seasonal freezing and thawing.

The thermistor strings will be connected to data loggers for automatic data collection and storage. Data will be reviewed periodically or as-needed and results will be reported as described in Section 4. Thermistors damaged during operation will be replaced when practical and within short distance from original locations to allow for continuation of monitoring.

The thermal monitoring of the Whale Tail and IVR WRSFs will be based on thermal modelling objectives for the site. Supplemental thermal modelling may be considered for evaluation of the long-term performance of the rock cover on top of the WRSF. If thermal modelling is required, results obtained from thermistor strings will be used for model calibration purposes.

3.2 WATER MANAGEMENT FACILITIES

3.2.1 Facility Description

Water management infrastructure includes contact water collection ponds, freshwater collection ponds, diversion channels, retention dikes, dams, culverts, water treatment plant for effluent, potable water treatment plant, sewage treatment plant, and a discharge diffuser. All contact water on-site will be directed to the Attenuation Ponds. Contact water will be treated and then released to the receiving environment through a discharge diffuser.

The Whale Tail Dike will be constructed before operations to allow mining of the Whale Tail Pit. After dewatering of the lake area downstream of the dike the operational lake water level upstream of the dike is predicted to be at El. 156 masl, about 3.5 m higher than the current average lake level. The dike will be breached during closure to restore the lake and will form permanent pit lakes as the open pits are flooded.

The Mammoth Dike is also a dewatering structure to be constructed at west side of the Whale Tail Pit, and east side of Mammoth Lake to limit flow from Mammoth Lake into the pit. Similarly, the Northeast Dike will be constructed to limit inflow from lakes A46, A47, and AP68, but this dike will be removed in 2020 to allow for construction and operation of the IVR Pit .

The Whale Tail Attenuation Pond will be located between the Whale Tail Dike and the Whale Tail Pit to collect mine water, runoff and seepage from the dike. The pond operational water level is expected to be at El. 146 masl. Refer to the thermal analysis for the dikes prepared by SNC (2018).

Three GSPs will be constructed west of the IVR WRSF to manage underground contact water.

Lake A53 and adjacent smaller lakes, which are located south of the IVR WRSF and southeast of the Underground WRSF, will be used as the IVR Attenuation Pond.

The Whale Tail WRSF Dike is a water retaining dam to store contact water from the Whale Tail waste rock pile and form the Whale Tail WRSF Pond. The facility will be emptied annually, and water will be pumped to the Attenuation Pond. Similarly, the IVR WRSF Dikes are planned to function as water retaining structures to retain contact water from the IVR WRSF and confine the GSPs.

3.2.2 Expected Thermal Effects on Permafrost

The Whale Tail Dike will be 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 compared to lake water temperature. Minimal effects to the permafrost at the abutment areas are expected.

Upon 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 Whale Tail 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 restore the original lake talik. The other dewatering dikes are expected to have similar thermal impacts on the permafrost associated with construction, operation and closure of the dikes.

The WRSF Dike may 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.

The talik zone under the Whale Tail Attenuation Pond would remain, but talik depth 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.

Similarly, the talik zone under Lake A53 used as the IVR Attenuation Pond would remain unchanged, unless there is a significant increase in the lake footprint associated with operation of the attenuation pond.

The GSPs will be partially constructed in the footprint of shallow lakes surrounded by permafrost. The impact of these ponds on permafrost will depend on how large and deep the ponds become. If the ponds become much larger than existing lakes, the surrounding surficial permafrost zone may be affected.

3.2.3 Thermal Monitoring

There are thermistors currently installed in the Whale Tail Dike and Mammoth Dike and WRSF areas. No thermistors are present in Northeast Dike. If required, additional thermistors will be installed after construction of the dikes along the dike alignments, dike abutments, and adjacent lake shore areas to monitor changes in the thermal regimes, monitor performance of the dikes and to confirm/validate the expected effects as described above. The exact location, quantity and specifications of new thermistor lines will be defined in future based on the actual layout of site facilities.

Thermistors have not been installed within the footprint of the Whale Tail and IVR Attenuation Ponds. Considering that the Attenuation Ponds are not anticipated to have any negative effects on permafrost due to their planned locations within an existing talik areas, probably there will be no need for installation of thermistors in these areas.

There are currently no thermistors in the footprint of the proposed GSPs. These ponds rely on permafrost to prevent seepage water from flowing into the open pits. Thermistors will be installed adjacent to the ponds to monitor and confirm that the ponds are not impacting the surrounding permafrost areas.

At the locations of the IVR dikes, thermistors will be installed within the dike footprint to monitor variations in the underlying permafrost condition.

All new thermistors will be connected to data loggers for automatic data collection and data storage. Existing thermistors that are not connected to a logger will be read manually, in at least monthly basis or be further connected to data loggers.

3.3 WHALE TAIL PIT

3.3.1 Facility Description

The proposed Whale Tail Pit will extend across the northern edge of Whale Tail Lake. During the initial phase, ore will be mined from the Whale Tail Pit and processed over a three to four-year mine life. Additional ore will be mined out from the expanded Whale Tail Pit. The ultimate base of the pit is designed to be at El. -127.6 masl, about 280.1 m below the existing average lake water level of 153.5 masl.

Construction upgrades to support the Expansion Project will begin as soon as approval and permits for the amendment applications are received (anticipated for early 2020). The operational phase will span seven years from Year 1 (2019) to Year 7 (2025). Mining activities are expected to end in Year 7 (2025) and ore processing is expected to end during Year 8 (2026). Closure will occur from Year 8 (2026) to Year 24 (2042) after the completion of mining and will include removal of the non-essential site infrastructure and flooding of the mined-out open pits and underground infra-structure, as well as reestablishment of the natural Whale Tail Lake water level.

The Whale Tail pit lake is expected to reach El. 146.3 masl in 2040, and will eventually be connected to the IVR pit lake when the Whale Tail Lake is restored to natural conditions with water level around 153.5 m.

3.3.2 Expected Effects on Permafrost

The 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. except for a shallow active zone adjacent to the pit walls subjected to seasonal thawing during summer.

Upon closure and subsequent flooding of the 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 thousand of years) to complete.

3.3.3 Thermal Monitoring

A total of eight thermistors are currently active in the proposed pit area, but some of the existing thermistors may be destroyed during pit mining. Additional thermal investigations around the pit may be undertaken; the need for this will be defined during mining.

Existing thermistors that remain active or new thermistors installed in this area will be connected to data loggers for automatic data collection and data storage. Data will be reviewed periodically or as-needed.

3.4 IVR PIT

3.4.1 Facility Description

The proposed IVR Pit for the Expansion Project is located to the north of the Whale Tail Pit and will extend from the northern edge of Whale Tail Lake to Lake A-P38 (refer to Figure 1). The base of IVR Pit is designed to be at El. 46.3 masl, about 106.2 m below the existing average lake water level of 153.5 masl.

Construction and pre-stripping of the IVR Pit is scheduled to begin in Q3 2020; mining of the expanded pits and underground zone may begin in Q4 of 2020.

The IVR Pit mining is anticipated to start after completion of Whale Tail Pit mining. After completion of mining in IVR Pit, pit flooding is anticipated to commence in 2026. The pit lake level is expected to reach El. 149.3 masl in 2027, and would eventually be connected to the Whale Tail Pit Lake as conditions in the Whale Tail lake are restored with average water level of 153.5 masl.

3.4.2 Expected Effects on Permafrost

Effects of the IVR Pit on the permafrost are similar to those described for the Whale Tail Pit. The IVR Pit will be excavated through permafrost, although within the pit footprint, closed lake talik is expected under a few small lakes such as A47, A49, and A46. During lake dewatering and operations of the pit the lake talik zones are expected to freeze back progressively and permafrost zones surrounding lower portions of pit walls will, in general, experience reduction in temperature

except for a shallow active zone adjacent to the pit walls subjected to seasonal thawing during summer.

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

3.4.3 Thermal Monitoring

Two thermistors are currently active in the proposed area of the pit (refer to Table 1), but these thermistors are expected to be destroyed during pit mining. Additional thermal investigations around the pit will be undertaken with installation of new thermistors; details of this study will be defined prior to mining in 2020.

Thermistors in the area will be connected to data loggers for automatic data collection and data storage. Data will be reviewed periodically or as-needed, and results will be reported as summarized in Section 4.

3.5 WHALE TAIL LAKE SHORE

The shore of Whale Tail Lake south basin will be affected by increased water levels upstream of the Whale Tail dike, while the shores of the Whale Tail Lake north basin will be affected by lake dewatering downstream of the dikes, mining of open pit, and re-flooding after breaching of dewatering dikes during closure of the facilities.

The design lake level of El. 156 masl upstream of the Whale Tail Dike is about 3.5 m higher than the current average lake water level. This will result in flooding of part of the lake shore and shallow thawing of the upper portion of the permafrost during operations. Nevertheless, given the short mine operation period of seven years, the impact is anticipated to be small. Deeper portions of the permafrost in newly flooded areas upstream of the dikes are not expected to be affected significantly. After the dewatering dikes are breached for closure, the lake level is planned to be lowered to 153.5 m, a metre higher than current average conditions, to compensate for loss of fish habitat. This will cause some portions of the Whale Tail lakeshore that had been flooded during operation to remain with shallow water after closure, possibly causing the uppermost portion of permafrost immediately below these areas to thaw. This increase in lake elevation will however not have any significant impact to permafrost conditions in general.

There are thermistors currently installed on the lake shore of Whale Tail North Basin. These thermistors will monitor thermal conditions on the shore prior to, during and after operations into post-closure.

There are no thermistors installed on the lake shore of Whale Tail South Basin upstream of the dike. Given the short period of time (up to seven years) during which the lake shore in the South Basin will be flooded, the effects on the permafrost will be temporary and limited to a shallow upper portion of the ground. It is not considered necessary to install additional thermistors in that area.

Thermistors on the shore of Whale Tail North Basin will be connected to data loggers for automatic data collection and storage. Data will be reviewed periodically or as-needed, and results will be summarized in annual monitoring reports during operations and for five years after closure.

Inspections of the lakeshore will be conducted yearly during operations to evaluate lakeshore conditions and look for signs of instability such as localized landslides. Any important impact on the lakeshore conditions due to the temporary flooding will be remediated upon closure.

3.6 UNDERGROUND OPERATIONS

3.6.1 Facility Description

The proposed underground structures are located mainly beneath the Whale Tail Pit but extend to the east side of IVR Pit. The underground mining is anticipated to begin in Q4 of 2020. As part of the closure plan, the underground mining will be flooded with natural water.

3.6.2 Expected Effects on Permafrost

The underground operations will be developed through permafrost, although the lower portion of the underground ramps may be in unfrozen ground below the permafrost. During the underground operations, warm air will circulate through underground infrastructure during summer, possibly leading to localized summer thawing of permafrost zones immediately adjacent to the ramps, tunnels and shafts. In winter, with circulation of colder air, these zones will freeze back. A thermal equilibrium between the structures and surrounding permafrost may be reached during the operations. Similarly, backfilling of underground structures with waste rock is not expected to have any significant impact in surrounding permafrost zones.

Upon closure and subsequent flooding of the pits and underground infrastructure, permafrost areas underneath or adjacent to the pit lake are expected to gradually thaw. Thermal assessments have indicated this process would take hundreds to thousands of years. The flooded underground infrastructure will probably accelerate thawing of permafrost zones immediately adjacent to the area in the short to mid terms but, due to its limited footprint, flooding of underground structures is not expected to impact significantly the overall permafrost thawing process under the pit lake.

3.6.3 Thermal Monitoring

Some of the existing thermistors adjacent to the pits, if not destroyed during pit mining, may continue to be used for monitoring both the pit and underground structures. Additional thermal investigations including installation of few thermistors along the underground infrastructure may be undertaken; the need for this will be defined during mining.

Thermistors in this area will be connected to data loggers for automatic data collection and data storage. Data will be reviewed periodically or as-needed, and results will be summarized in annual monitoring reports as described in Section 4.

4 REPORTING

Results obtained from the instrumentation installed at the different facilities will be presented in annual reports during mine operation, and for five years after closure. The reports will include: a) plots of instrumentation data, b) data interpretation and discussion on measured vs. expected thermal behaviour of the different facilities, c) evolution of permafrost conditions and, d) recommendations, if required, for supplemental instrumentation or monitoring activities.

The frequency of data reporting will be reviewed five years after closure and can be reduced based on the evolution of permafrost conditions after closure of the mine. The monitoring program will be discontinued when instrumentation data provide sufficient evidence that permafrost conditions have stabilized.

5 ADAPTIVE MANAGEMENT

The Thermal Monitoring Plan presented in this document is intended to constitute a guide for instrumentation and monitoring of the Project facilities to evaluate the effects of mine developments on the thermal regime of the natural ground and relevant site infrastructure.

The instrumentation program at the different facilities will consist primarily of thermistor strings installed as needed. Data obtained from the thermistor strings will constitute the primary source of information for evaluation of changes in the thermal regime of the permafrost basin associated with construction, operations, and closure of the mine facilities.

The actual schedule of instrumentation installation, quantities, type of instrument, location, depth and length of thermistor strings to be installed will be defined specifically for each facility based on the mine plan, construction schedule and accessibility. An adaptive management approach for the instrumentation program is adopted, so the activities listed in this Plan will be periodically reviewed to reflect the dynamics of site development and operation. Decisions on installation of supplemental sensors during operation and after closure will be based on the results of the monitoring program.

Installation of different types of instrumentation such as vibrating-wire piezometers, monitoring wells and oxygen probes may be considered in the future in areas such as the WRSF if there is a need to better understand the process of water percolation, air-flow convection and heat generation within the piles.

Refer to the ARD-ML management plan for the WRSF adaptive management strategy and to the Groundwater Monitoring plan for specific adaptive management strategy related to groundwater movement on site.

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APPENDIX A: THERMAL DATA RESULTS

AGNICO EAGLE

APPENDIX A

Subject: Summary of Thermal monitoring at Whale Tail Site from 2015-2018

This document present a summary of the thermal monitoring at the Amaruq project from 2015 to 2018. During that period, thermistor strings were installed around the Amaruq site to support various studies for the construction of the different infrastructures of the project.

A total of 14 boreholes for thermistors were installed between May 2015 and December 2018. 10 of the installation are still functional and continue to be monitored on a bi-weekly basis, either manually or with Dataloggers.

Table 1 present the thermistors installation, their coordinate and their status.

Figure 1 show a plan view of the location of the thermistors installed between May 2015 and December 2018.

Figure 2 to 15 present the thermistors data with a description of the instrument and the thermal results highlights for the active instruments.

Table 1: Permanent and temporary thermistors installation coordinates and status

Name	Area	Easting (X)	Northing (Y)	Elevation (Z)	Azimuth	Dip	Installed	Active (Y) or (N)
AMQ17-1159	WTD	607580.20	7254827.60	152.56	--	-90	2017	Y
AMQ17-1188	WTD	607209.90	7254681.30	151.76	--	-90	2017	N
Stkd299	WTD	607689.94	7254751.01	153.74	--	-90	2017	Y
MD-02-2015	MD	605906.10	7255094.50	152.27	--	-90	2015	Y
AMQ15-294	WTP	607073.20	7255676.10	155.93	322.67	-45.18	2015	Y
AMQ15-349 A	WTP	607064.90	7255627.50	155.30	204.41	-45.32	2015	N
AMQ15-421	WTP	607098.30	7255490.80	155.09	273.93	-51.31	2015	N
AMQ15-306	WTP	606714.80	7255363.80	154.92	96.30	-45.41	2015	N
AMQ15-324	WTP	606496.80	7254995.20	161.79	323.41	-55.46	2015	Y
AMQ15-452	WTP	606627.20	7255687.90	156.16	159.5	-49.98	2015	Y
AMQ17-1265 A (2)	WTP	606950.00	7255414.00	140.00	196.03	-79.99	2017	Y
AMQ17-1277 A	WTP	606911.00	7255964.00	153.00	193.06	-60.17	2017	Y
AMQ17-1337	IVR	607078.00	7256522.00	155.00	260.37	-59.62	2017	Y
AMQ17-1233	IVR	606778.00	7256254.00	162.00	252.71	-59.06	2017	Y
WTD TH-0+142	WTD	607119.93	7254637.98	157.00	--	-90	2018	Y
WTD TH-0+190	WTD	607165.34	7254653.83	157.00	--	-90	2018	Y
WTD TH-0+210	WTD	607182.89	7254666.21	157.00	--	-90	2018	Y
WTD TH-0+260	WTD	607227.54	7254686.18	157.00	--	-90	2018	Y
WTD TH-0+276	WTD	607237.43	7254677.47	157.00	--	-90	2018	Y
WTD TH-0+310	WTD	607273.97	7254707.04	157.00	--	-90	2018	Y
WTD TH-0+360	WTD	607318.76	7254727.18	157.00	--	-90	2018	Y
WTD TH-0+407	WTD	607363.05	7254744.87	157.00	--	-90	2018	Y
WTD TH-0+453	WTD	607408.62	7254753.75	157.00	--	-90	2018	Y
WTD TH-0+520	WTD	607473.78	7254764.25	157.00	--	-90	2018	Y
WTD TH-0+607	WTD	607561.18	7254778.36	157.00	--	-90	2018	Y
WTD TH-0+675	WTD	607626.34	7254788.87	157.00	--	-90	2018	Y
WTD TH-0+710	WTD	607662.29	7254790.63	157.00	--	-90	2018	Y
WTD TH-0+750	WTD	607701.78	7254797.00	157.00	--	-90	2018	Y
WTD TH-0+772	WTD	607724.09	7254804.66	157.00	--	-90	2018	Y
MD TH-01	MD	605914.18	7255097.26	153.54	--	-90	2019	Y
MD TH-02	MD	605926.22	7255102.63	154.93	--	-90	2019	Y
MD TH-03	MD	605912.68	7255097.55	154.07	--	-90	2019	Y
WRSFD TH-01	WRSF	605414.51	7255528.27	157.91	--	-90	2019	Y
WRSFD TH-02	WRSF	605416.45	7255526.76	159.07	--	-90	2019	Y
WRSFD TH-03	WRSF	605414.98	7255545.01	155.29	--	-90	2019	Y

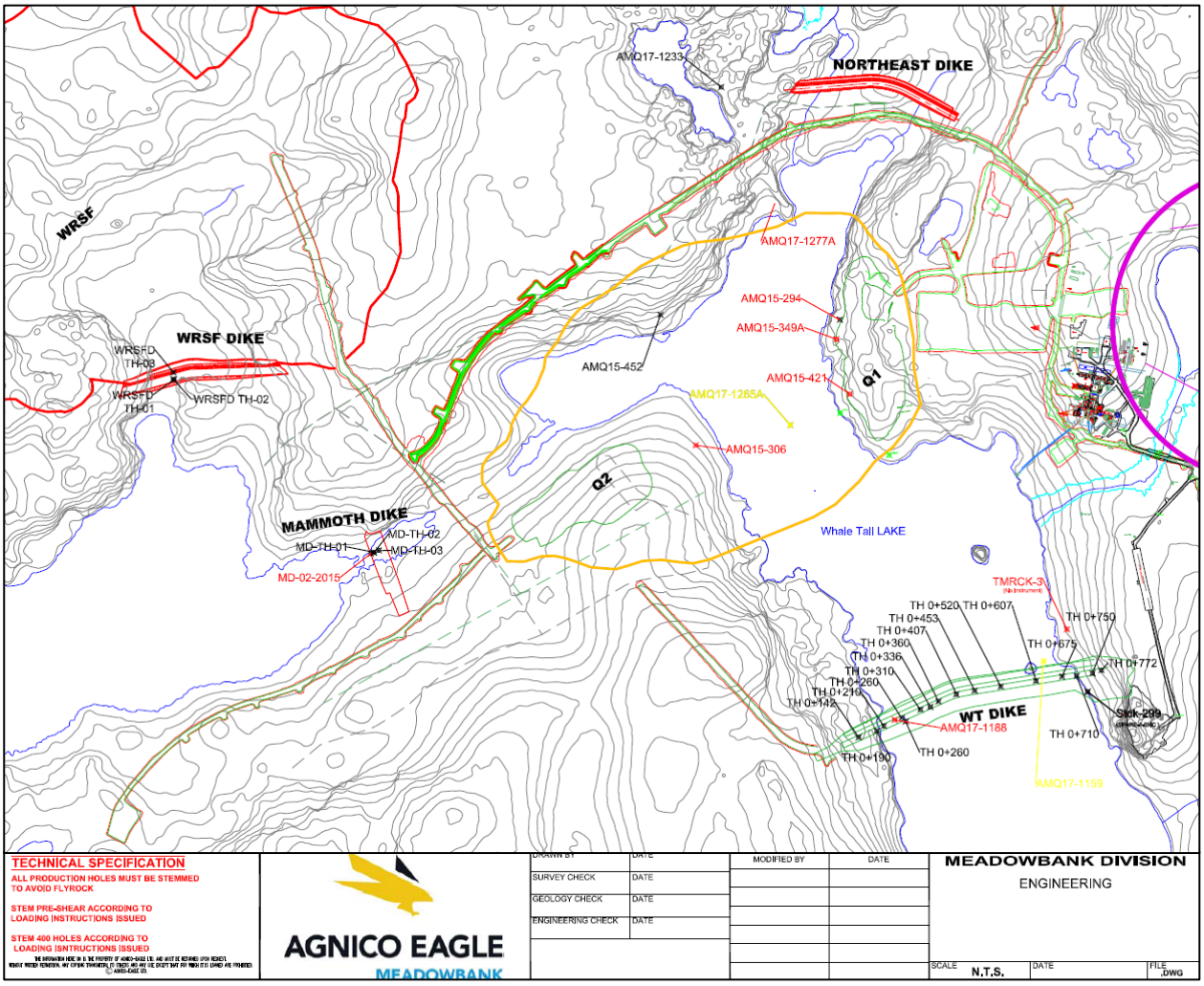


Figure 1: Amaruq Thermistor Location Plan View (active instrument in black)

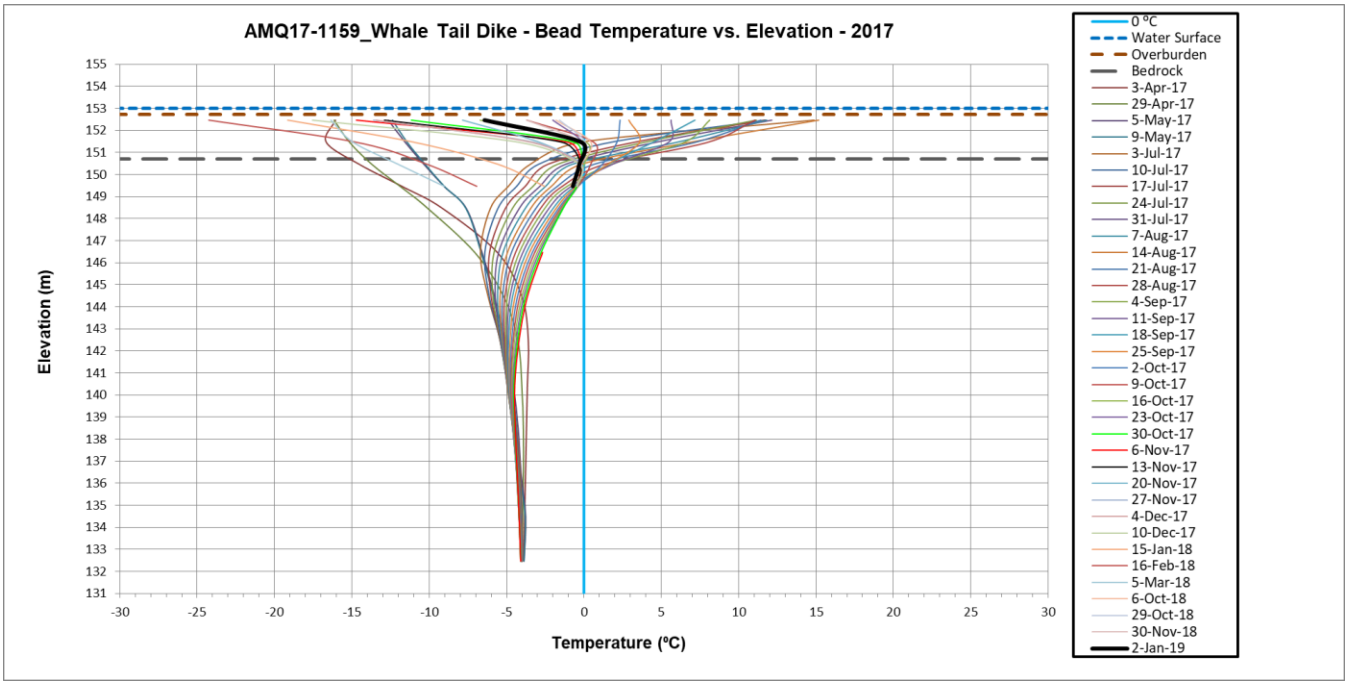


Figure 2: Temperature profile (Celsius) as a function of elevation (masl) from installation to January 2019 for thermistor AMQ17-1159

Location of the instrument:

- In proximity of the east abutment of Whale Tail dike; in shallow water (0.3m).
- Depth : 20.2m

Monitoring objective:

- Thermal condition of the surficial overburden under Whale Tail dike foundation

Thermal results highlights:

- Active layer: 3.2m (from elev. 152.7 to 149.5)
- Depth of zero annual amplitude: 13.7m (from elevation 152.7 to 139)
- Steady permafrost temperature of around -4ºC down to bottom of hole (elev 132.5)
- Geothermal gradient: Thermistor not deep enough to evaluate gradient
- Permafrost thickness: > 17m; Thermistor not deep enough to reach bottom of permafrost layer.

Annual variation in ground temperature: Similar from 2017 to 2018.\

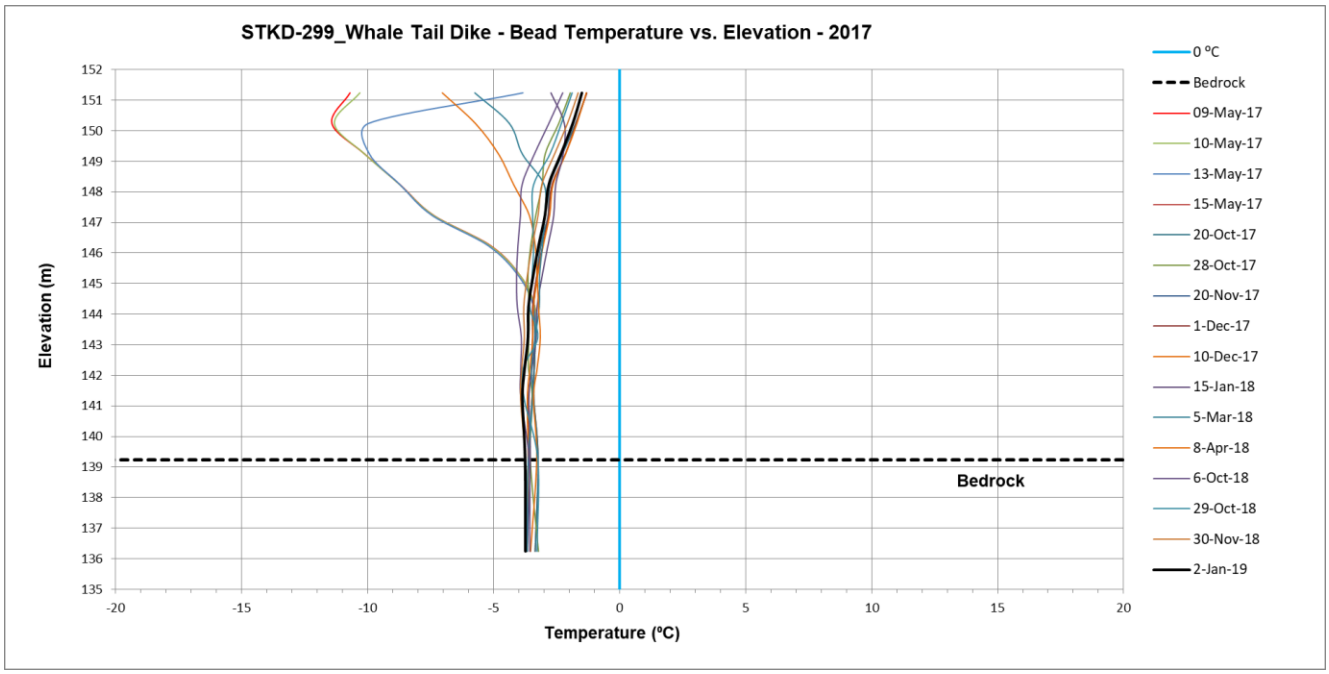


Figure 3: Temperature profile (Celsius) as a function of elevation (masl) from installation to January 2019 for thermistor STKD-299

Location of the instrument:

- In proximity of the east abutment of Whale Tail dike; on the shore.
- Depth : 16.0m

Monitoring objective:

- Thermal condition of the surficial overburden under Whale Tail dike foundation

Thermal results highlights:

- Active layer: Unknown ; Lack of surficial thermistor beads
- Depth of zero annual amplitude: 8.4m (from elevation 152.4 to 144)
- Steady permafrost temperature of around -3.7ºC down to bottom of hole (elev 136.2)
- Geothermal gradient: Thermistor not deep enough to evaluate gradient
- Permafrost thickness: > 15m; Thermistor not deep enough to reach bottom of permafrost layer.
- Annual variation in ground temperature: Similar from 2017 to 2018.

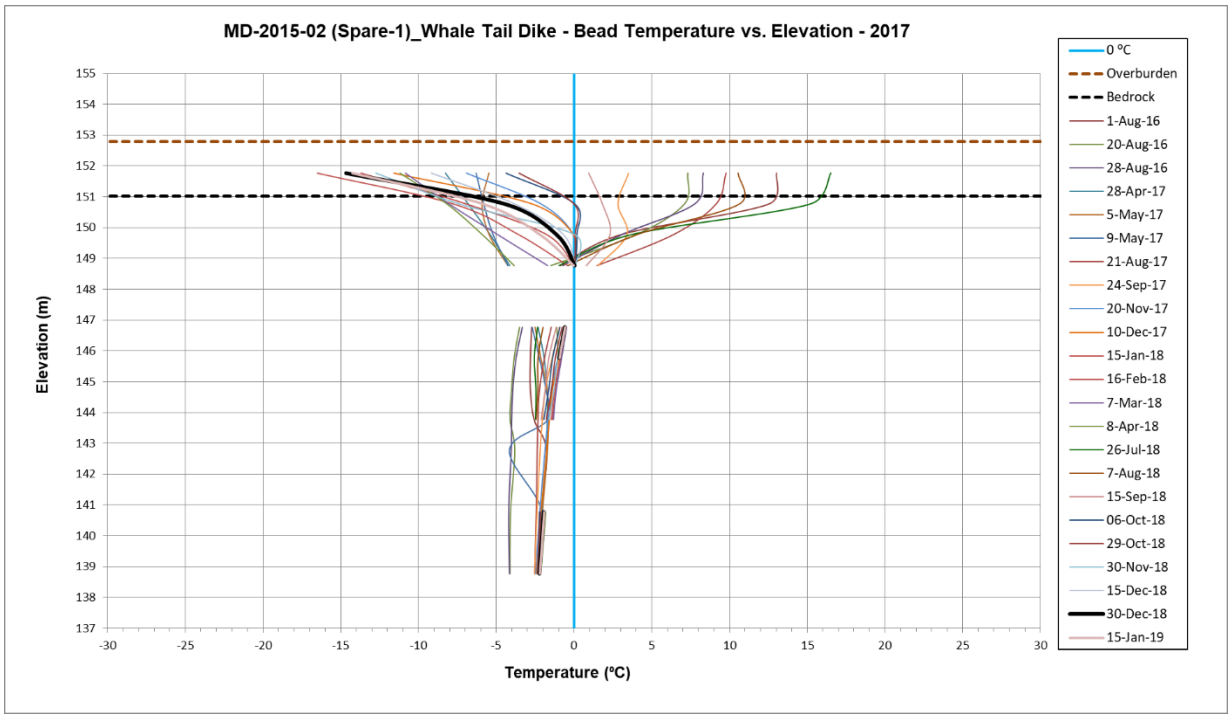


Figure 4: Temperature profile (Celsius) as a function of elevation (masl) from installation to January 2019 for thermistor MD-2015-02

Location of the instrument:

- In proximity of the deepest portion of Mammoth dike; in shallow water (<0.3m).
- Depth : 14.1m

Monitoring objective:

- Thermal condition of the surficial overburden under Mammoth dike foundation

Thermal results highlights:

- Active layer: 4.3m (from elev. 152.8 to 148.5)
- Depth of zero annual amplitude: 11.8m (from elevation 152.8 to 141)
- Steady permafrost temperature of around -2.1ºC down to bottom of hole (elev 138.7)
- Geothermal gradient: Thermistor not deep enough to evaluate gradient
- Permafrost thickness: > 9.8m; Thermistor not deep enough to reach bottom of permafrost layer.
- Annual variation in ground temperature: Similar from 2017 to 2018. 2016 data looks offset by -1 ºC

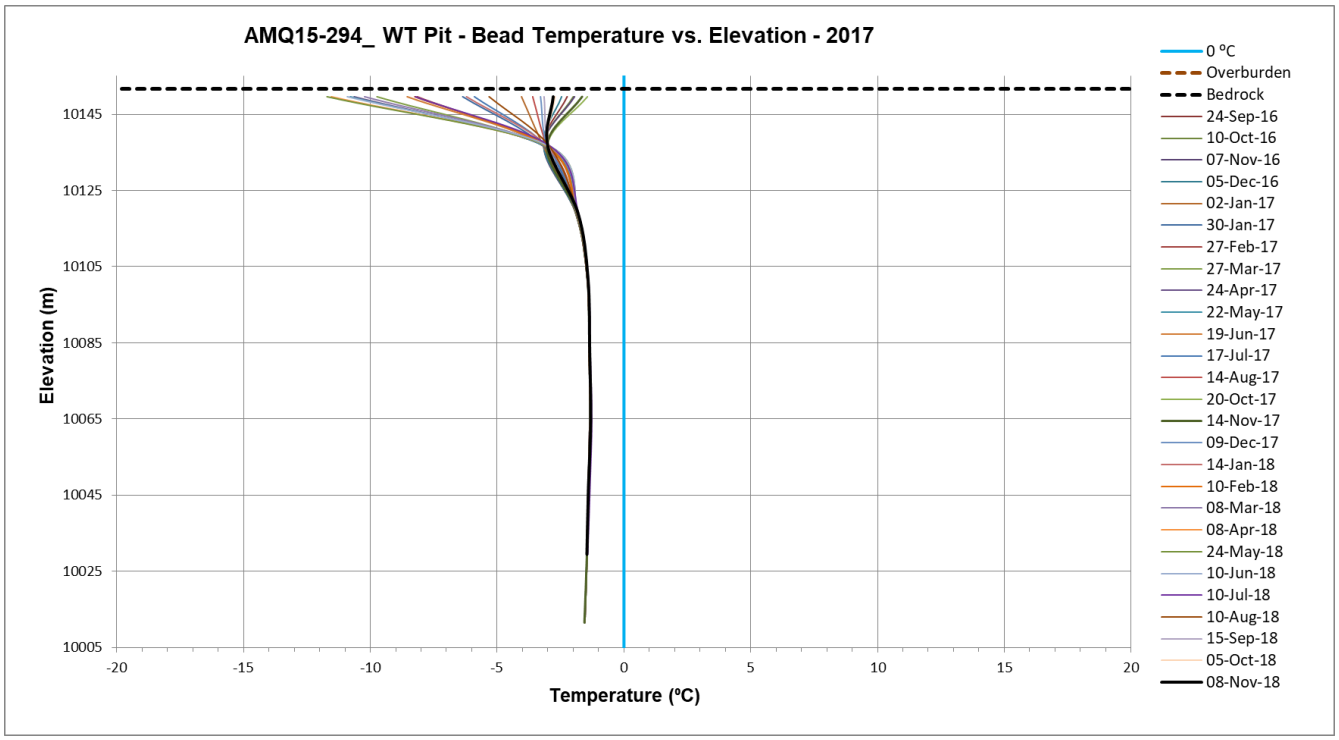


Figure 5: Temperature profile (Celsius) as a function of elevation (masl) from installation to November 2018 for thermistor AMQ15-294

Location of the instrument:

- Within the Whale Tail pit footprint (east wall). On the shore (not the lake).
- Depth : 144.4m

Monitoring objective:

- Thermal condition of the open pit walls (east). Calibration of the global thermal model.

Thermal results highlights:

- Active layer: Unknown ; Lack of surficial thermistor beads (not the objective of the instrument)
- Depth of zero annual amplitude: Unknown ; Lack of surficial thermistor beads (not the objective of the instrument)
- Steady permafrost temperature of around -1.4ºC down to bottom of hole (elev 011.5)
- Geothermal gradient: Thermistor not deep enough to evaluate gradient
- Permafrost thickness: > 140m; Thermistor not deep enough to reach bottom of permafrost layer.
- Annual variation in ground temperature: Similar from 2016 to 2018. Instrument broken as of nov 2018.

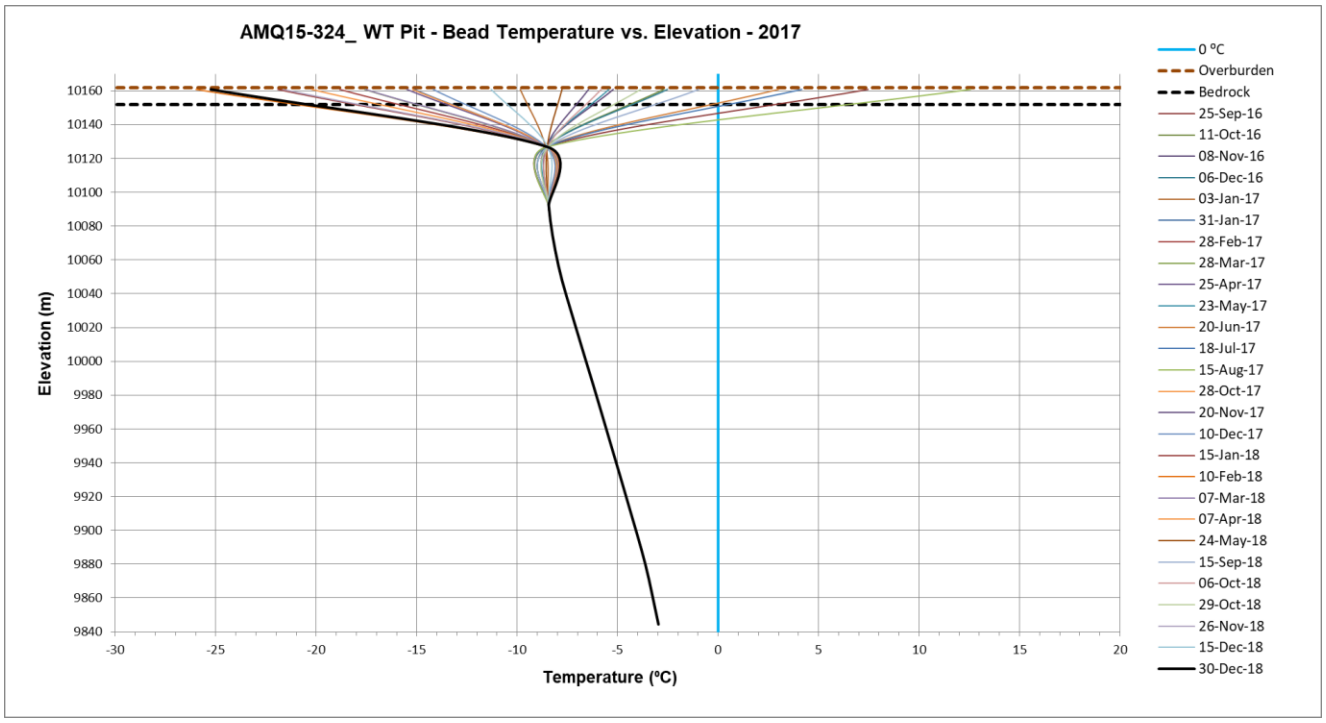


Figure 6: Temperature profile (Celsius) as a function of elevation (masl) from installation to December 2018 for thermistor AMQ15-324

Location of the instrument:

- West of Whale Tail Lake and Whale Tail pit.
- Depth : 317 m

Monitoring objective:

- Thermal condition of deep permafrost (far from talik influence). Calibration of the global thermal model.

Thermal results highlights:

- Active layer: Unknown ; Lack of surficial thermistor beads (not the objective of the instrument)
- Depth of zero annual amplitude: Unknown ; Lack of surficial thermistor beads (not the objective of the instrument)
- Variable permafrost temperature; from -8.0 ºC (ele 056) to -3 ºC (elev -155)
- Geothermal gradient: approximately +0.024ºC/m
- Permafrost thickness: > 315m; Thermistor not deep enough to reach bottom of permafrost layer.
- Annual variation in ground temperature: Similar from 2016 to 2018.

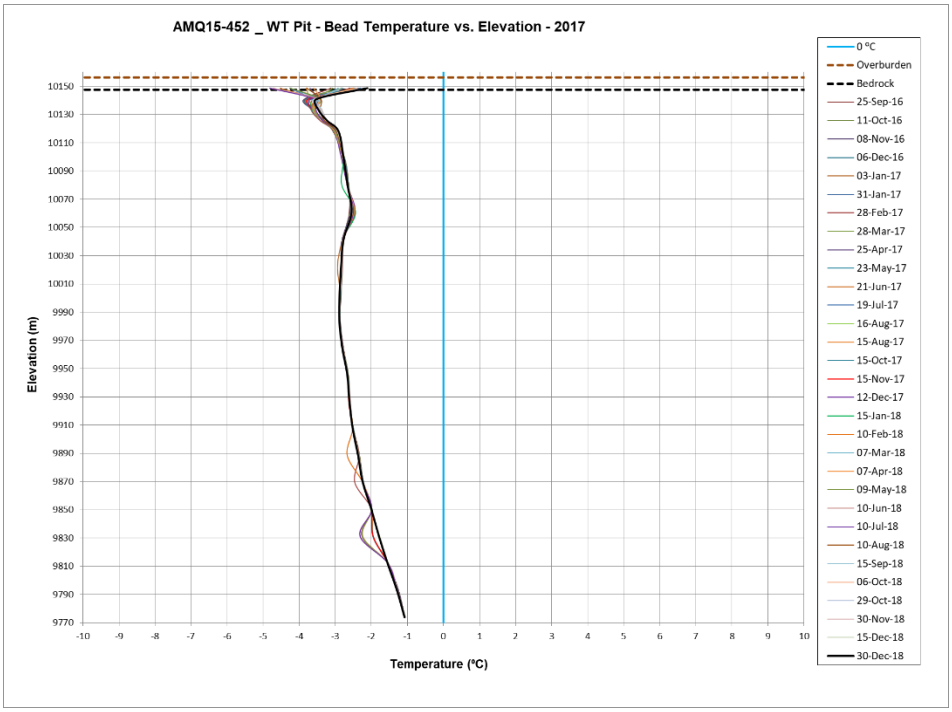


Figure 7: Temperature profile (Celsius) as a function of elevation (masl) from installation to December 2018 for thermistor AMQ15-452

Location of the instrument:

- North of Whale Tail Lake (on the shore); Within Whale Tail pit north walls.
- Depth : 382 m

Monitoring objective:

- Thermal condition of permafrost (near from talik influence). Calibration of the global thermal model.

Thermal results highlights:

- Active layer: Unknown ; Lack of surficial thermistor beads (not the objective of the instrument)
- Depth of zero annual amplitude: Unknown ; Lack of surficial thermistor beads (not the objective of the instrument)
- Variable permafrost temperature; from -2.9 ºC (ele -016) to -1.0 ºC (elev -226)
- Geothermal gradient: approximately +0.009ºC/m
- Permafrost thickness: > 380m; Thermistor not deep enough to reach bottom of permafrost layer.
- Annual variation in ground temperature: Similar from 2016 to 2018.

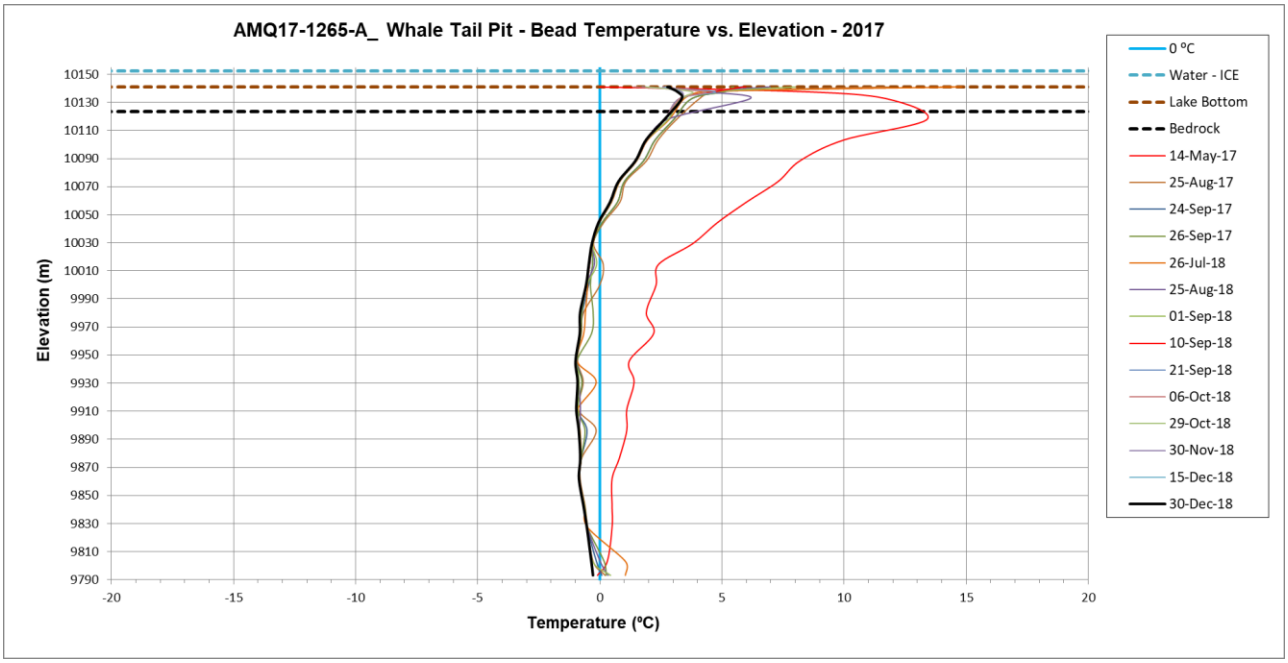


Figure 8: Temperature profile (Celsius) as a function of elevation (masl) from installation to December 2018 for thermistor AMQ17-1265A

Location of the instrument:

- In the middle of Whale Tail Lake (deep portion @ 11m of water);
- Depth : 348 m

Monitoring objective:

- Thermal condition of talik underneath the lake. Calibration of the global thermal model.

Thermal results highlights:

- Active layer: Not applicable – Talik area
- Depth of zero annual amplitude: Not applicable – Talik area
- Depth of talik: 97m (elev 141 to 044)
- Variable permafrost temperature; from -1.0 ºC (ele -055) to -0.3 ºC (elev -207)
- Geothermal gradient: approximately +0.00046ºC/m
- Permafrost thickness: approximately 250m (elev. 044 to -207)
- Annual variation in ground temperature: Similar from 2016 to 2018.

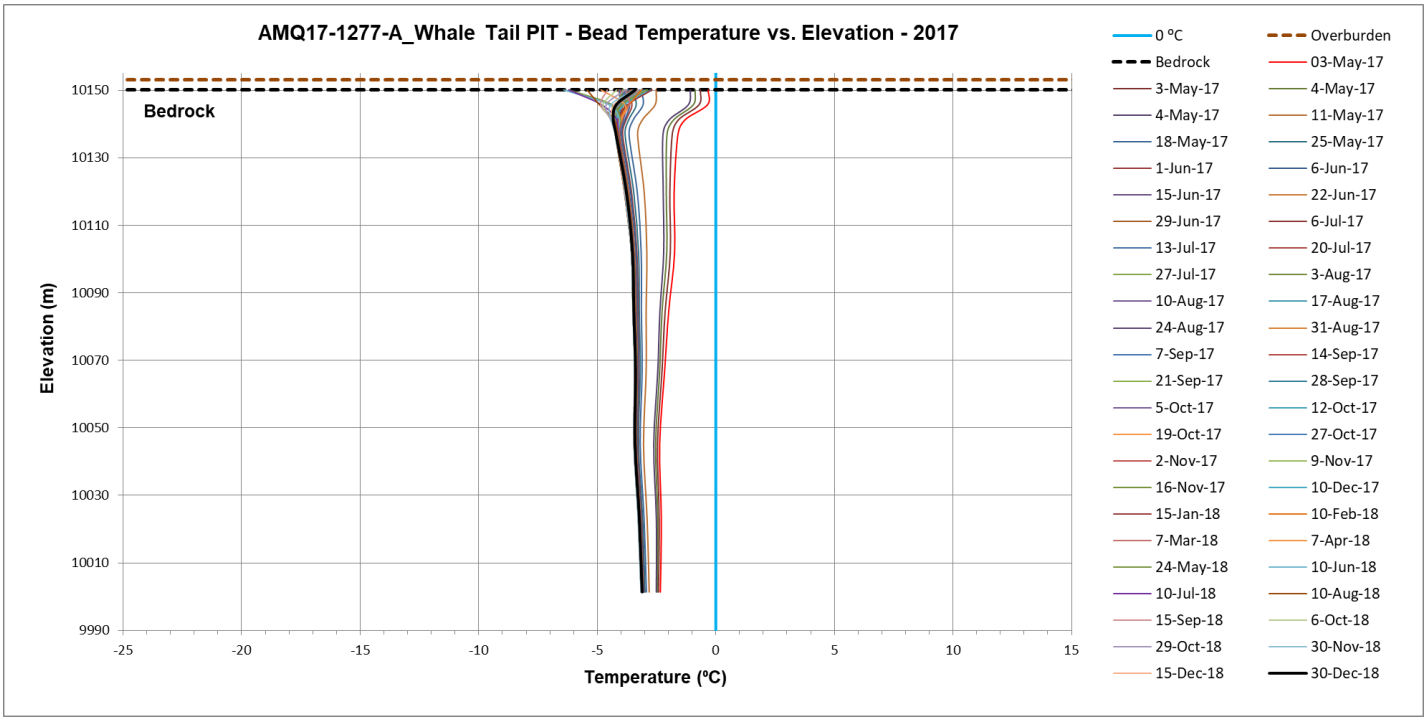


Figure 9: Temperature profile (Celsius) as a function of elevation (masl) from installation to December 2018 for thermistor AMQ17-1277A

Location of the instrument:

- North East of Whale Tail Lake (on the shore); Within the Whale Tail pit footprint
- Depth : 152 m

Monitoring objective:

- Thermal condition of talik underneath the lake. Calibration of the global thermal model.

Thermal results highlights:

- Active layer: Unknown ; Lack of surficial thermistor beads (not the objective of the instrument)
- Depth of zero annual amplitude: Approximately 12m (elev 153 to 141)
- Variable permafrost temperature; from -4.3 ºC (elev 141) to -3.1 ºC (elev 001)
- Geothermal gradient: approximately +0.0086ºC/m
- Permafrost thickness: > 150m; Thermistor not deep enough to reach bottom of permafrost layer.
- Annual variation in ground temperature: Similar from 2017 to 2018. Early 2017 data were under stabilization (post-installation)

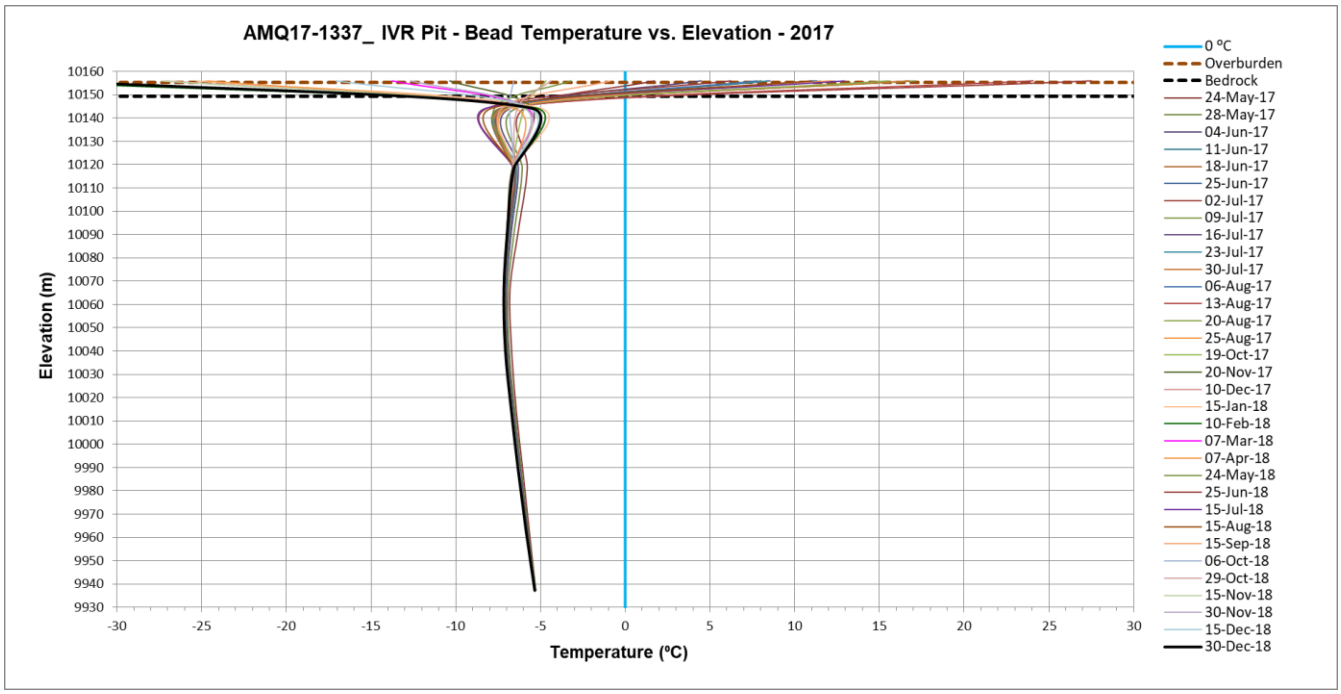


Figure 10: Temperature profile (Celsius) as a function of elevation (masl) from installation to December 2018 for thermistor AMQ17-1337

Location of the instrument:

- Within the IVR pit footprint
- Depth : 218 m

Monitoring objective:

- Thermal condition within the IVR pit area. Calibration of the global thermal model.

Thermal results highlights:

- Active layer: Unknown ; Lack of surficial thermistor beads (not the objective of the instrument)
- Depth of zero annual amplitude: Unknown ; Lack of surficial thermistor beads (not the objective of the instrument)
- Variable permafrost temperature; from -7.1 ºC (elev 040) to -5.3 ºC (elev -063)
- Geothermal gradient: approximately +0.017ºC/m
- Permafrost thickness: > 215m; Thermistor not deep enough to reach bottom of permafrost layer.
- Annual variation in ground temperature: Similar from 2017 to 2018.

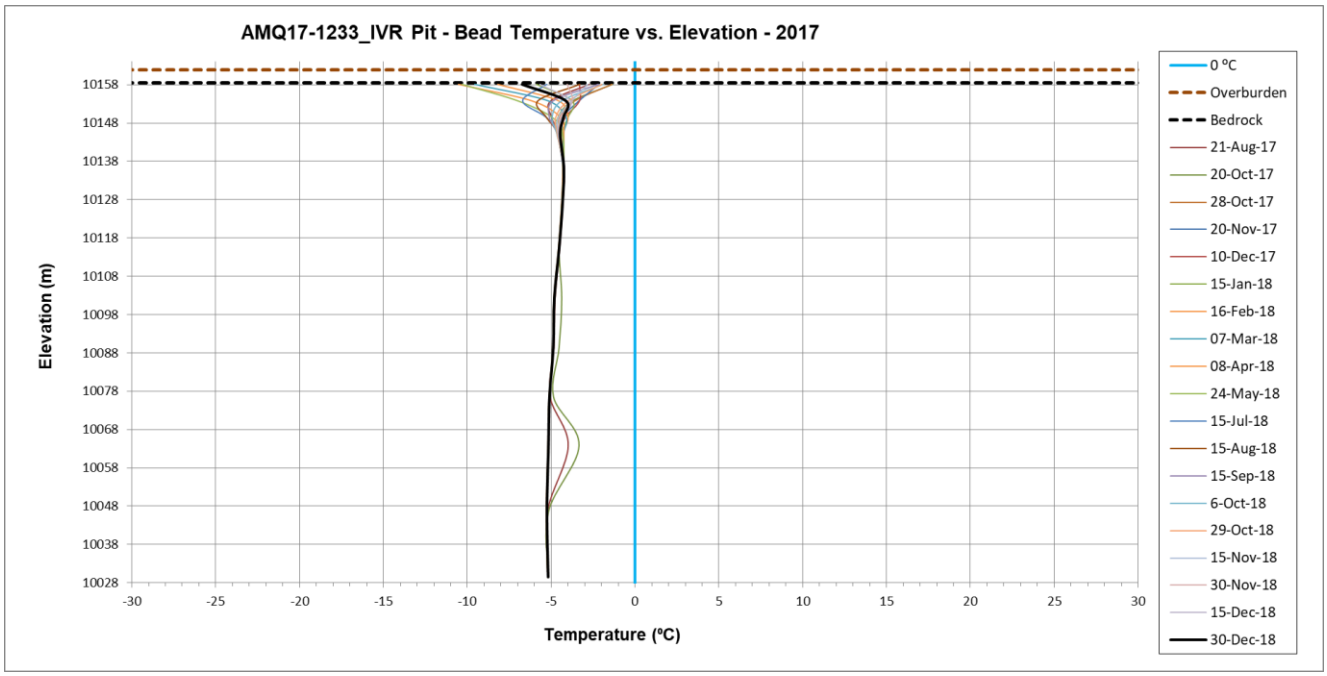


Figure 11: Temperature profile (Celsius) as a function of elevation (masl) from installation to December 2018 for thermistor AMQ17-1233

Location of the instrument:

- Within the IVR pit footprint
- Depth : 132 m

Monitoring objective:

- Thermal condition within the IVR pit area. Calibration of the global thermal model.

Thermal results highlights:

- Active layer: Unknown ; Lack of surficial thermistor beads (not the objective of the instrument)
- Depth of zero annual amplitude: Approximately 25m (from elev 161 to 136)
- Stable permafrost temperature around -5.3 ºC
- Geothermal gradient: Thermistor not deep enough to evaluate gradient
- Permafrost thickness: > 132m; Thermistor not deep enough to reach bottom of permafrost layer.
- Annual variation in ground temperature: Similar from 2017 to 2018.

Non Active thermistors:

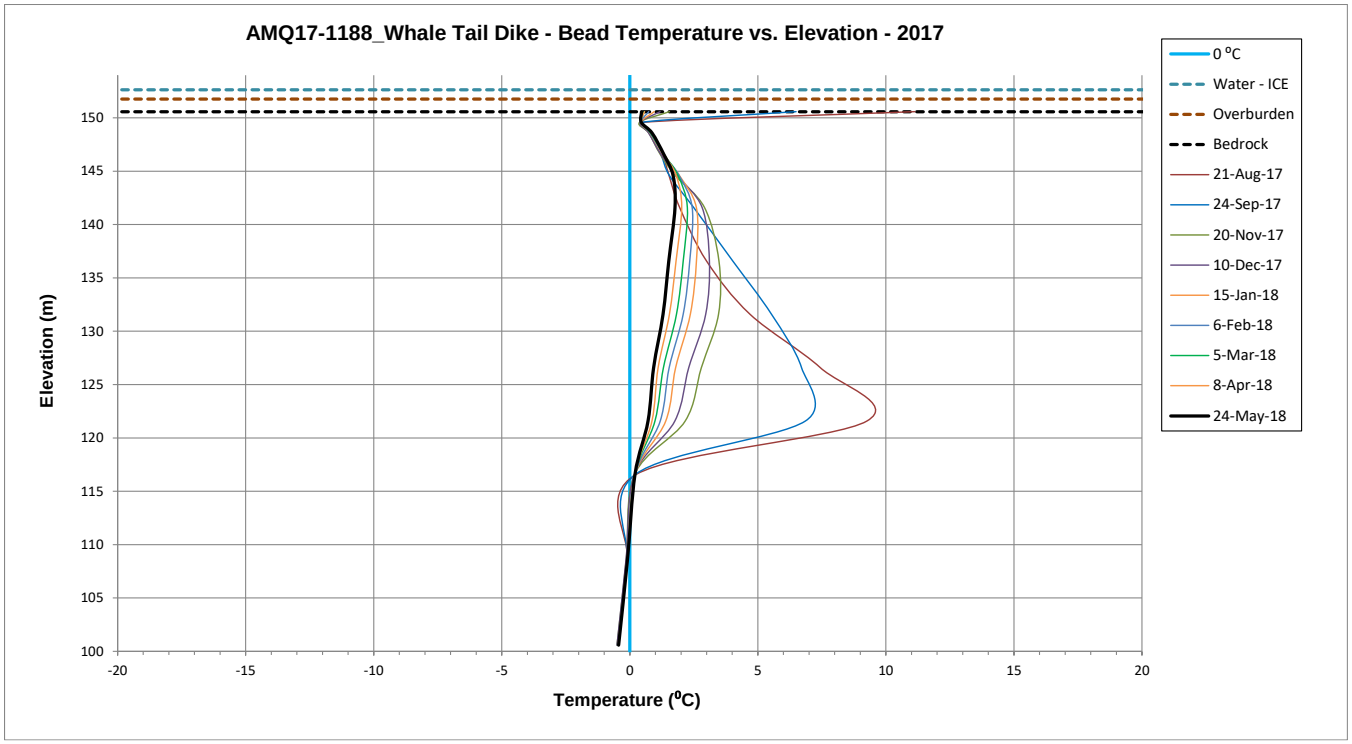


Figure 12: Temperature profile (Celsius) as a function of elevation (masl) from installation to May 2018 for thermistor AMQ17-1188

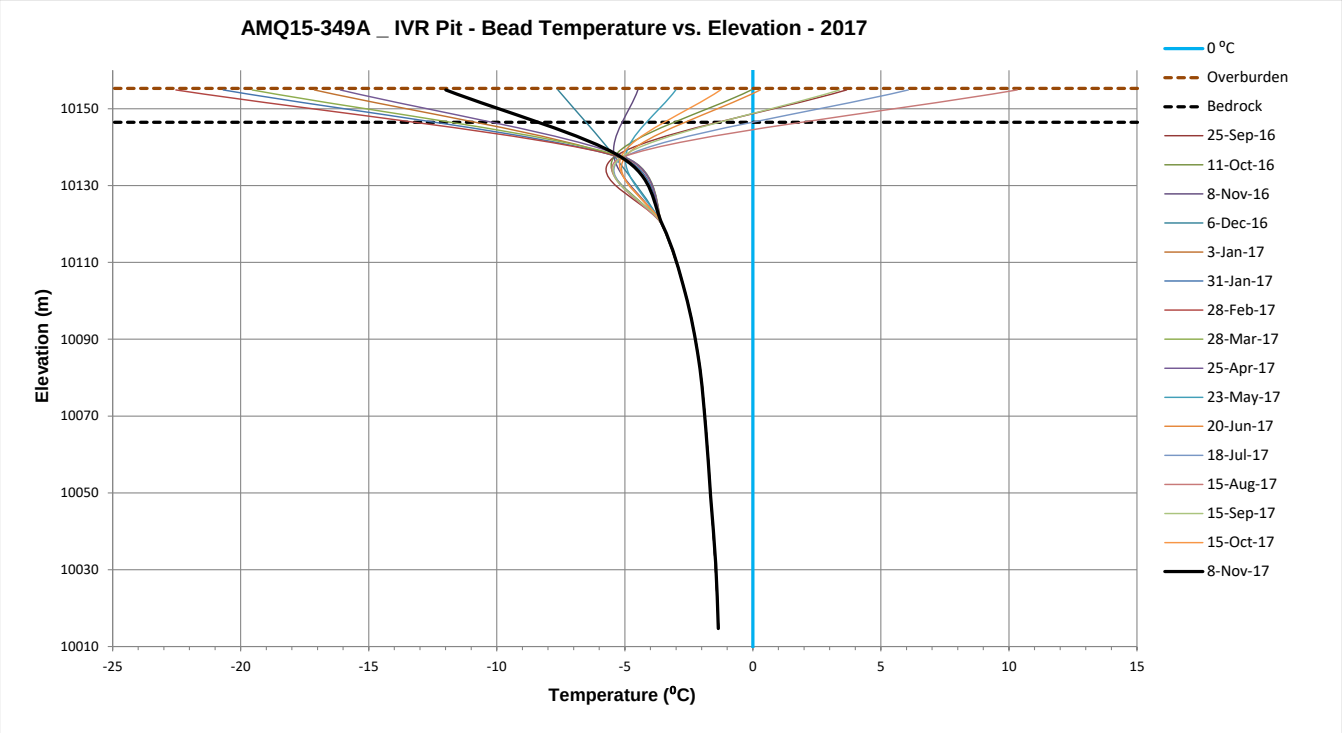


Figure 13: Temperature profile (Celsius) as a function of elevation (masl) from installation to November 2017 for thermistor AMQ15-349A

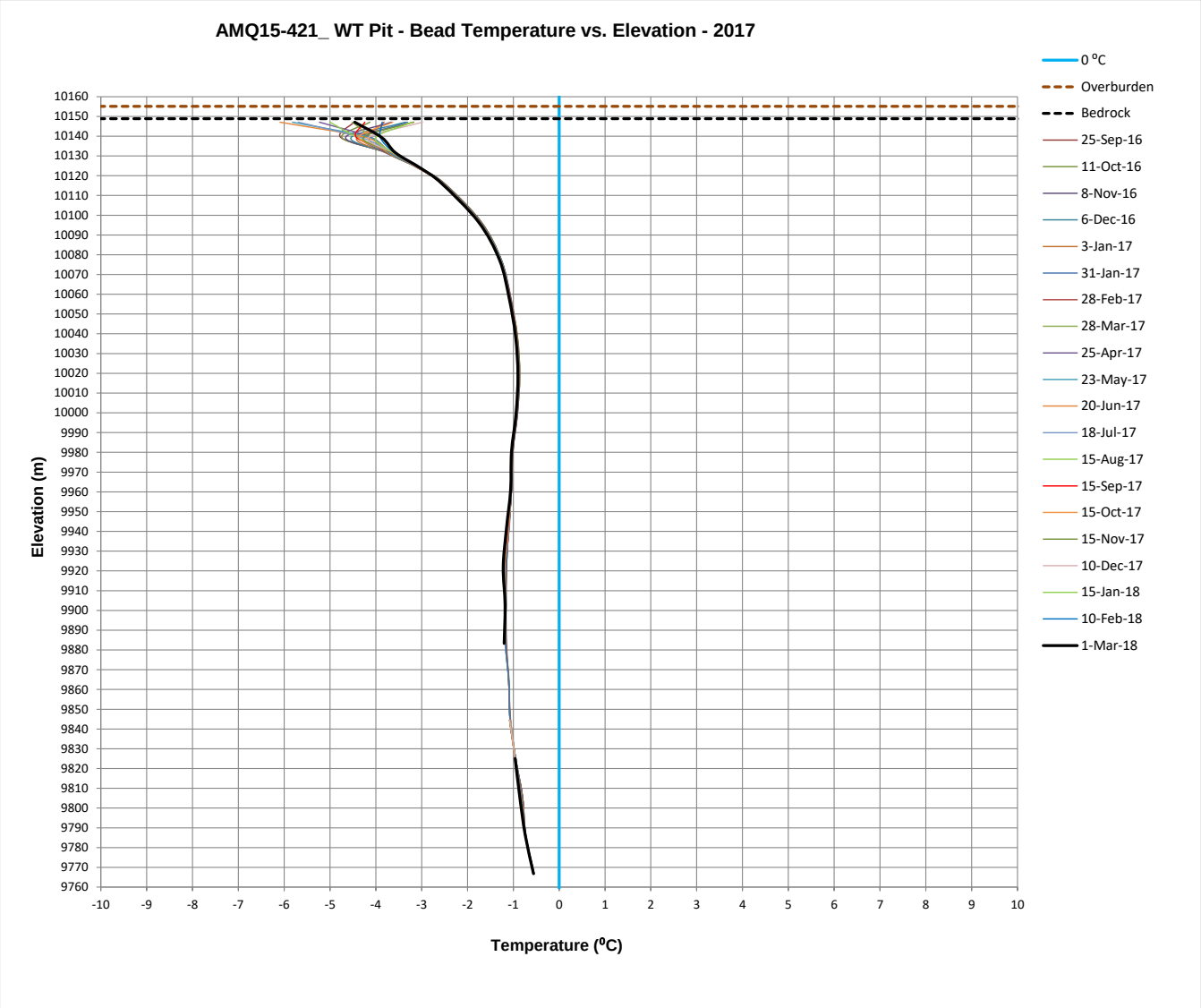


Figure 14: Temperature profile (Celsius) as a function of elevation (masl) from installation to Mars 2018 for thermistor AMQ15-421

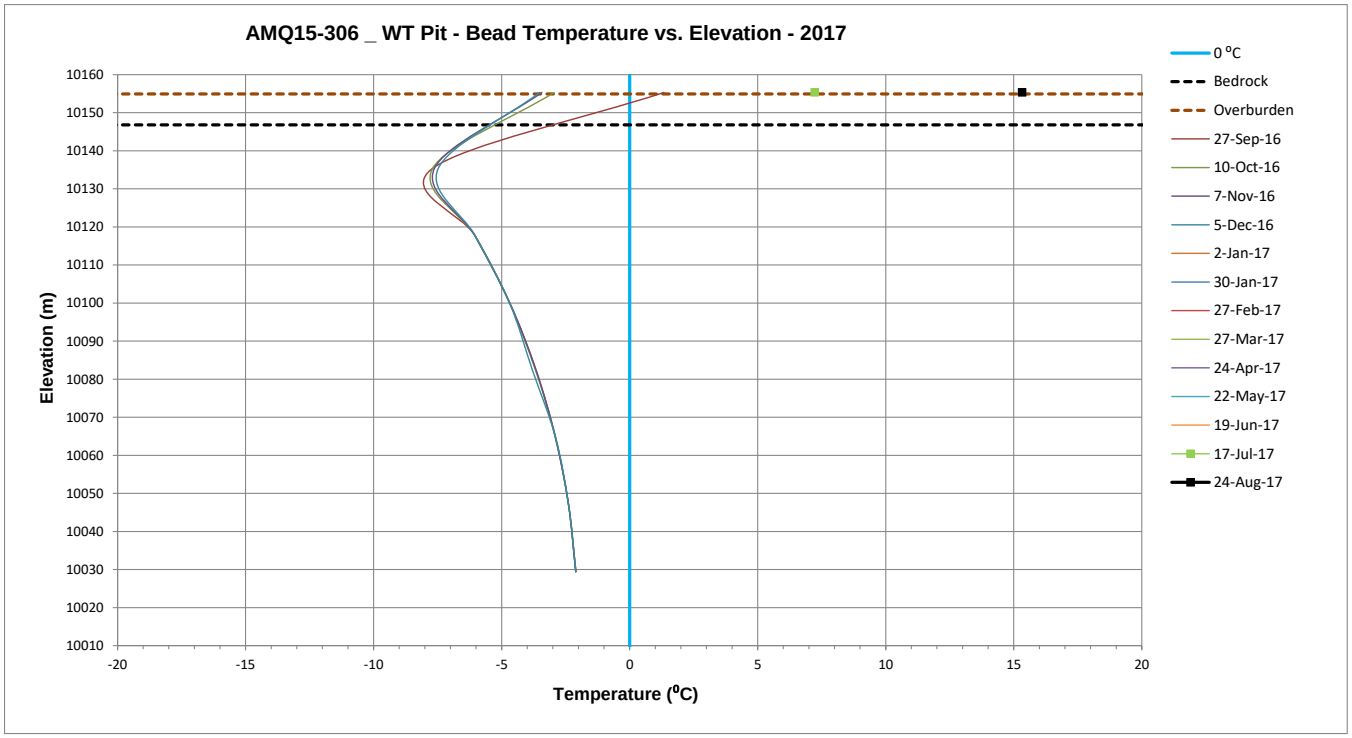


Figure 15: Temperature profile (Celsius) as a function of elevation (masl) from installation to August 2017 for thermistor AMQ15-306

Whale Tail Dike

The following pages will present the results of the 15 thermistors installed within the Whale tail dike, targeting the rockfill structure, the granular foundation and the bedrock. Data is collected automatically every 3 hours and closely monitored by Engineering on a daily basis.

Location of the instruments:

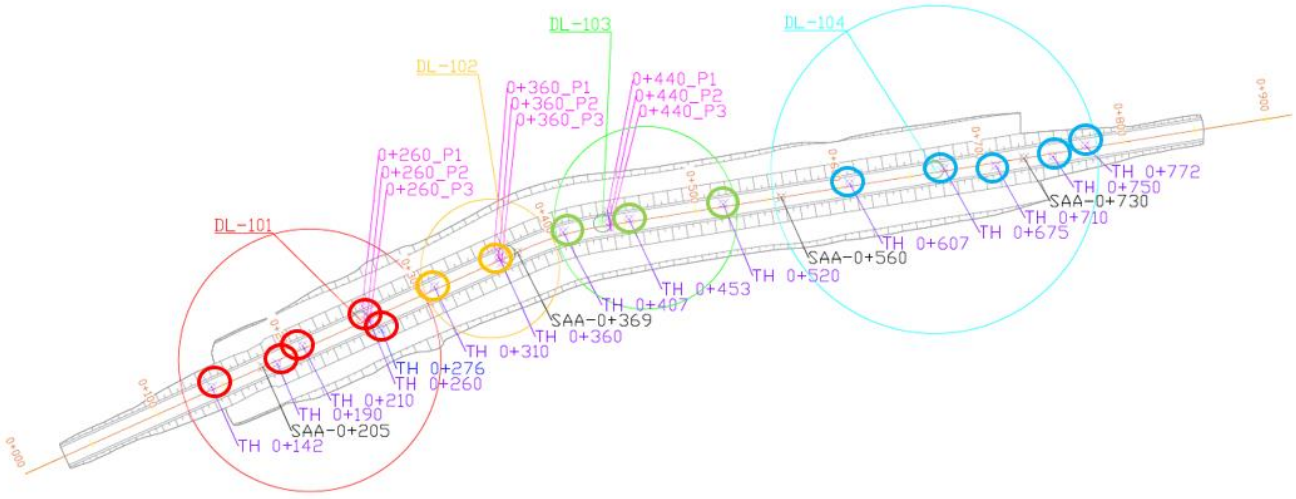
- Within the dike foundation
- Depth : various installation, beads located between elevations 157 and 127 m

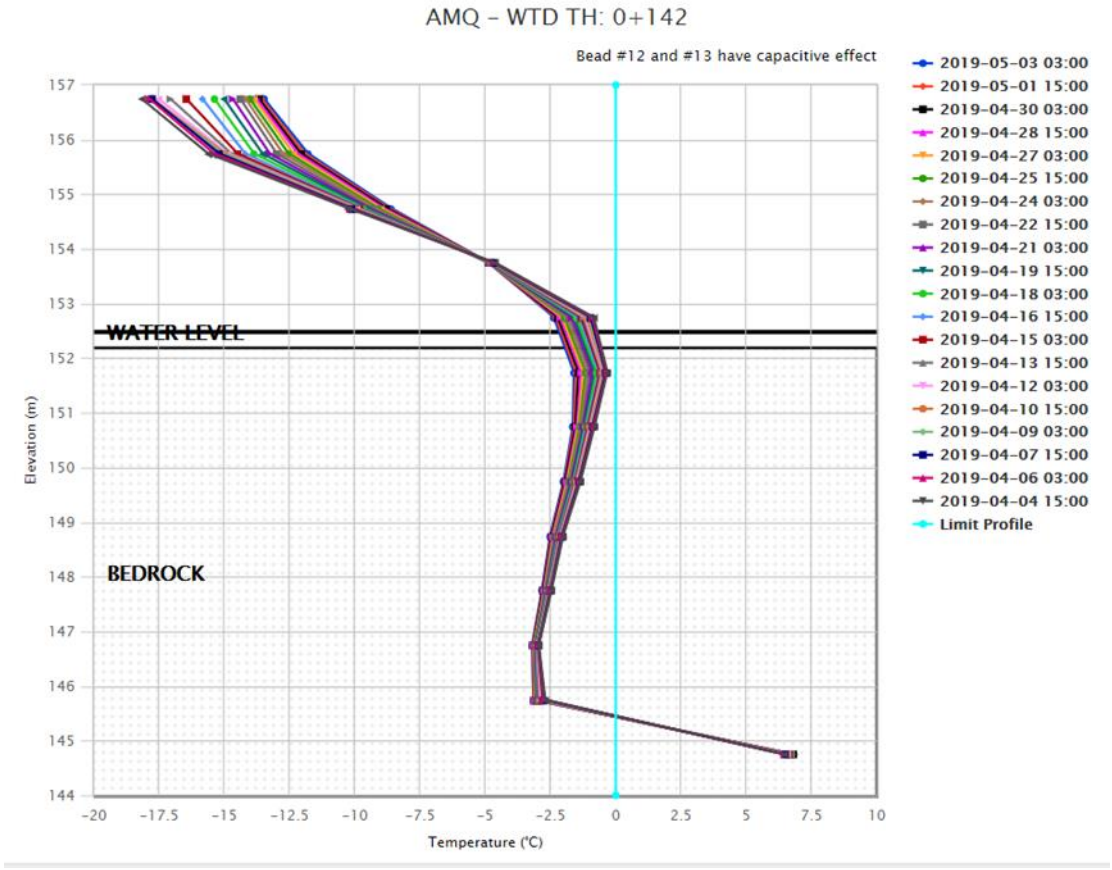
Monitoring objective:

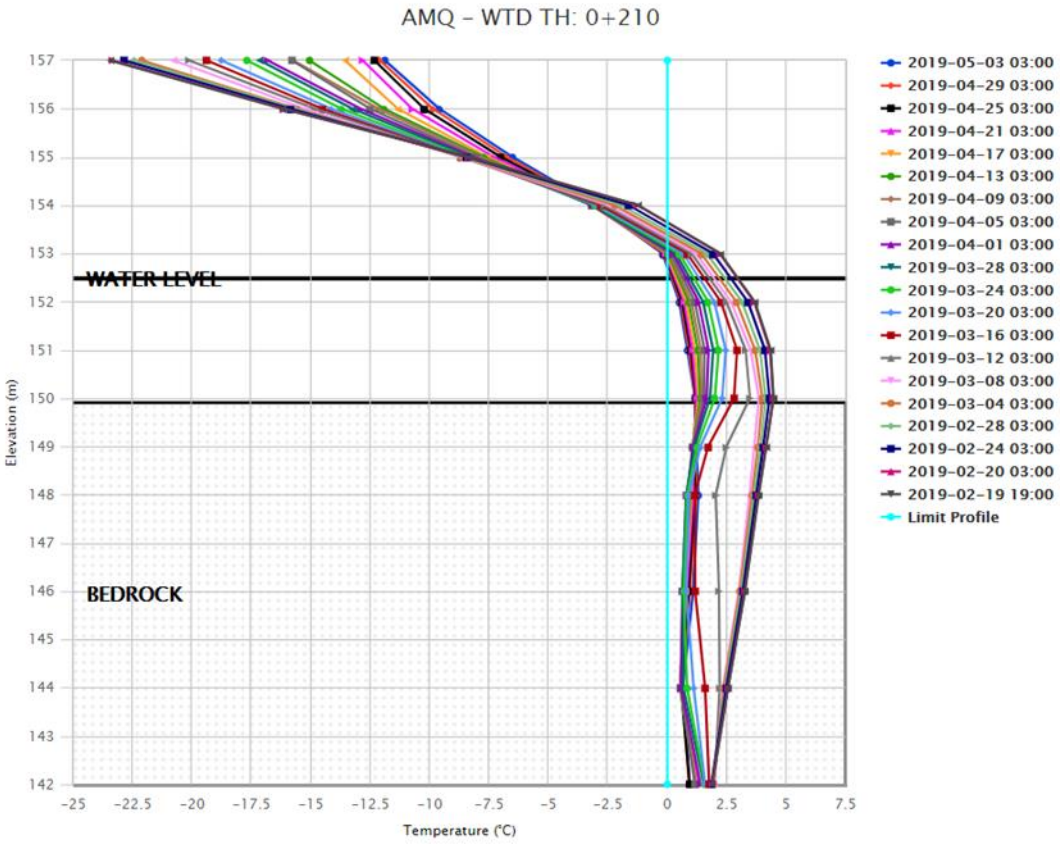
- Thermal condition within the Whale Tail Dike. Thermal follow-up during dewatering and operations as part of the Operation, Maintenance and Surveillance (OMS) program.

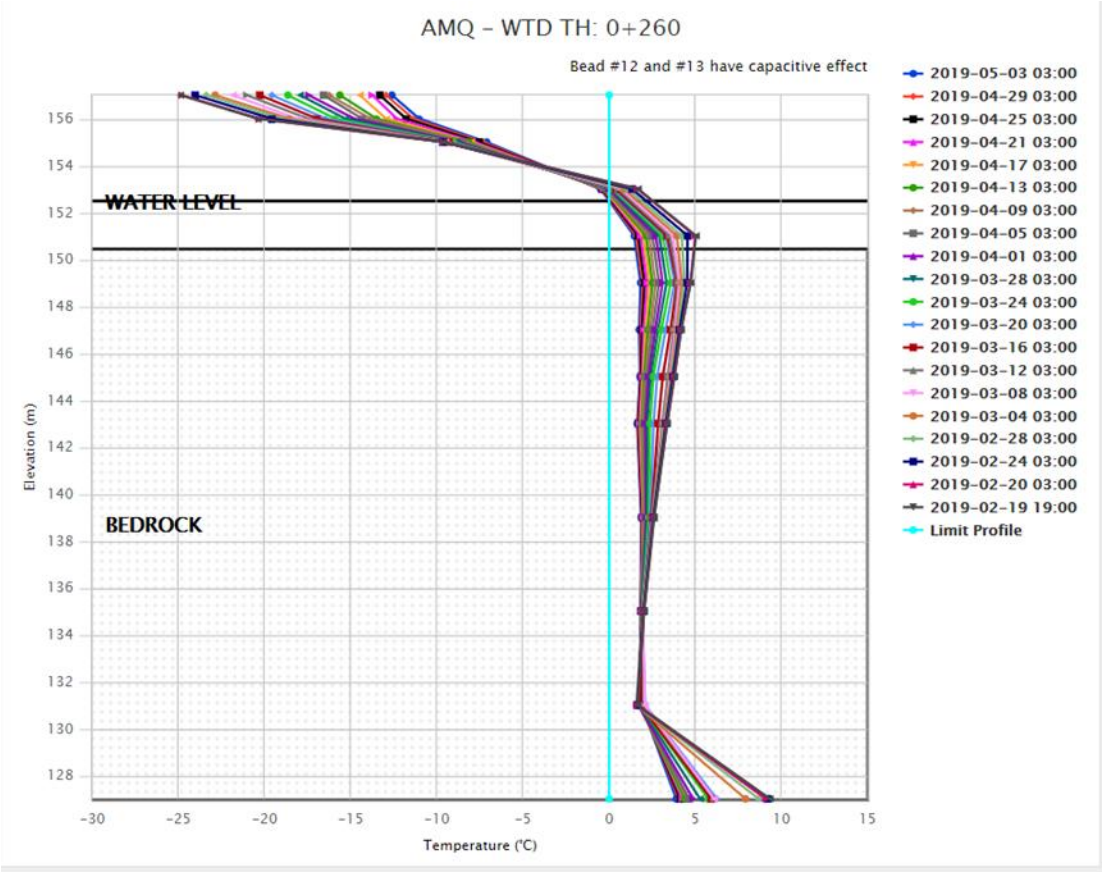
Thermal results highlights:

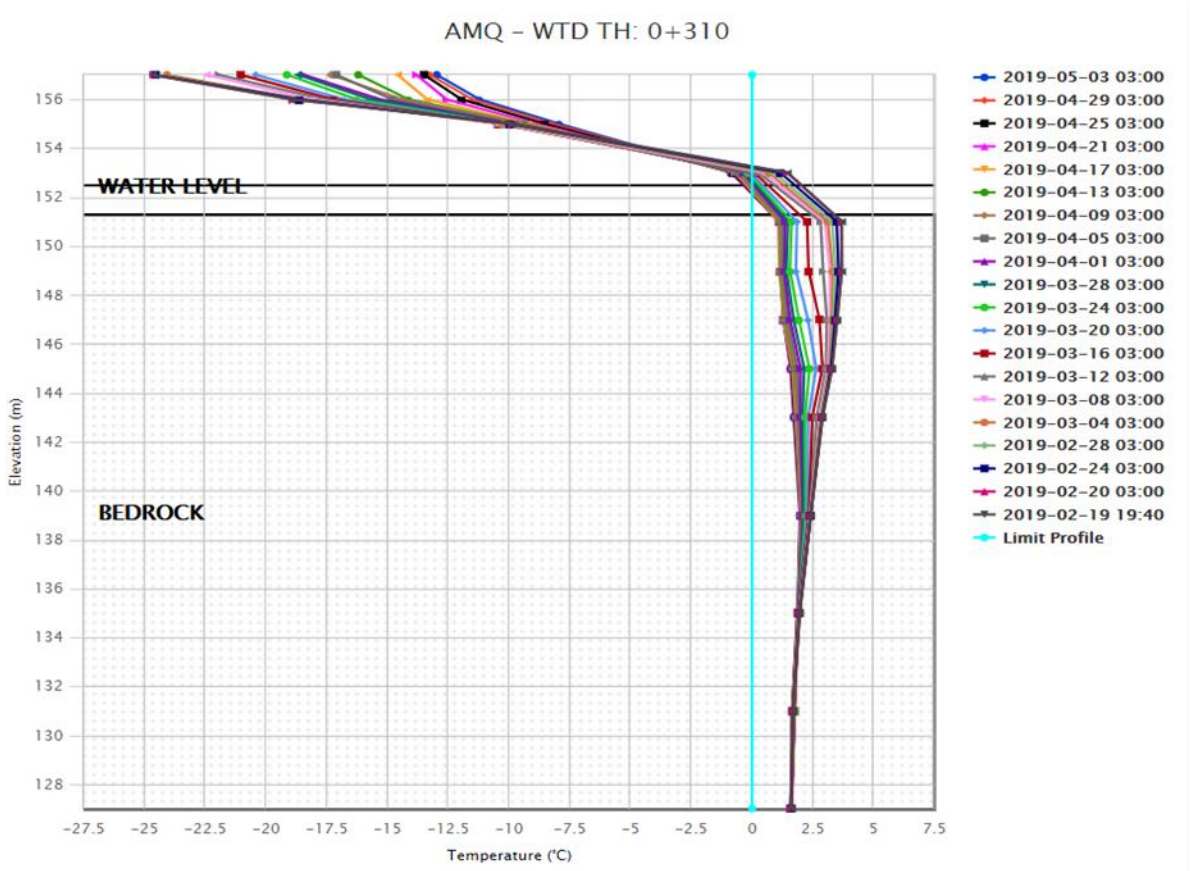
- Installed a couple months ago, we are currently seeing a general cooling trend of the dike structure and recording some reactions associated with dewatering of the lake on the downstream of the structure.
- Various instruments location to assess different properties of the dike and its foundation and/or changes of current or future conditions linked with the operation of the structure.

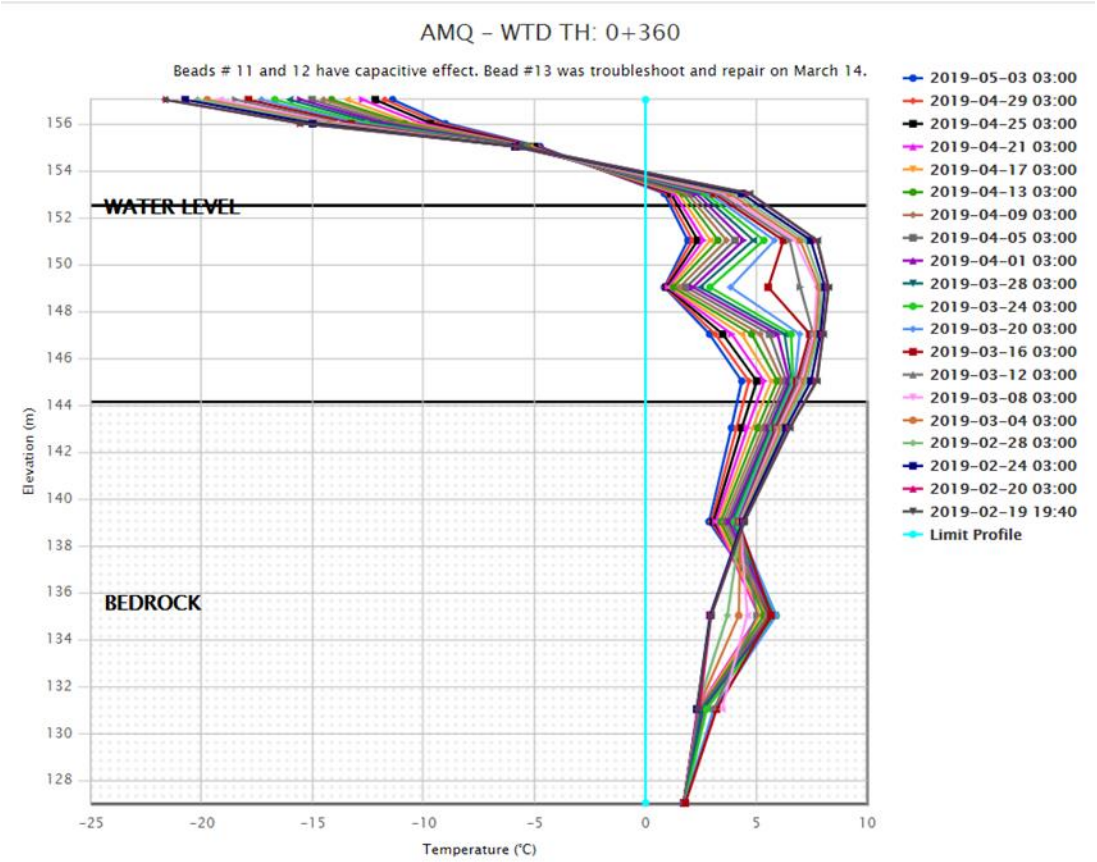


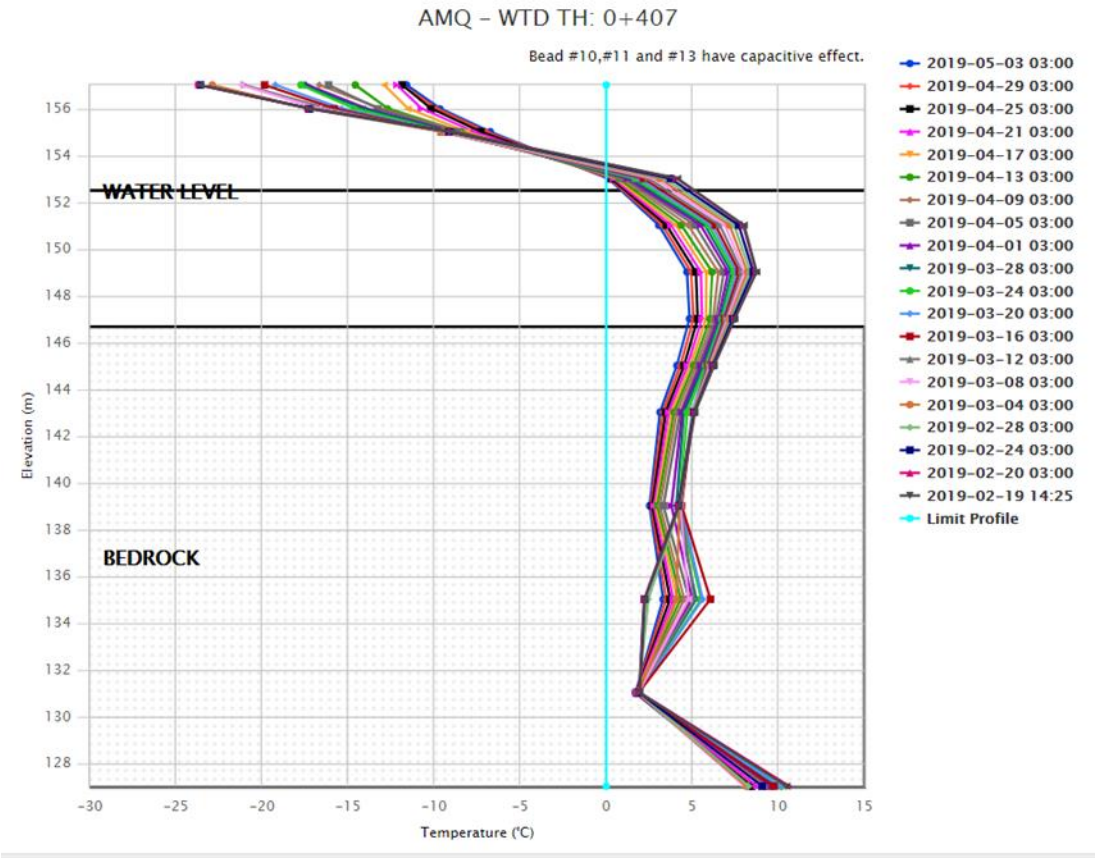

AMQ – WTD TH: 0+142
Bead #12 and #13 have capacitive effect
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
157
156
155
154
153
152
151
150
149
148
147
146
145
144
-20
-17.5
-15
-12.5
-10
-7.5
-5
-2.5
0
2.5
5
7.5
10
2019-05-03 03:00
2019-05-01 15:00
2019-04-30 03:00
2019-04-28 15:00
2019-04-27 03:00
2019-04-25 15:00
2019-04-24 03:00
2019-04-22 15:00
2019-04-21 03:00
2019-04-19 15:00
2019-04-18 03:00
2019-04-16 15:00
2019-04-15 03:00
2019-04-13 15:00
2019-04-12 03:00
2019-04-10 15:00
2019-04-09 03:00
2019-04-07 15:00
2019-04-06 03:00
2019-04-04 15:00
Limit Profile

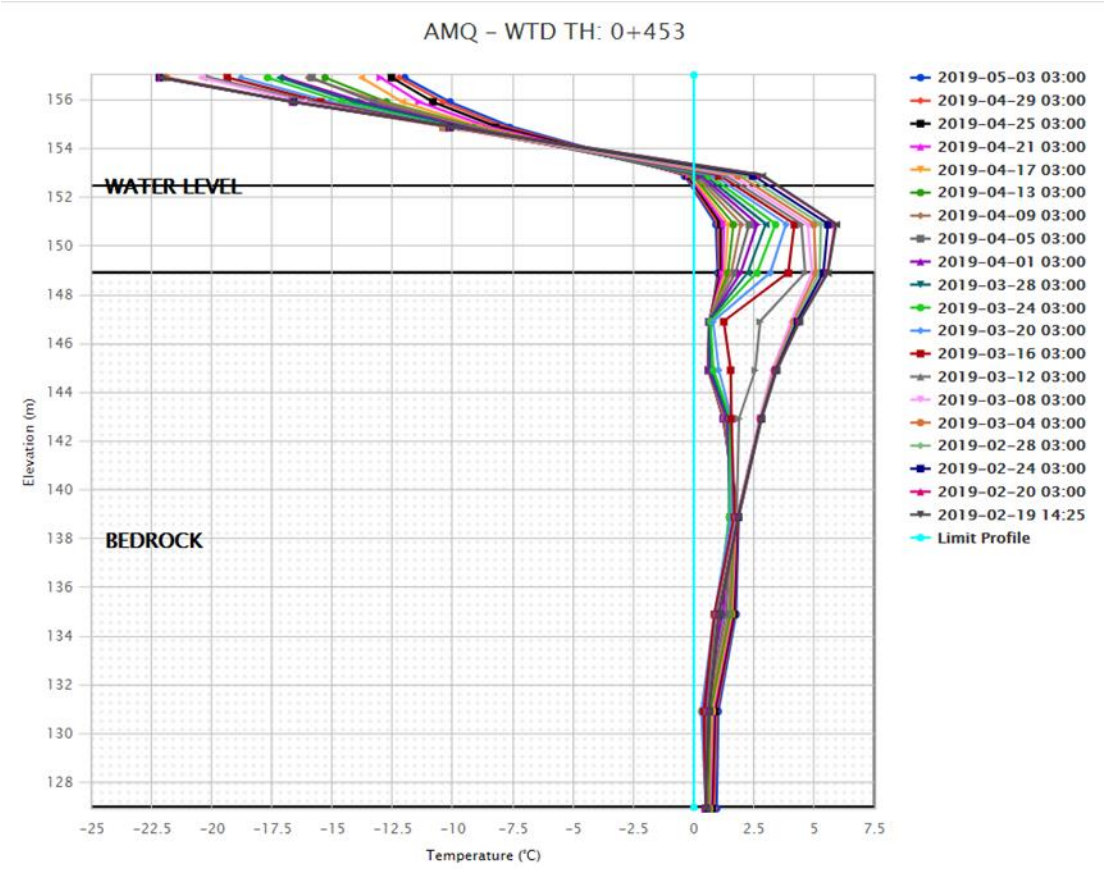

AMQ – WTD TH: 0+210
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
157
156
155
154
153
152
151
150
149
148
147
146
145
144
143
142
-25
-22.5
-20
-17.5
-15
-12.5
-10
-7.5
-5
-2.5
0
2.5
5
7.5
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-19 19:00
Limit Profile

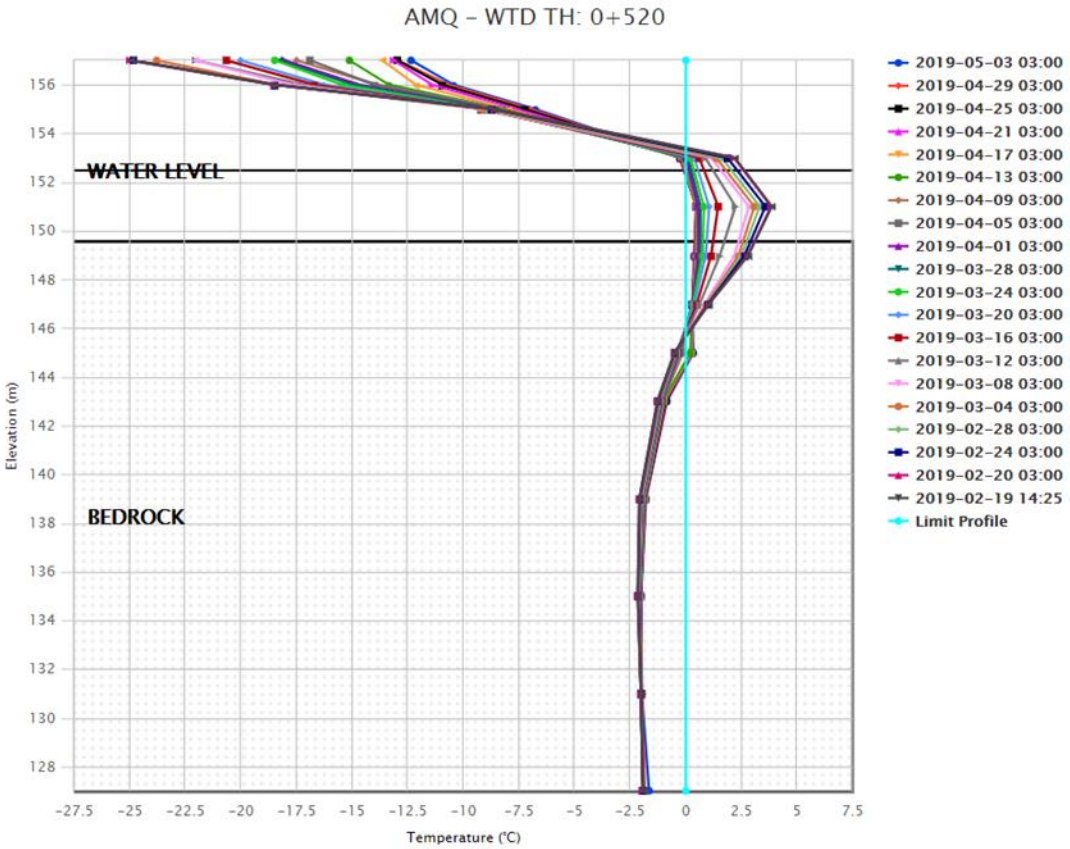

AMQ – WTD TH: 0+260
Bead #12 and #13 have capacitive effect
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-19 19:00
Limit Profile

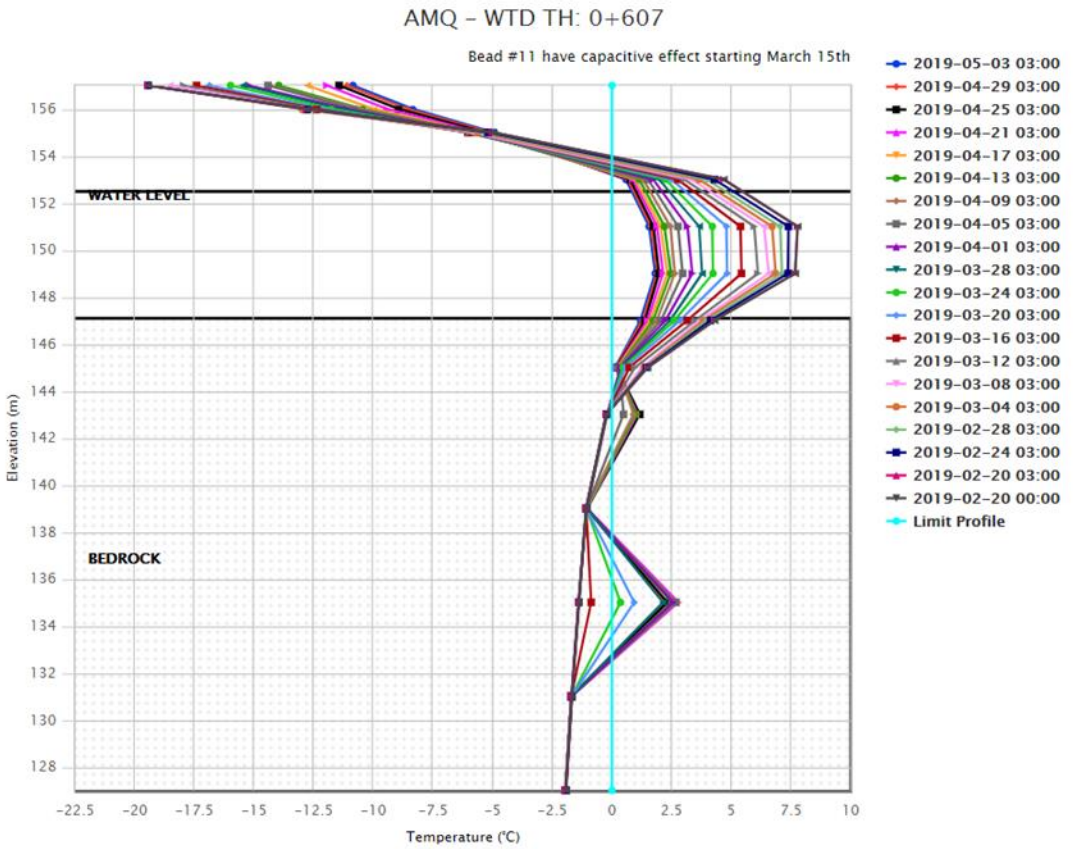

AMQ – WTD TH: 0+310
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
156
154
152
150
148
146
144
142
140
138
136
134
132
130
128
-27.5
-25
-22.5
-20
-17.5
-15
-12.5
-10
-7.5
-5
-2.5
0
2.5
5
7.5
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-19 19:40
Limit Profile

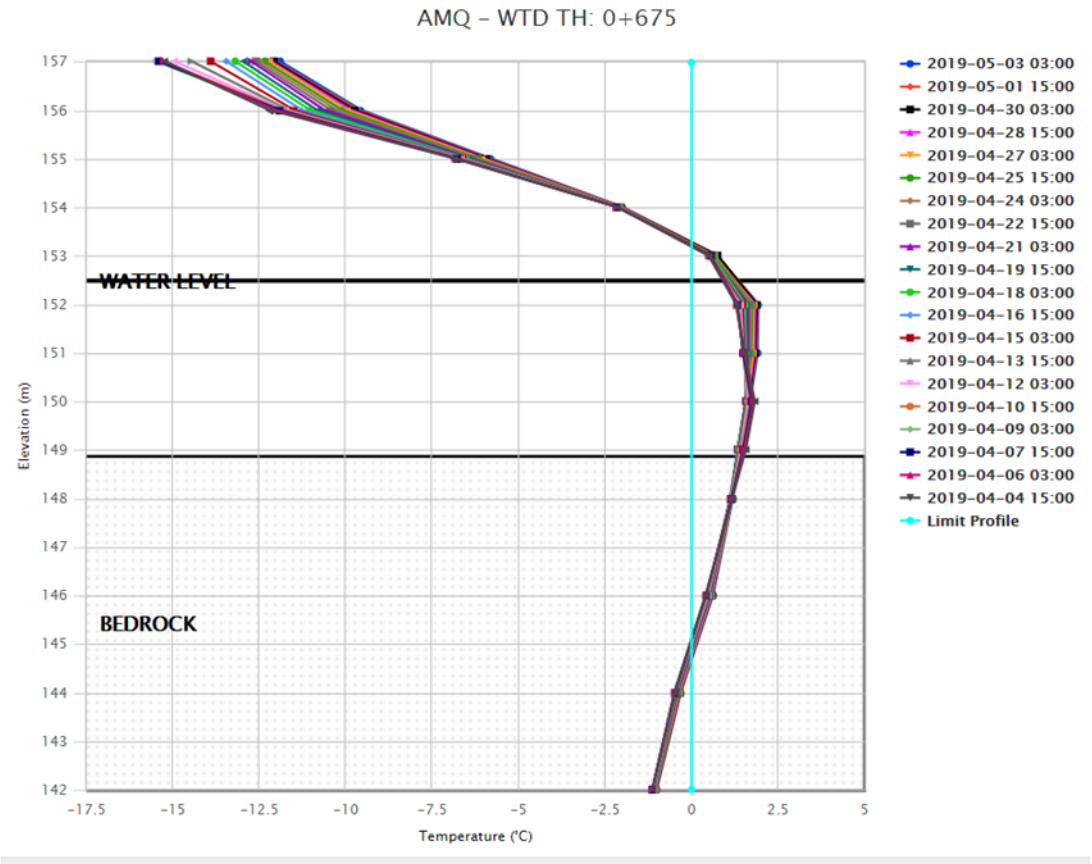

AMQ – WTD TH: 0+360
Beads # 11 and 12 have capacitive effect. Bead #13 was troubleshoot and repair on March 14.
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-19 19:40
Limit Profile

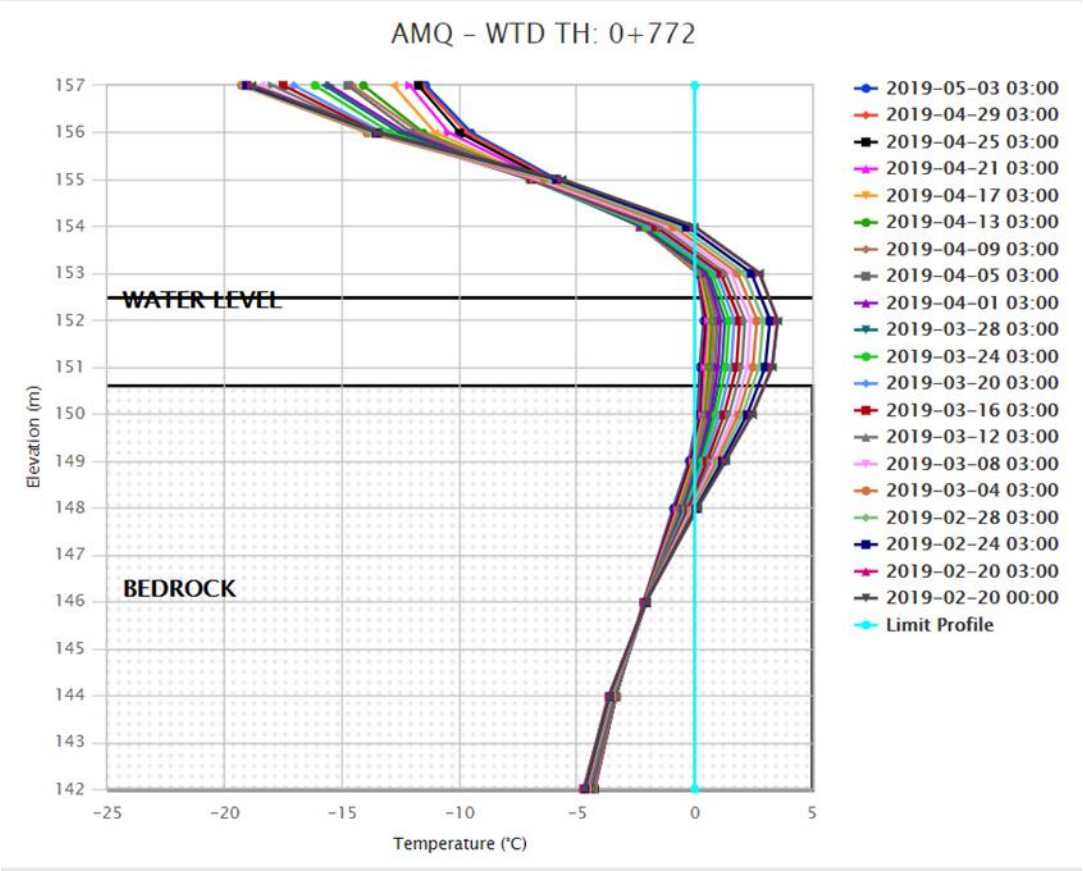

AMQ – WTD TH: 0+407
Bead #10,#11 and #13 have capacitive effect.
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
156
154
152
150
148
146
144
142
140
138
136
134
132
130
128
-30
-25
-20
-15
-10
-5
0
5
10
15
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-19 14:25
Limit Profile

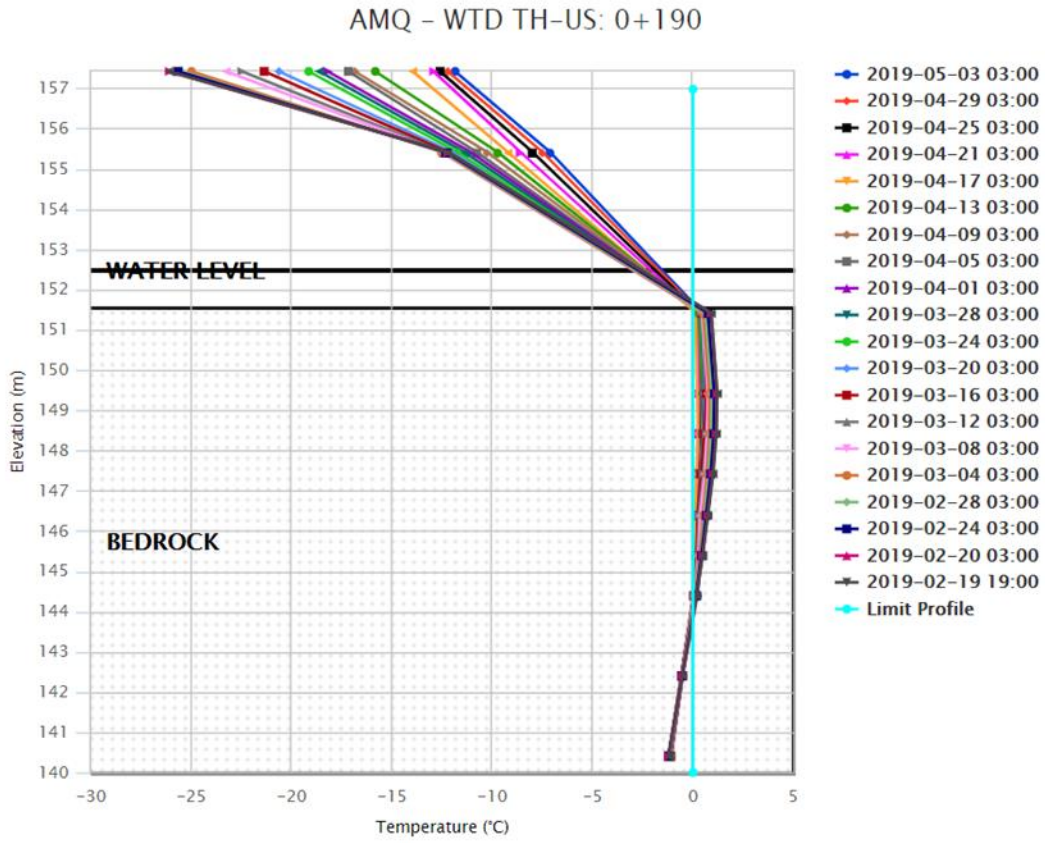

AMQ – WTD TH: 0+453
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
156
154
152
150
148
146
144
142
140
138
136
134
132
130
128
-25
-22.5
-20
-17.5
-15
-12.5
-10
-7.5
-5
-2.5
0
2.5
5
7.5
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-19 14:25
Limit Profile

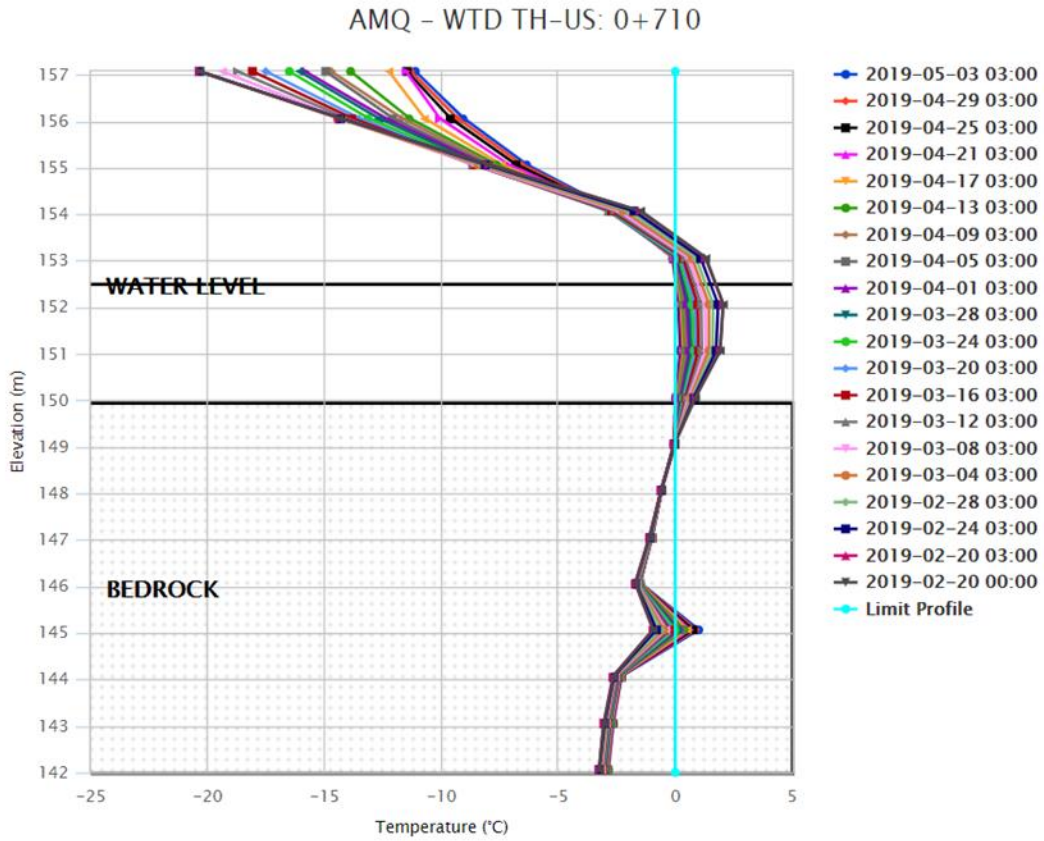

AMQ – WTD TH: 0+520
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
156
154
152
150
148
146
144
142
140
138
136
134
132
130
128
-27.5
-25
-22.5
-20
-17.5
-15
-12.5
-10
-7.5
-5
-2.5
0
2.5
5
7.5
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-19 14:25
Limit Profile

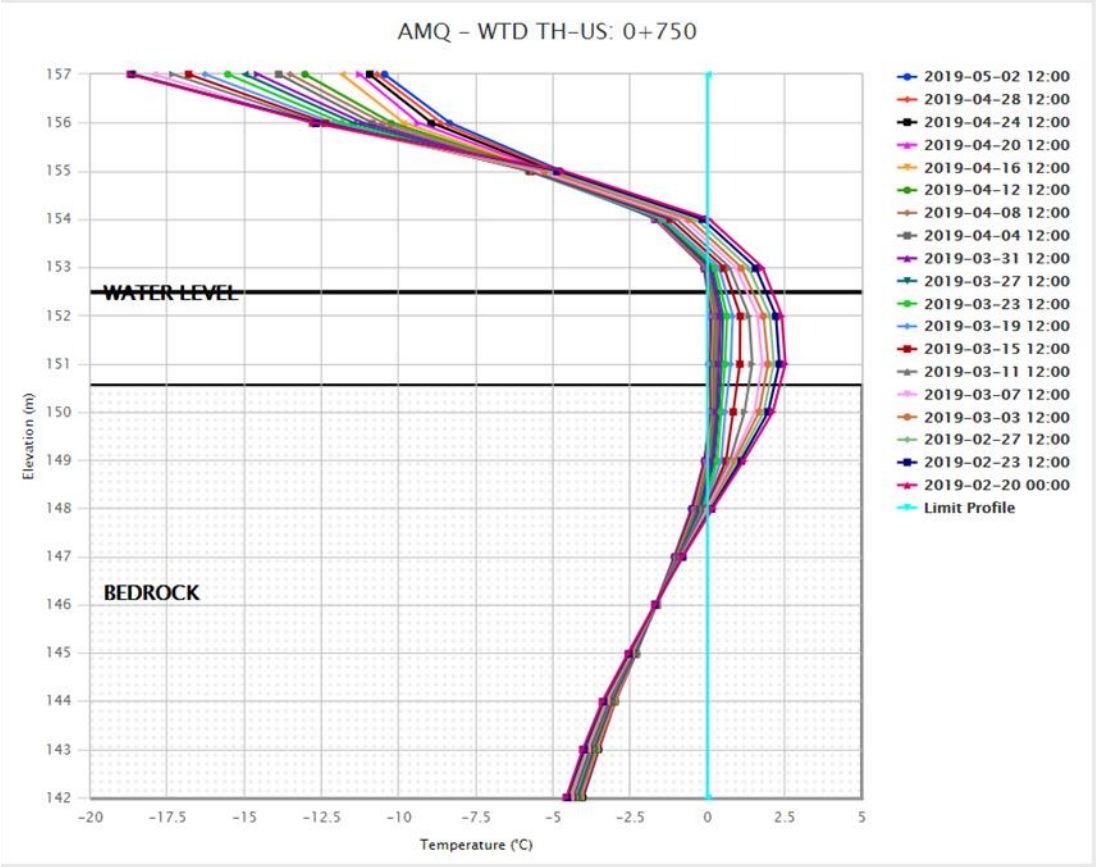

AMQ – WTD TH: 0+607
Bead #11 have capacitive effect starting March 15th
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-20 00:00
Limit Profile

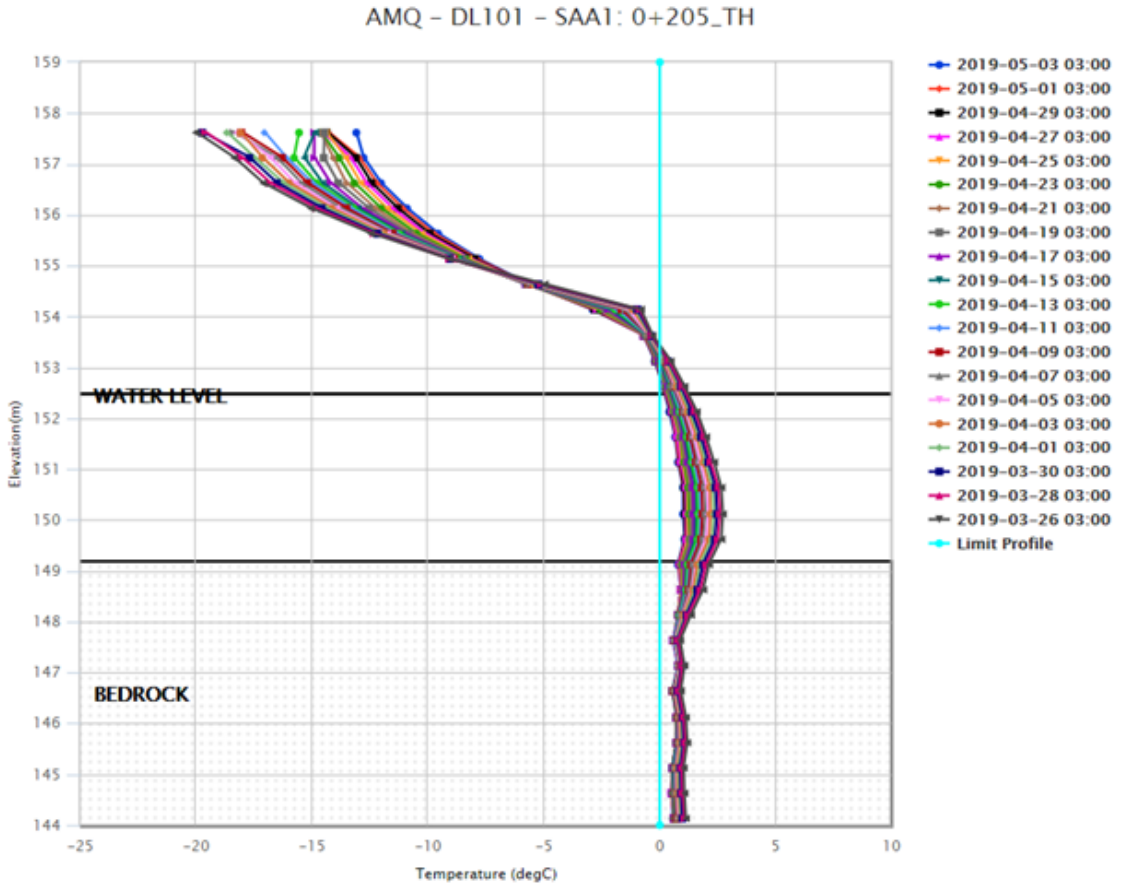

AMQ – WTD TH: 0+675
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
157
156
155
154
153
152
151
150
149
148
147
146
145
144
143
142
-17.5
-15
-12.5
-10
-7.5
-5
-2.5
0
2.5
5
2019-05-03 03:00
2019-05-01 15:00
2019-04-30 03:00
2019-04-28 15:00
2019-04-27 03:00
2019-04-25 15:00
2019-04-24 03:00
2019-04-22 15:00
2019-04-21 03:00
2019-04-19 15:00
2019-04-18 03:00
2019-04-16 15:00
2019-04-15 03:00
2019-04-13 15:00
2019-04-12 03:00
2019-04-10 15:00
2019-04-09 03:00
2019-04-07 15:00
2019-04-06 03:00
2019-04-04 15:00
Limit Profile

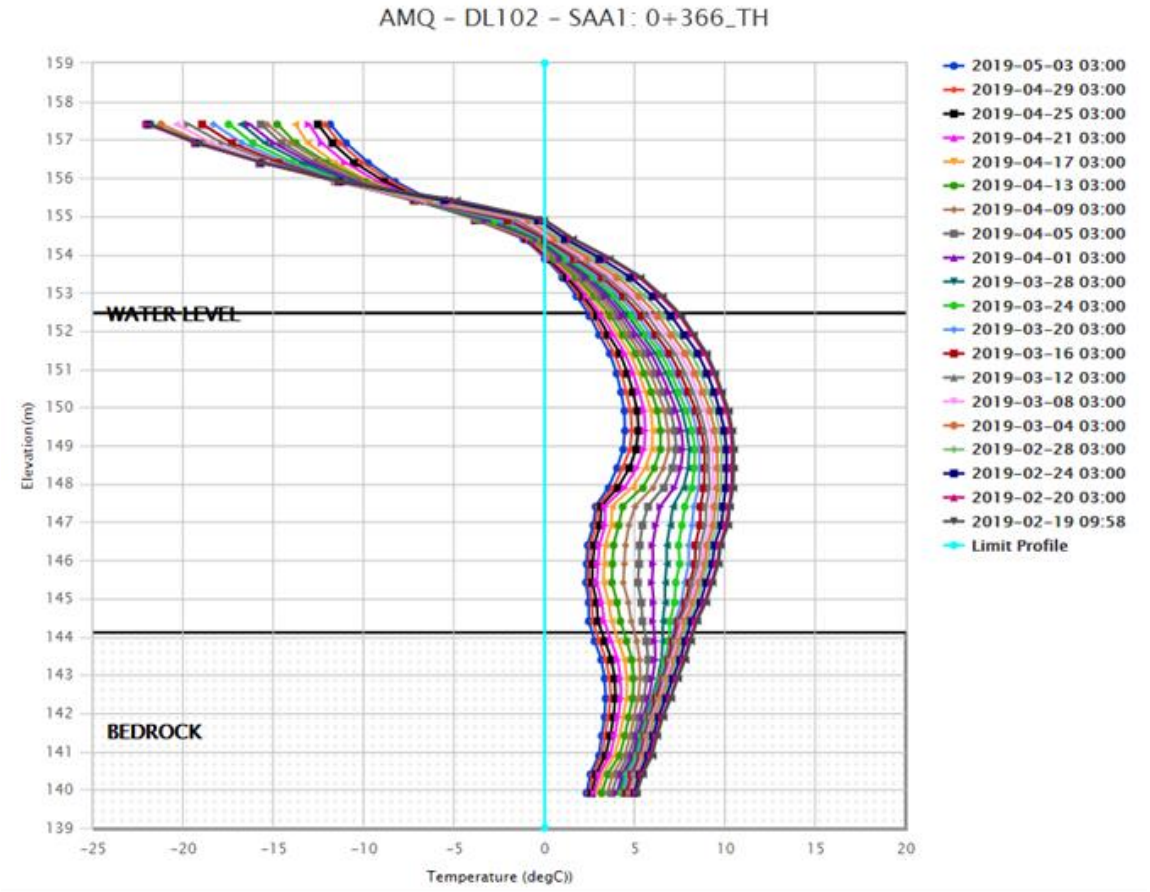

AMQ – WTD TH: 0+772
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
157
156
155
154
153
152
151
150
149
148
147
146
145
144
143
142
-25
-20
-15
-10
-5
0
5
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-20 00:00
Limit Profile

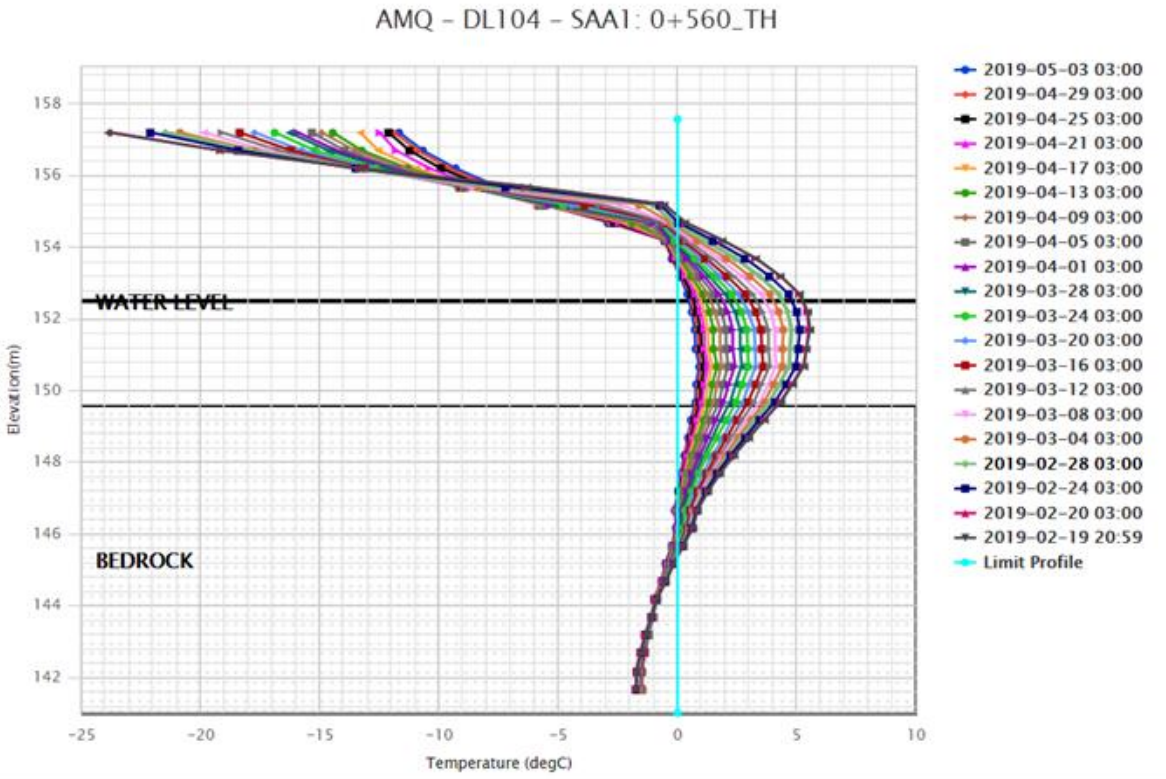

AMQ – WTD TH-US: 0+190
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
157
156
155
154
153
152
151
150
149
148
147
146
145
144
143
142
141
140
-30
-25
-20
-15
-10
-5
0
5
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-19 19:00
Limit Profile


AMQ – WTD TH-US: 0+710
Elevation (m)
Temperature (°C)
WATER LEVEL
BEDROCK
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-20 00:00
Limit Profile


AMQ – WTD TH-US: 0+750
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (°C)
157
156
155
154
153
152
151
150
149
148
147
146
145
144
143
142
-20
-17.5
-15
-12.5
-10
-7.5
-5
-2.5
0
2.5
5
2019-05-02 12:00
2019-04-28 12:00
2019-04-24 12:00
2019-04-20 12:00
2019-04-16 12:00
2019-04-12 12:00
2019-04-08 12:00
2019-04-04 12:00
2019-03-31 12:00
2019-03-27 12:00
2019-03-23 12:00
2019-03-19 12:00
2019-03-15 12:00
2019-03-11 12:00
2019-03-07 12:00
2019-03-03 12:00
2019-02-27 12:00
2019-02-23 12:00
2019-02-20 00:00
Limit Profile


AMQ – DL101 – SAA1: 0+205_TH
WATER LEVEL
BEDROCK
Elevation(m)
Temperature (degC)
159
158
157
156
155
154
153
152
151
150
149
148
147
146
145
144
-25
-20
-15
-10
-5
0
5
10
2019-05-03 03:00
2019-05-01 03:00
2019-04-29 03:00
2019-04-27 03:00
2019-04-25 03:00
2019-04-23 03:00
2019-04-21 03:00
2019-04-19 03:00
2019-04-17 03:00
2019-04-15 03:00
2019-04-13 03:00
2019-04-11 03:00
2019-04-09 03:00
2019-04-07 03:00
2019-04-05 03:00
2019-04-03 03:00
2019-04-01 03:00
2019-03-30 03:00
2019-03-28 03:00
2019-03-26 03:00
Limit Profile


AMQ - DL102 - SAA1: 0+366_TH
WATER LEVEL
BEDROCK
Elevation (m)
Temperature (degC)
2019-05-03 03:00
2019-04-29 03:00
2019-04-25 03:00
2019-04-21 03:00
2019-04-17 03:00
2019-04-13 03:00
2019-04-09 03:00
2019-04-05 03:00
2019-04-01 03:00
2019-03-28 03:00
2019-03-24 03:00
2019-03-20 03:00
2019-03-16 03:00
2019-03-12 03:00
2019-03-08 03:00
2019-03-04 03:00
2019-02-28 03:00
2019-02-24 03:00
2019-02-20 03:00
2019-02-19 09:58
Limit Profile


AMQ – DL104 – SAA1: 0+560_TH
WATER LEVEL
BEDROCK
Elevation(m)
Temperature (degC)
158
156
154
152
150
148
146
144
142
-25
-20
-15
-10
-5
0
5
10
2019-05-03 03:00
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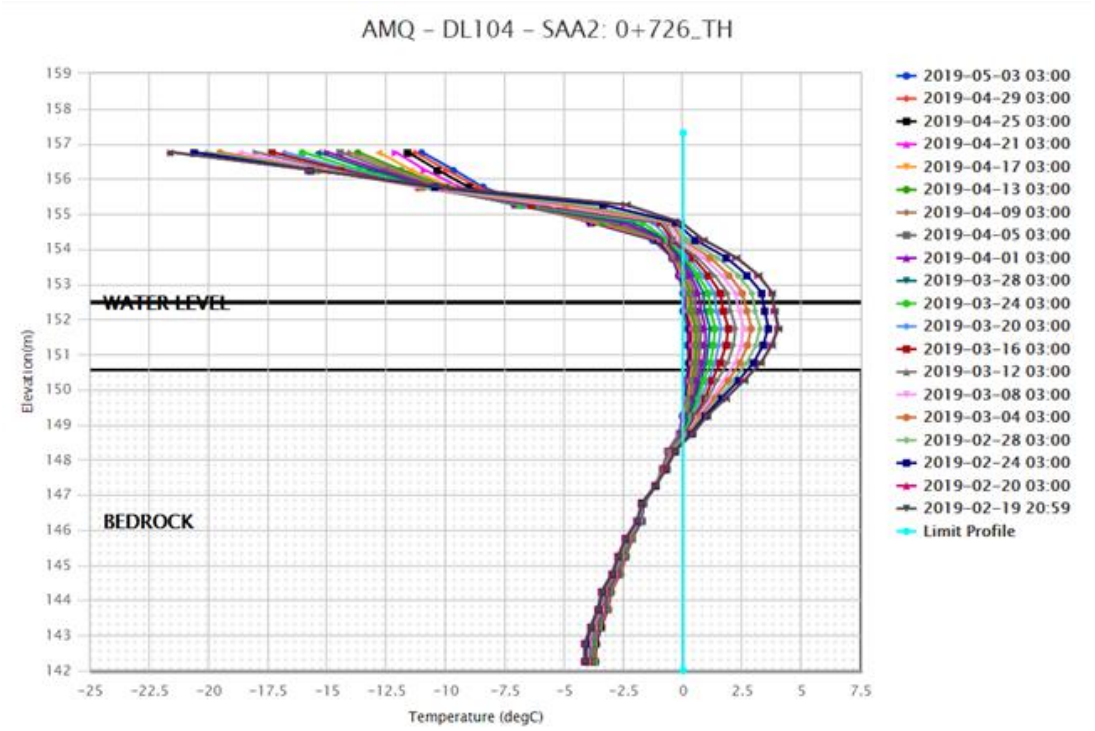
Limit Profile


AMQ – DL104 – SAA2: 0+726_TH
Elevation(m)
Temperature (degC)
WATER LEVEL
BEDROCK
2019-05-03 03:00
2019-04-29 03:00
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2019-02-19 20:59
Limit Profile

Mammoth Dike

3 thermistors were installed within the Mammoth dike, targeting the rockfill structure, the granular foundation and the bedrock. Installation happened on April 25th so no stabilized data is available for the moment.

Location of the instruments:

- Within the dike foundation
- Depth : various installation, beads located between elevations 154 and 142 m

Monitoring objective:

- Thermal condition within the Mammoth Dike. Thermal follow-up during operations as part of the Operation, Maintenance and Surveillance (OMS) program.

Thermal results highlights:

- Nothing to report.
-

WRSF Dike

3 thermistors were installed within the WRSF dike, targeting the rockfill structure, the granular foundation and the bedrock. Installation happened on April 25th so no stabilized data is available for the moment.

Location of the instruments:

- Within the dike foundation
- Depth: various installation, beads located between elevations 157 and 143 m.

Monitoring objective:

- Thermal condition within the WRSF Dike. Thermal follow-up during operations as part of the Operation, Maintenance and Surveillance (OMS) program.

Thermal results highlights:

- Nothing to report.