2021 Lupin Mine Tailings Area Inspection Report

Annual Geotechnical Inspection of the Tailings Containment Area

November 5, 2021

Prepared for:

Lupin Mines Incorporated

Prepared by:

Alvin Tong, P.Eng.

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Sign-off Sheet

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REGISTERED PROFESSIONAL ENGINEER
C. A. TONG
LICENSEE
NT/NU

Prepared by ______________________ Nov 18. 2021

(signature)

Alvin Tong, P.Eng.

Reviewed by ______________________

(signature)

Tim Peterson, P.Eng.

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1.0 INTRODUCTION

Lupin Mines Incorporated (LMI) retained Stantec Consulting (Stantec) to complete the annual geotechnical dam inspection at the Lupin Mine tailings containment area (TCA). The Lupin Mine site is currently undergoing active closure and operates under the Nunavut Water License 2AM-LUP2032 (NWB 2020) for LMI issued by the Nunavut Water Board (NWB, or the Board). LMI is a wholly owned indirect subsidiary of Mandalay Resources.

The Lupin Mine is located on the northwest shore of Contwoyto Lake, approximately 400km northeast of Yellowknife, Northwest Territories (Figure 1). The site consists of a mill, camp and support facilities, fuel storage, airstrip, and the TCA (Figure 2). A detailed view of the mill site is provided in Figure 3 and of the TCA in Figure 4.

The water license explicitly requires an annual geotechnical inspection to be completed for the TCA internal and external dams, including a quantitative assessment of any seepage from the TCA (NWB 2020). Stantec has provided a qualified person to conduct the geotechnical inspection to fulfill the requirements listed in Part E, Item 7 and Part J, Item 12 of the water license, which stipulates the following:

“The tailings containment area shall be constructed, operated and maintained to engineering standards such that:

- A minimum freeboard of 1.0 meter shall be maintained at all times or as recommended by a geotechnical engineer and as approved by the Board in writing.
- Seepage to the environment from the Tailings Containment Area is minimized.
- Any seepage to the environment that occurs is collected and returned immediately to the Tailings Containment Area.
- Erosion of constructed facilities is addressed immediately.
- The solids fraction of the mill tailings shall be permanently contained within the Tailings Containment Area or underground as backfill.
- Implement measures to ensure that the Tailings Containment Area is adequately covered or managed, including the use of approved binding agents, to prevent windblown tailings from impacting other areas of the project site.
- Transducers are installed and maintained within selected existing standpipes, to collect water level data and ensure tailings saturation.
- An inspection of the TCA shall be carried out annually during the ice free, open water condition by a geotechnical engineer. The engineer’s report shall be submitted to the Board within sixty (60) days following the inspection and shall include a cover letter from the Licensee outlining an implementation plan to respond to the engineer’s recommendations.

During care and maintenance, the Licensee shall conduct inspection on a bi-weekly basis during the freshet (approx. May and June), and monthly during the reminder of the open water period (approx. July – October) of the following:

- Seepage in Dam 2.
- Water levels in ponds and cells.
- General surface erosion, tension cracks and/or anomalies on dams.
- Records of these inspection shall be kept for review upon the request of an Inspector, or as otherwise approved by the Board.

- More frequent inspections shall be performed at the request of an Inspector.

This report summarizes Stantec's observations of the TCA's condition in 2021 and presents our recommendations. Previous annual inspections, safety reviews, and risk assessments with respect to the TCA made available to Stantec include:

- Construction reporting during active closure activities.
- Inspection Report from 2020 by Stantec Consulting.
- Inspection Report from 2019 by Stantec Consulting.
- Inspection Report from 2018 by Stantec Consulting.
- Inspection Report from 2017 by Norwest Corporation.
- Inspection Report from 2016 by Norwest Corporation.
- Inspection Reports from 2012-2015 by SRK Consulting.
- 2015 Dam Safety Review Report by SRK Consulting. (See recommendations Section 4.1)
- 2012 TCA Risk Assessment and Water Quality Review by SRK Consulting.

While the annual inspection is carried out to satisfy the license requirements, the format and methodology used are in accordance with the best engineering practice using the Inspection and Maintenance of Dams Safety Guidelines issued by the Province of British Columbia, Water Management Branch (BCWMB 2011) and the Mining Association of Canada (MAC) Guidelines.

1.1 PROJECT DESCRIPTION

1.1.1 Location and Access

The Lupin Mine is only accessible by air or winter road. The air access is serviced by a gravel runway, capable of handling large aircraft such as Hercules C-130 and Boeing 737 jets. Charter flights are typically deployed from Yellowknife for worker rotation and re-supply during the open water seasons. When the mine was in operation, it used the Tibbitt to Contwoyto Winter Road to resupply the mine. This winter road currently ends at the Ekati Diamond Mine and has not been extended to the Lupin Mine since 2005, when the mine went into care and maintenance status. An overland access trail was constructed to site in winter of 2020 to facilitate equipment mobilization for the closure activities. This overland trail will be reestablished for demobilization once the closure activities are completed.

1.1.2 History and Current Status

Currently the Lupin Mine is in active closure and licensed accordingly. Mining operations ceased in 2005. Current closure activities include, but are not limited to, mill demolition, water treatment and discharge, water quality monitoring, tailings cover construction, dam repairs, and waste management as needed.

1.1.3 Site Infrastructure

The mine site consists of the following main structures: mill site, camp and support facilities, fuel storage, airstrip, and tailings containment area (TCA).

- The mill site included an underground hoist and wheelhouse, ball mill, concentrator, and a paste backfill plant (all now decommissioned and demolished).

- The camp and support facilities included multiple wings of accommodations for workers, an office building, recreation facilities, cool and warm storage, generators (all now demolished). In addition there are sewage lagoons and dams, and waste management facilities. Gravel roads are in place to connect the facilities.
- Fuel storage includes the main tank farm that contains diesel fuel for annual operation, along with fuel for aircraft. Fuel is pumped to a satellite tank farm as needed for equipment fueling and power generation to minimize the risk of spillage and accidents from using the large fuel tanks at the main farm. Most of the fuel tanks are decommissioned and demolished.
- The airstrip is a gravel runway that could accommodate aircraft up to the size of a Boeing 737 jet when the mine was in operation.
- The TCA consists of a number of frozen core dams that provide a closed system for tailings and water treatment. Tailings are contained in a number of cells and progressive reclamation is ongoing and has now been completed at several cells. Water treatment is carried out using Pond 1 as a holding pond for effluent, treating the water in a plant, and then using Pond 2 as a polishing pond to allow the solids to precipitate prior to discharge to the environment. Details of the TCA configuration are described in Section 2 of this report.

1.2 CLIMATE

Stantec evaluated the climate data from an automated weather station known as Lupin (CWIJ) available in the Weather Underground database (WU 2016). Intermittent climate data is also available from the Environment Canada database under station Lupin CS Climate ID 230N002. The climate data evaluation was done from May 2005 to April 2017. The climate data evaluation has not been updated in since 2018 as the data was not made publicly available. The evaluation results indicate the station reported an annual mean temperature of -13°C. The average winter temperature, from October to April, was around -21°C. The average summer temperature, from May to September, was around 8°C. Annual total precipitation was averaged to be around 592mm, where the data does not differentiate between snow and rain. The mean wind direction was south-southeast, with average wind speed of 16km/h and high of 50km/h.

1.3 SITE GEOLOGICAL CONDITIONS

The Lupin Mine is located in the Archean metaturbidite sequence of the Contwoyto Formation. The rocks have been subjected to both regional and contact metamorphism, including deformations and intrusions.

The area was glaciated, and experienced isostatic rebound after the melt. The glaciers and runoff from the melt washed out the erodible soils and formed lakes in low lying areas. The easily erodible glaciolacustrine and glacio-fluvial sands were reworked and displaced by the meltwater and resulted in the outcrops present with thin soil veneers, abandoned beaches and esker formations (Kinross 2005). Where bedrock is not present at the surface, the overburden typically consists of coarse grained glacial till which is intermittently covered by glaciolacustrine and glacial-fluvial deposits. The till is a silty sand with gravel and boulders, with low plasticity and ice depending on the depth.

1.4 PERMAFROST AND DAM GEOTECHNICAL CONDITIONS

The site is within a continuous permafrost region. The active layer is observed to be variable between the depth of 1.25m to 3m based on available data. During operation, scheduled monitoring was completed of all instrumentation, recording water levels, water quality and production volumes. This monitoring program was reduced accordingly during the care and maintenance period and is now carried out when work is being done on site where applicable. Thermistors are installed in several dams and in the tailings cover to monitor their performance. Some of the thermistors are no longer functional or damaged beyond repair. The remaining thermistors are read at least once annually during the geotechnical inspection and more often when site access allows. The thermistor readings indicate that permafrost remains within the dams and reclaimed tailings, and the readings are consistent with historical variation and limits.

2.0 TAILINGS CONTAINMENT AREA DAMS

The tailings are primarily comprised of amphibole and quartz, which account for 80% of the volume. Pyrrhotite and arsenopyrite make up an additional 17%. The tailings have been shown through various studies to have a potential for acid generation (Kinross 2005). All of the tailings are contained within the TCA.

The Lupin Mine TCA consists of eight (8) perimeter dams and nine (9) internal dams. The perimeter dams are Dams 1A, 1B, 1C, and Dams 2 through 6. The internal dams are Dam 3a through 3e, Dams J through N, and the Divider Dykes. Combinations of the perimeter dams and internal dams form Tailings Cells 1 through 5 for containment. As the progressive reclamation is being completed, some of the internal dams (3a, 3b, 3c, 3e) are incorporated into the cover and are no longer considered as individual dams. Currently, Cells 1 and 2 are completely reclaimed from historical activities. Cell 3 and Cell 5 are covered with the latest closure activities in 2021. Ninety-eight percent (98%) of the documented tailings area is now reclaimed with at least 1m of sand/gravel cover, with the exception of a small portion in Cell N and north corner of Cell 4. No new tailings have been produced since 2005 when the site went into care and maintenance status.

All dams are constructed from esker sands and gravels, with the perimeter dams and Dam K, incorporating a geosynthetic liner for seepage control. All the perimeter dams are designed as frozen core dams founded on permafrost. Generally, the perimeter dams range in height from 1 to 8 meters. The internal dam heights range from 6 to 12 meters and are now covered.

The active closure procedures for water management directs runoff from Cell 3 into Cell 4 via the newly constructed surface water management structure. The water in Cell 4 then flows through the newly constructed spillway built in the Divider Dyke into Pond 1. Cell 1 and 2 excess runoff is directed into Pond 1, while the rest is left on the cover for evapotranspiration. Cell 5 runoff is directed into Pond 1 with the newly constructed surface water management structures. The Pond 1 water level is managed by siphoning water into Pond 2. Water treatment is carried out by treating the water in-situ in Pond 2, by adding neutralizing products to raise the pH. Precipitates from this treatment are deposited in Pond 2. The treated water in Pond 2 is siphoned into the environment in accordance with the Water License requirements (NWB 2020). Pond 2 does not have any flood overflow structures, such as a spillway or a control gate, to manage the water level. All water is retained, and discharge is restricted until water quality meets the discharge requirement outlined in the Water License (NWB 2020).

2.1 DAM CONSEQUENCE CLASSIFICATIONS

Stantec utilized the Canadian Dam Association Guidelines (CDA 2014) to classify the consequence classification of each dam. The CDA consequence classifications are shown in Table 2-1. The dam consequence classifications of the dams based on Stantec's 2020 inspection are outlined in Table 2-2. These consequence classifications are in line with the classifications outlined in the 2015 Dam Safety Review (SRK 2015).

An emergency preparedness plan (EPP) is noted by the dam safety review (DSR) (SRK 2015) to be in place and deemed appropriate for care and maintenance status. Stantec did not review the EPP. Due to the lack of transportable tailings, permanent population, or infrastructure downstream of the perimeter dams, a detailed inundation study is deemed non-applicable.

Table 2-1: CDA Dam Consequence Classifications

Dam Class	Population at Risk(1)	Incremental Losses		
		Loss of Life(2)	Environmental and Cultural Values	Infrastructure and Economics
Low	None	0	• Minimal short-term loss; • No long-term loss	Low economic losses Area contains limited infrastructure or services
Significant	Temporary only	Unspecified	• No significant loss or deterioration of fish or wildlife habitat • Loss of marginal habitat only • Restoration or compensation in kind highly possible	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes
High	Permanent	10 or fewer	• Significant loss or deterioration of important fish or wildlife habitat • Restoration or compensation in kind highly possible	High economic losses affecting infrastructure, public transportation, and commercial facilities
Very High	Permanent	100 or fewer	• Significant loss or deterioration of critical fish or wildlife habitat • Restoration or compensation in kind possible but impractical	Very high economic losses affecting important infrastructure or services (e.g. highway, industrial facility, storage facilities for dangerous substances)
Extreme	Permanent	More than 100	• Major loss of critical fish or wildlife habitat • Restoration or compensation in kind impossible	Extreme losses affecting critical infrastructure or services (e.g. hospital, major industrial complex, major storage facilities for dangerous substances)

Note 1. Definition for population at risk:
None - There is no identifiable population at risk, so there is no possibility of loss of life other than through unforeseeable misadventure. **Temporary** - People are only temporary in the dam-breach inundation zone (e.g. seasonal cottage use, passing through on transportation routes, participating in recreational activities).
Permanent - The population at risk is ordinarily located in the dam-breach inundation zone (e.g. as permanent resident); three consequence classes (high, very high, extreme) are proposed to allow for more detailed estimate of potential loss life (to assist in decision-making if the appropriate analysis is carried out).
Note 2. Implication for loss of life:
Unspecified - The appropriate level of safety required at a dam where people are temporarily at risk depends on the number of people, the exposure time, the nature of their activity, and other conditions. A higher class could be appropriate, depending on the requirements. However, the design flood requirement, for example, might not be higher if the temporary population is not likely to be present during the flood season.

Table 2-2: Lupin TCA Dam Consequence Classifications

Dam		Consequence Classification	Rationale
Perimeter Dams	1A	Significant	Release of water that might not meet discharge criteria into the environment
	1B	Significant	Release of water that might not meet discharge criteria into the environment
	1C	Significant	Release of water that might not meet discharge criteria into the environment
	2	Significant	Release of water that might not meet discharge criteria into the environment
	3	Low	No free-standing water; Stable reclaimed tailings with very limited impact consequence upon failure
	4	Significant	Release of water that might not meet discharge criteria into the environment
	5	Low	No free-standing water; Stable reclaimed tailings with very limited impact consequence upon failure
	6	Low	No free-standing water; Stable reclaimed tailings with very limited impact consequence upon failure
Internal Dams	3D	Low	Any release of effluent or tailings are contained within the TCA
	J	Low	Any release of effluent or tailings are contained within the TCA
	K	Low	Any release of effluent or tailings are contained within the TCA
	L	Low	Any release of effluent or tailings are contained within the TCA
	M	Low	Any release of effluent or tailings are contained within the TCA
	N	Low	Any release of effluent or tailings are contained within the TCA
	Divider Dykes	Low	Any release of effluent or tailings are contained within the TCA

3.0 2020 TCA INSPECTION

3.1 GENERAL

Mr. Alvin Tong, P.Eng., a Senior Geotechnical Engineer with Stantec, conducted the geotechnical inspection on the 9th and 10th of September 2021. Detailed visual inspection was completed on all TCA components, along with readings of instrumentation. Mr. Dave Vokey, representative of LMI, was on site for communication and organization, but did not accompany Stantec on the inspection.

The weather during inspection was overcast with sunny periods. Detailed inspection and photograph logs are provided in Appendix A.

The general observations indicated that the perimeter dams are in stable condition. Various earthwork was done in 2021 as part the closure activities. Cell 3 and 5 tailings covers were completed in 2021 with engineered surface water management channels. These channels lead to the outlet structures built into Dam L and Dam M to allow for passive drainage into Cell 4 and Pond 1, respectively. The temporary emergency measures that were done on the divider dyke and Dam L were either removed or rendered obsolete with the final closure construction. The localized minor failure at Dam M from 2020 is being monitored in 2021 and to be repaired during the final closure reslope. Dam K underwent closure resloping to 2H:1V or flatter. A spillway was constructed in the divider dyke to allow passive drainage from Cell 4 into Pond 1.

Since the inspection in September, LMI has partially covered Cell N. Temporary surface water management was constructed to limit run-on water from upstream environment into the uncovered portion of Cell N.

3.2 INSTRUMENTATION

3.2.1 Thermistors

Thermistors were installed in the TCA between 1995 and 2004 to monitor the performance of the dams and tailings covers. From the existing records, there were thirteen thermistors installed in the dams, but only six of them are currently functional. The two previously damaged thermistors, one thermistor located on each of Dam 1A (D1A-00-01s) and Dam 4 (D4-2) were repaired this year. Thermistor D4-3 did not get repaired this year due to timing. The thermistor at Dam 2 lost some of it beads this year and repairs will be attempted next year. Of the six functioning thermistors, four are in the perimeter dams and two are in the internal dams. There are an additional seven thermistors installed in the reclaimed tailings cover, but three of them do not have calibration data on record to evaluate the results. This report focuses on the thermistor readings from the dams, using the thermistor readings from the cover for reference and comparison.

The thermistors were read monthly during operation up until 2006, and then read semi-annually during care and maintenance. Not all the functioning thermistors were read consistently throughout the care and maintenance period. To provide a point of reference in this report, selected data series between August and September, from year 2010 to 2020, are shown for comparison, while maximum values are calculated from the entire series from the first available records to 2014.

For the perimeter dams, the four functioning thermistors are less than 20m deep. The five thermistor readings are shown in the figures below. The data suggests the 2021 readings are within the historical variations, taking into account annual climatic variations and time of reading. Generally, the active layer (thaw zone) ranges from 2m to 3m depth, as interpolated by the 0°C gradient line. The largest historical variation in the 2020 data set is approximately 3.3°C (between -1.2°C and -4.5°C) in Dam 1 (D1A-00-01s) at the depth of 7m.

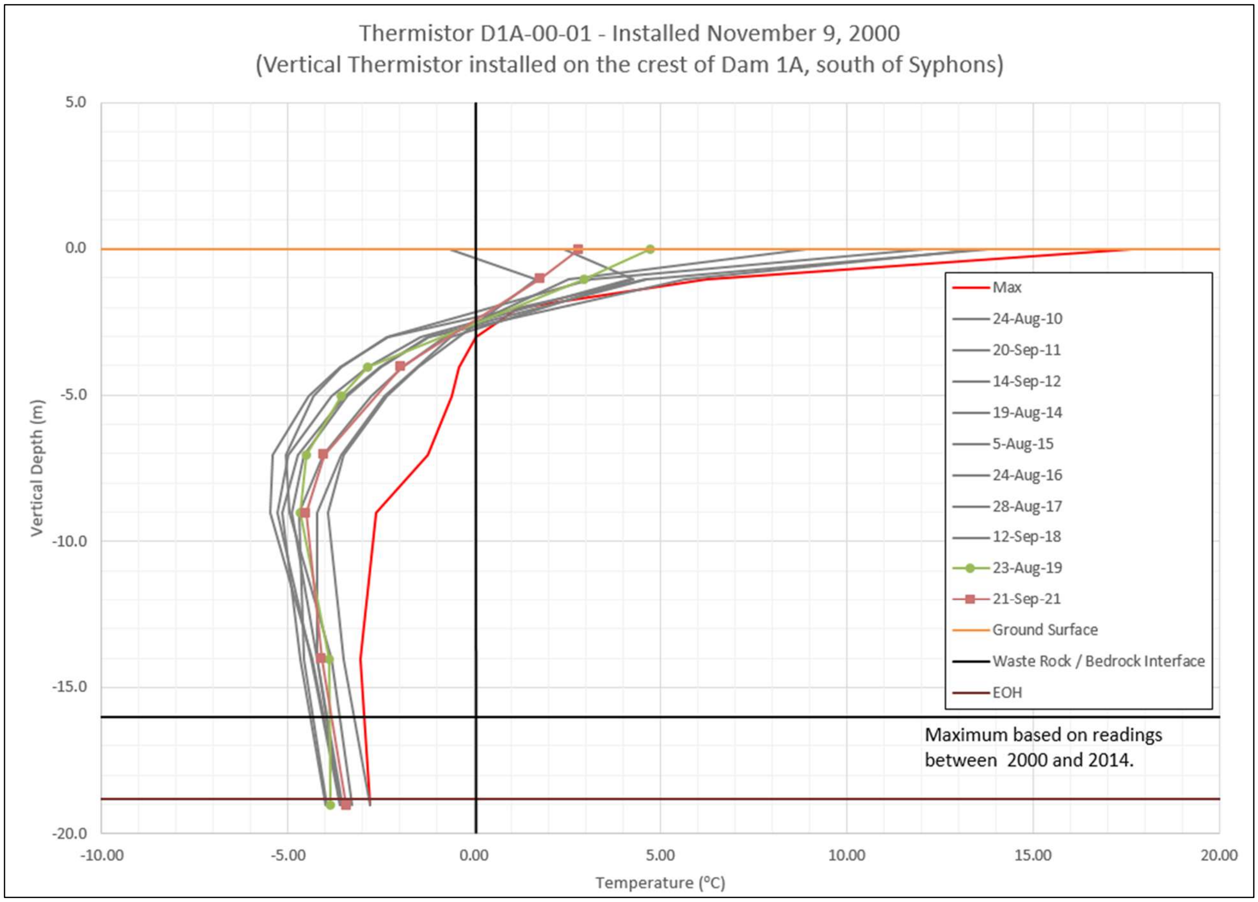


Figure 3-1: Thermistor Reading for Dam 1A

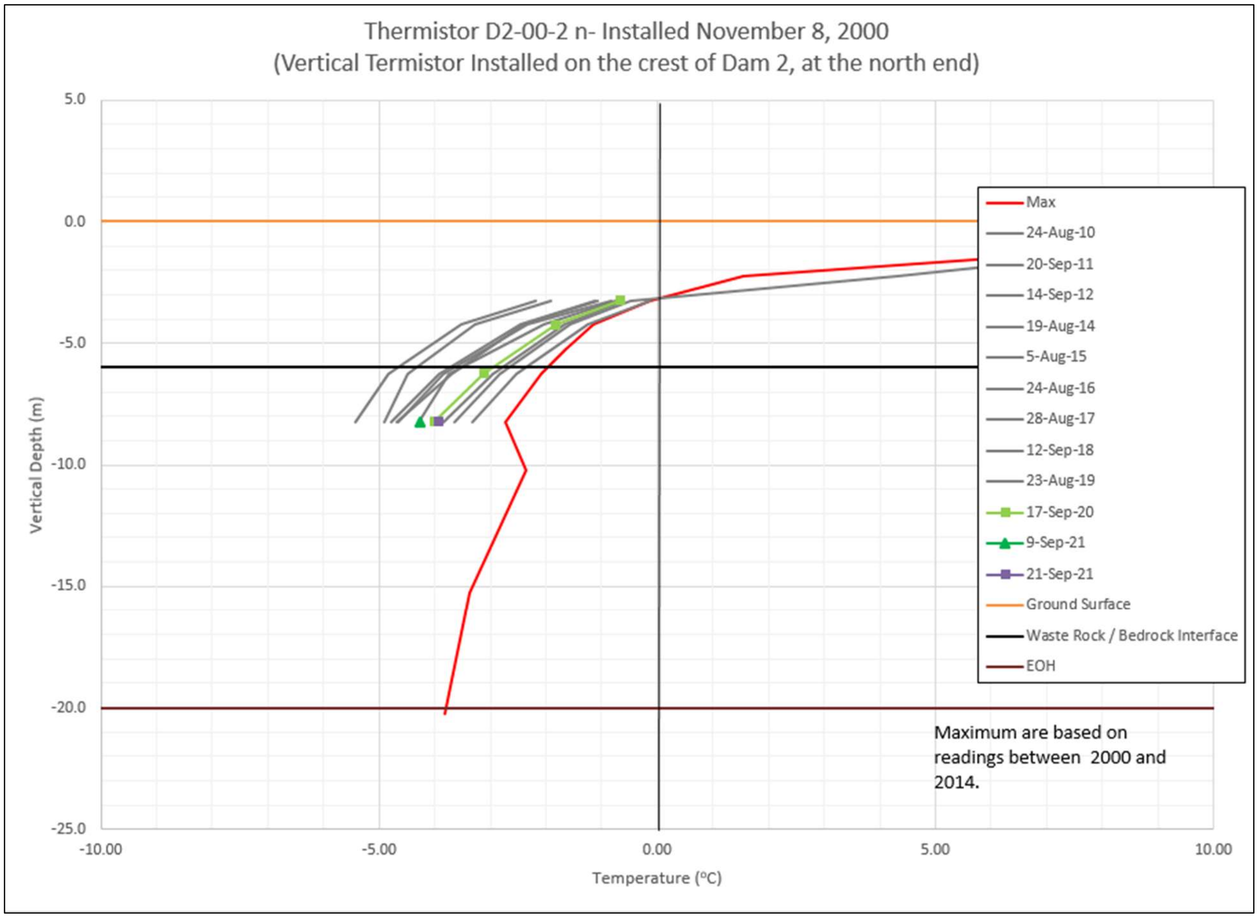


Figure 3-2: Thermistor Reading for Dam 2

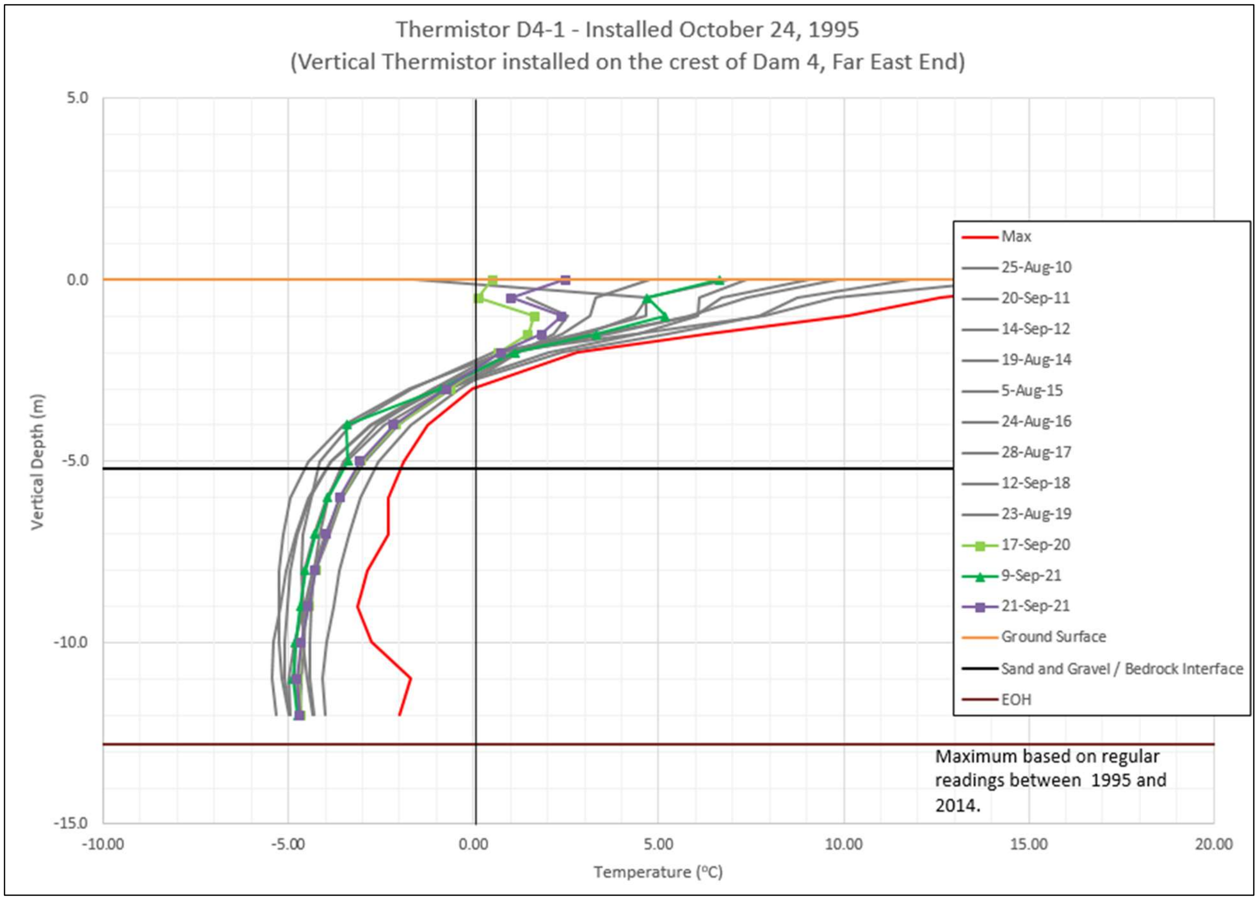


Figure 3-3: Thermistor Reading for Dam 4-1

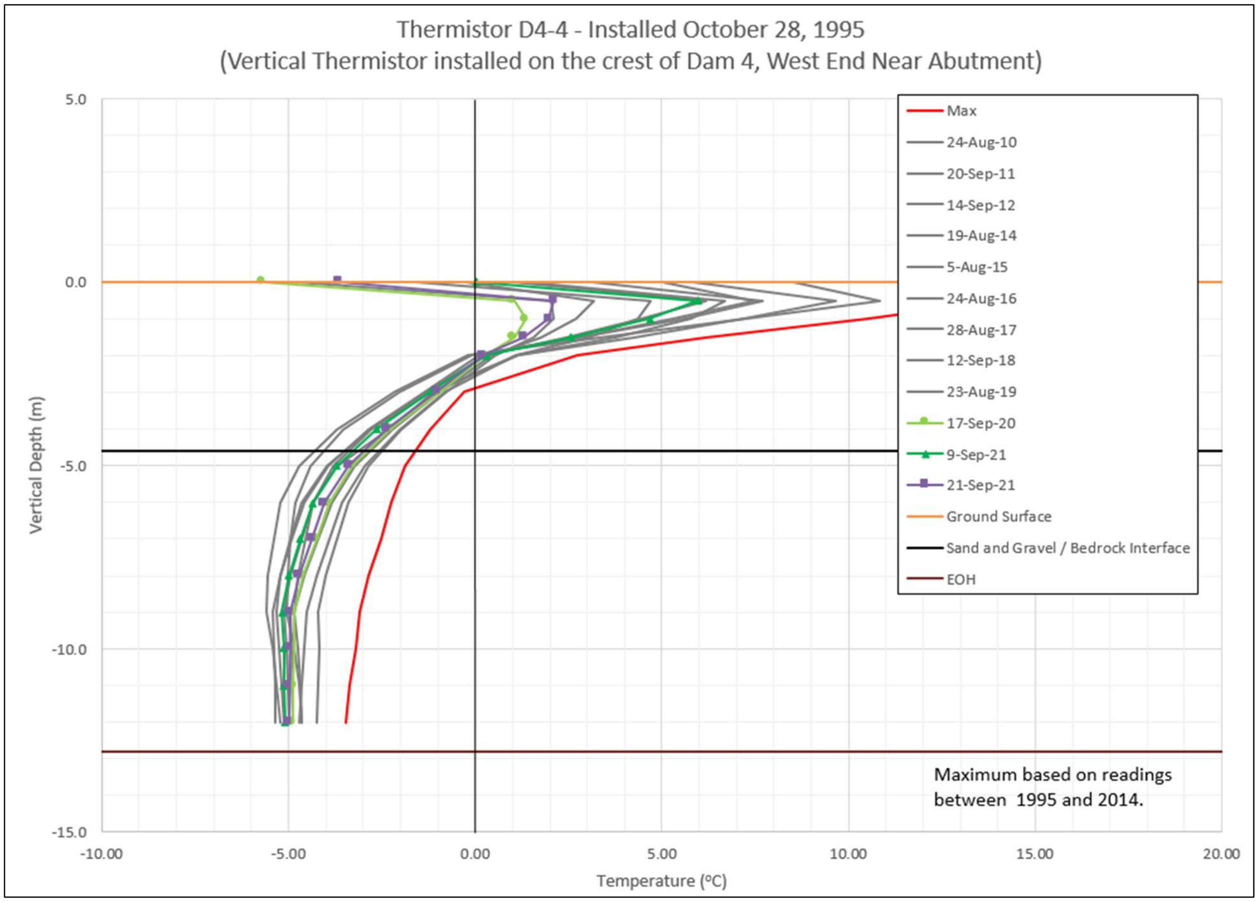


Figure 3-4: Thermistor Reading for Dam 4-4

For the internal dams, the two functional thermistors are also less than 20m deep in Dam K and Dam 3D. These were not historically monitored as rigorously as the ones installed in the perimeter dams, and only have recent data from 2014. The two thermistor readings are shown in the figures below. The active layer is observed to be between 2m to 3m, as interpolated by the 0°C gradient line. The variations between the data sets are less than 2°C and generally occur below the historical maximum.

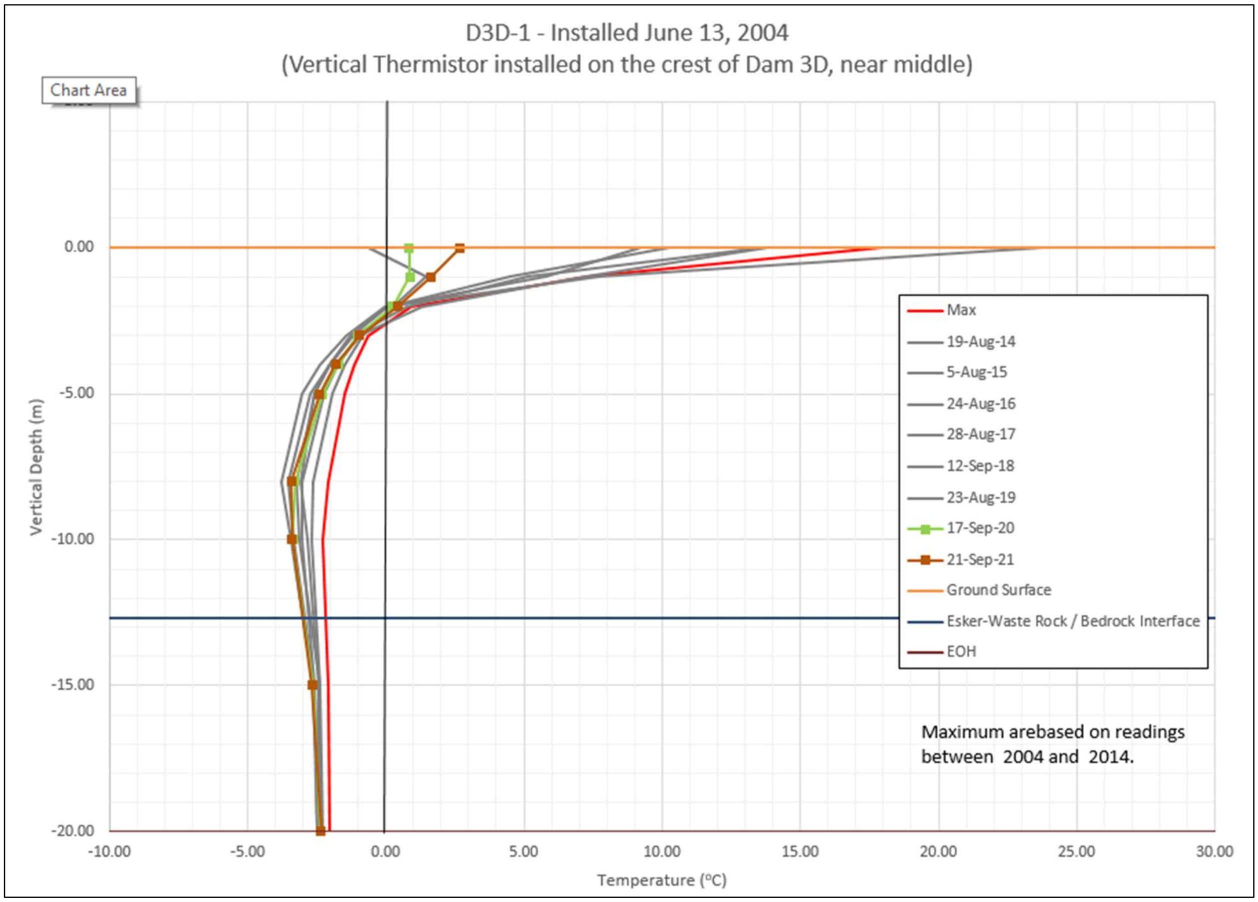


Figure 3-5: Thermistor Reading for Dam 3D

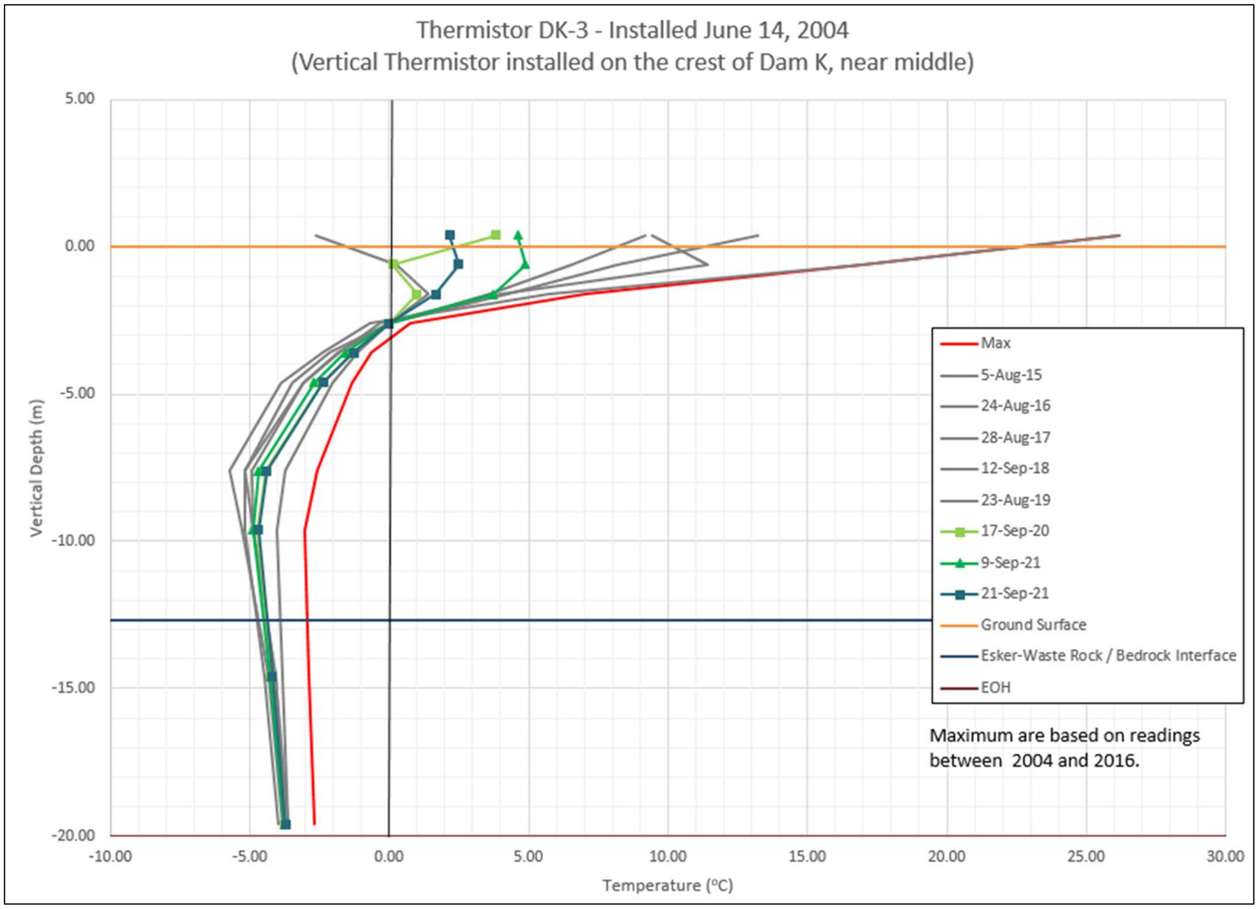


Figure 3-6: Thermistor Reading for Dam K

Readings from the four thermistors in the tailings cover are not presented in this report. The cover thermistor trends are comparable to the readings from the dams with a noticeable thinner active layer between 1.25m to 1.75m. All the observed larger temperature variations remained below 0°C and well below the active layer. The observed active layer depths remain consistent with the site recorded data and information provided by national research (Penner 1983). The thermistor readings indicate that the frozen cores within the monitored dams are frozen below the active layer and are performing well.

3.2.2 Moisture Sensors

To provide insight into the performance of the cover, volumetric moisture sensors were installed in the Cell 1 and Cell 3 covers in 2018. The sensors are TEROS-12 VWC sensors that measure volumetric water content, temperature and electrical conductivity. The sensor readings are set to read once every 12 hours and the readings are recorded by dataloggers. Cells 1 and 3 each have one string of five sensors installed within the cover (C2VWC and C3VWC). The sensor spacings and background material are provided in Table 3-1.

Table 3-1: VWC Installation Details

VWC ID	Cell 1-1		Cell 3-1	
	Depth (m)	**Material**	**Depth (m)**	**Material**
Port 5	1.0	Fine Sand (Cover)	0.35	Sand and Gravel (Cover)
Port 4	1.2	Fine Sand (Cover)	0.5	Sand and Gravel (Cover)
Port 3	1.4	Fine Sand (Cover)	0.6	Sand and Gravel (Cover)
Port 2	1.6	Fine Sand (Cover)	0.7	Sand and Gravel (Cover)
Port 1	1.8	Tailings	1.0	Sand and Gravel (Cover)

MEND (2009) shows that an effective barrier against oxidization can be achieved with a soil cover moisture content greater than 85%. The intent of the sensor readings is to define the degree of saturation throughout the year at various depths within the cover. It should be noted that sensors register ice as a dry void. Thus, as the pore water freezes and ice forms, the moisture content reading in the sensors drops sharply. In order to calculate the volumetric water content, an assumed void ratio is assigned to each sensor string based on the cover material type. The assumed void ratio for Cell 2 cover is 0.42 which corresponds to a fine sand and Cell 3 cover is 0.33 which corresponds to a gravelly sand.

The data from 2020 indicates that at both strings there is a zone of saturated material above the tailings.

3.2.2.1 Cell 1-1 VWC

The figure below shows the percentage saturation for VWC in Cell 1. All sensors show frozen conditions between November and July. There is a spike in the percentage of saturation in all sensors in early July related to overall thawing. The 2021 data indicated Port 4 moisture contents are above 85% saturation once thawed. Port 1, 2 and 3 that are at a lower elevation than Port 4 showed a variable trend but remains around 80% saturation. After in depth review of the data, it is found that the lower degree of saturation in Port 1 through 3 could be contributed to near freezing temperatures measured at depth. The WCC interpret frozen material as voids thus reporting a lower degree of saturation.

It should be noted that there is a gap in data collection between July 6th to August 7th, 2020. The cause of the data gap is unknown and will be noted for documentation.

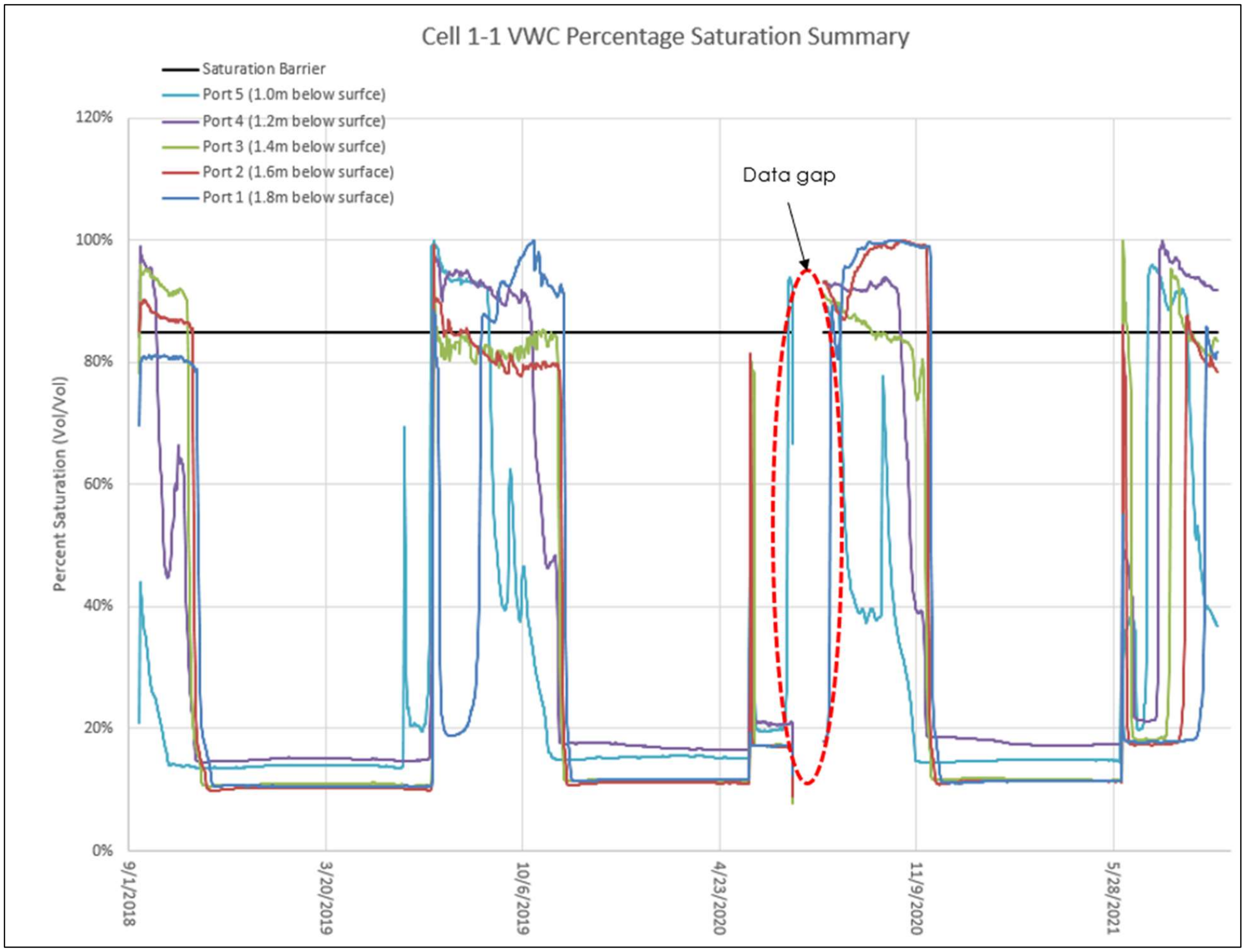


Figure 3-7: Cell 1-1 VWC Percentage Saturation Summary

3.2.2.2 Cell 3-1 VWC

The figure below shows the percentage saturation for VWC in Cell 3. The majority of the sensors show frozen conditions between October and June. There is a spike in percentage of saturation in the top sensors in June signaling overall thawing. The 2021 data indicate the lower portion of the over as shown by Ports 1 and 2 are generally above 85% saturation once thawed. The upper portion cover as shown in Port 3 to 5 showed a variable trend between 57% to 86% saturation, mostly related to surface evaporation and rehydration from rain. It is assumed that the tailings remain to be inert as the lower portion of the cover is above 85% saturation.

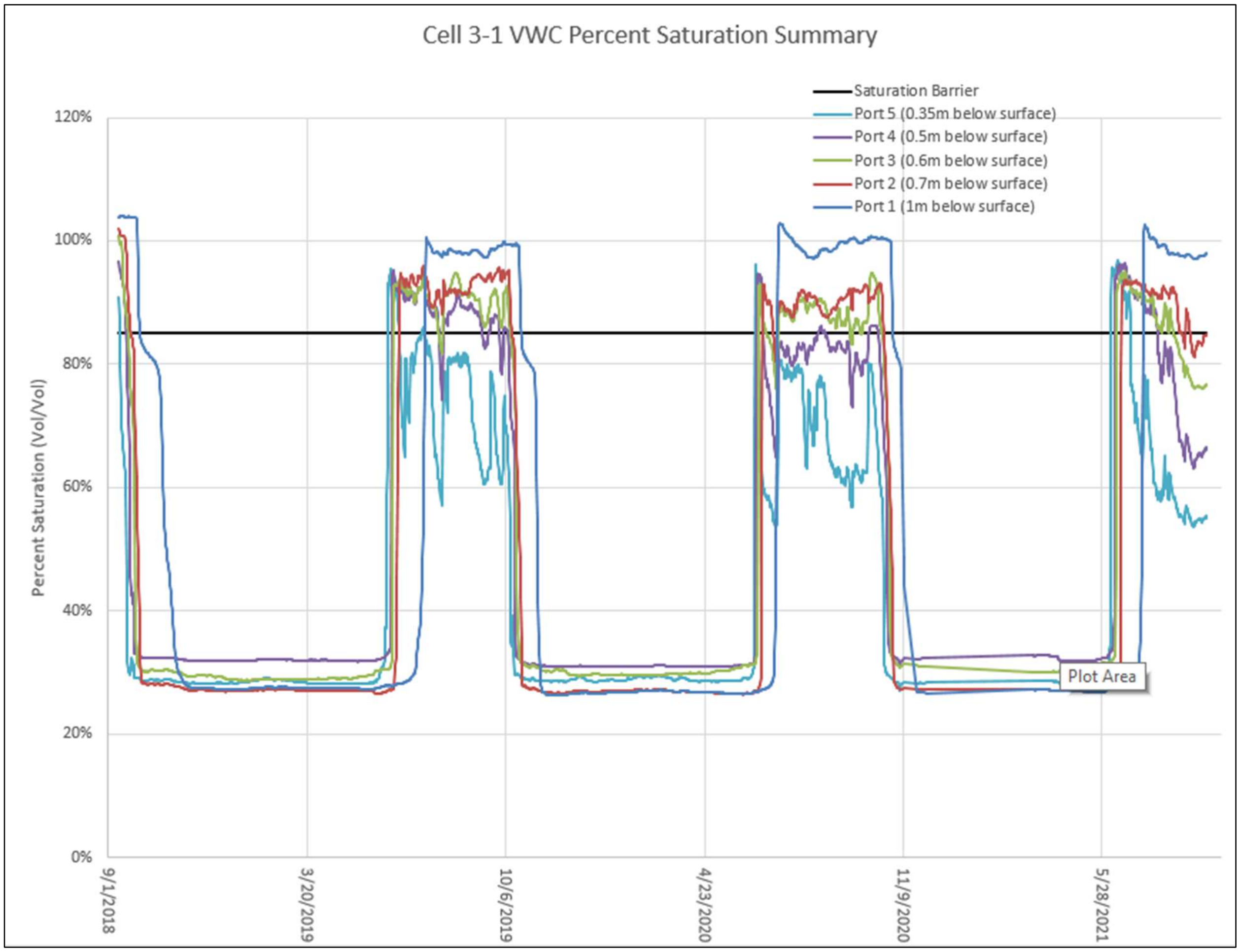


Figure 3-8: Cell 3-1 Port 1 VWC Result

3.2.3 Transducers

Three Level TROLL 400 transducers and one BaroTROLL 500 transducer were installed in 3 standpipes in Cell 1 in 2019. Based on the historical information (Kinross 2006), the standpipes were installed to the tailings/cover contact and the transducers are installed few centimeters off the bottom. The installation data indicated there is approximate 1m cover thickness between the three transducers locations. They will provide further insight into the cover performance and help reconcile the VWC data. The transducers are programmed to read depth of water above the sensor in each standpipe, every 15 minutes. The transducers are winterized to continue functioning through the freezing period, but any water level readings at temperatures below zero degrees Celsius are not representative of real water/ice thickness.

Water level data from the transducers are provided in Figure 3-9 below. Data collected during the freezing period are not provided in the plot as the non-representative readings skew the scale for the real non-freezing period (summer) data. The summer readings fluctuate as expected due to evaporation and precipitation events, but the general trend indicates there is minimum 0.2m of water above the tailings/cover contact. Reading above the top cover indicated ponding above the cover. According to the transducers data, the cover and tailings are reporting to be saturated at these locations, indicating the cover is functioning as designed. SP-8 was not read in 2020 and 2021 due to limited access where cover around the standpipe was either ponded or too soft for traffic.

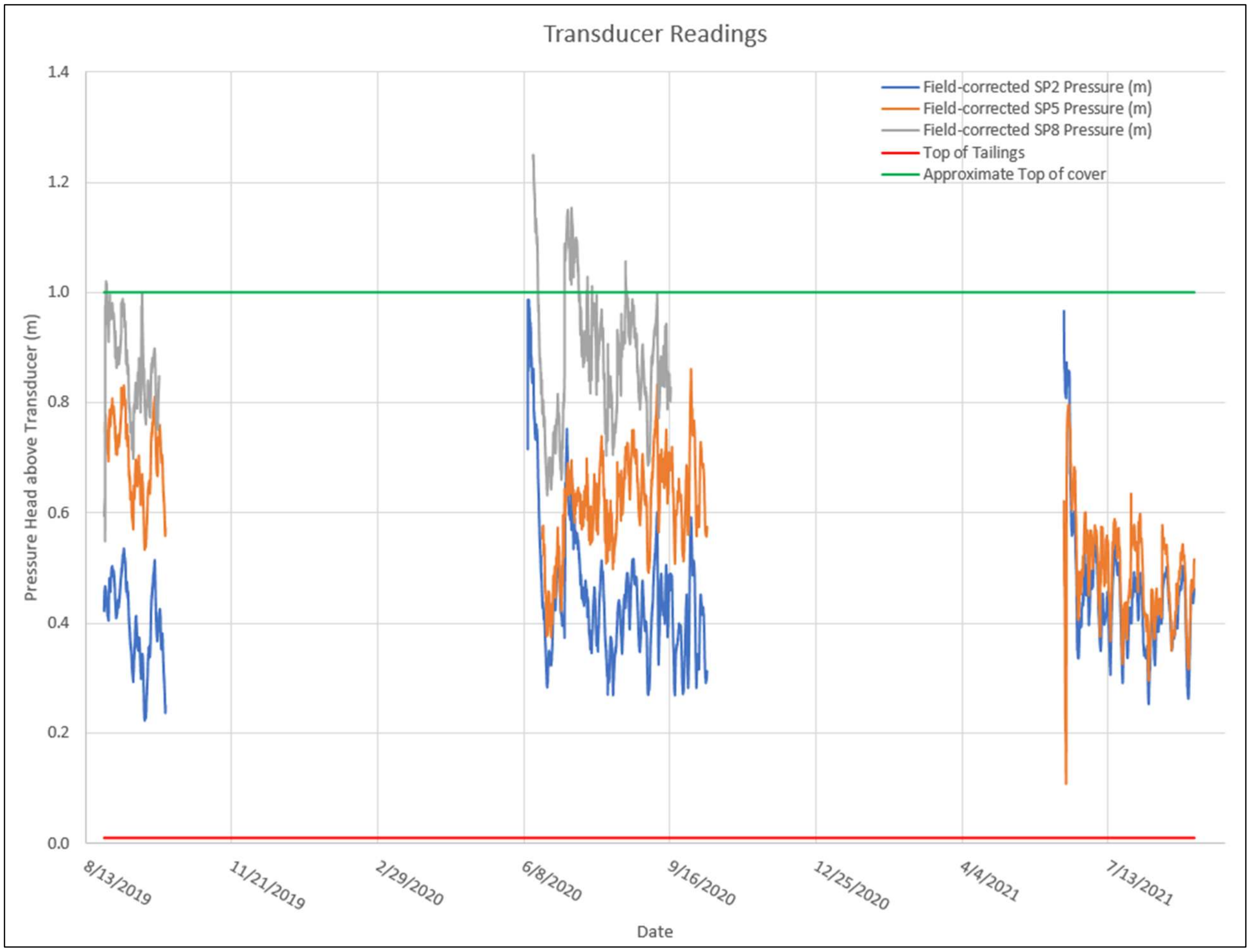


Figure 3-9: Transducer Results

3.3 TCA PERIMETER DAMS

The perimeter dams (Dam 1A through Dam 6) were observed to be in stable condition. Old erosion was observed on the dam slopes from historical wave action below the high-water mark (HWM). While most of the surface erosion was observed to be minor, it should continue to be monitored for deformation and repaired as recommended to prevent the erosion from becoming worse and creating preferential surface flow paths prior to final closure. Once the final closure activities are completed, the water level in the TCA will be passively managed to below Dam 1A, B, and C, Dam 2, Dam 4 and Dam 5 structure elevations where they will no longer be performing as water retaining structures.

Previous annual inspections noted seepage from the northern toe buttress of Dam 2 into the seepage collection pond adjacent to the Dam 2 Lake. Seepage was not observed during the 2021 inspection, but water was seen to be present in the seepage collection pond. It was communicated on site that the seepage water should be pumped back to Pond 2 as per requirement.

Pond 2 water level has lowered significantly from last year's discharge. The observed freeboard at the perimeter dams was around 4.5m or greater. This well exceeds the minimum requirement of 1m freeboard as stated in the water license. Dam 1B, 1C, Dam 5 and Dam 6 do not have water on the upstream face of the dams.

It was noted by the site engineer that a minor surface erosion occurred on Dam 6 during early freshet around the first week of June. The erosion is a shallow surface erosion, approximately 2m wide and 0.5m deep on the crest of Dam near the north abutment. Immediate active water management (pumping) was done to reroute the freshet water and the erosion was repaired with compacted coarse sand and gravel with cobble, under the supervision of the site engineer with direction from the EOR.

3.4 INTERNAL DAMS

Various earthwork was completed in 2021 as part the closure activities and emergency water management. The summary of work done is listed below:

- Cell 3 tailings cover was completed along with the surface channel. An outlet was built in Dam L near the southern abutment to allow passive runoff drainage from Cell 3 to Cell 4. All temporary measures on Dam L in 2020 were removed under field supervision in preparation for closure activities.
- Cell 5 tailings cover was completed along with the surface channel. An outlet was built in Dam M near the southern abutment to allow passive runoff drainage from Cell 5 to Pond 1.
- A spillway was constructed through the Divider Dyke, replacing the old culvert. This allows Cell 4 to passively drain into Pond 1 through the Chain Lakes area.
- The erosion and undercutting along Dam K were repaired and the dam was resloped to 2H:1V or flatter according to the closure design.
- Cell N was partially covered, and temporary water management was built to limit run-on into the uncover area.

The Pond 2 water level was lowered from last year's discharge operation, providing a freeboard upwards of 2.5m at the Dam J. Dam 3D also had some crest erosion from surface runoff. Dam J had wave action erosion at the HWM that reduced the crest width. Dam L has some minor crest erosions north of the outlet area.

Dam K underwent closure construction and was resloped to 2H:1V or flatter. All of the deformations noted from previous years has been repaired as part of the closure activities. The reslope was done by partially excavating the buttress constructed last year and using the excavated fill in areas that needed material. The fill was compacted using a compactor where applicable and also compacted by the excavator bucket in thin lifts (<200mm) where the compactor could not be used. The closure construction was overseen by a designated EOR representative to ensure the reslope was constructed using appropriate material and compacted accordingly. A summary construction report (Stantec 2021a) was submitted to document the work done on Dam K.

The buttress at Dam M experienced localized minor sloughing in 2020. During 2020 closure activities, a minor localized failure caused by a construction incident was observed by the EOR representative. This area was monitored by the EOR representative throughout 2021 and further deformation was observed. Upon the 2021 inspection, it was determined that this localized failure does not impact the overall stability of Dam M and further repair was suspended to be completed during the final reslope to minimize risks.

Cell N was partially covered as part of the closure activities. Temporary surface water management was constructed to limit run-on from the upstream area into the uncovered area and Cell N was emptied of ponded water prior winterization. If the temporary structures are not successful in rerouting the run-on, there is a risk of insufficient freeboard in Cell N during the 2022 freshet. This was communicated to LMI and the plan is to be on site prior to freshet to monitor the situation and to actively manage the freeboard in Cell N if needed.

Cell 3 cover was completed in 2021 along with the surface water channel and outlet through Dam L. The temporary dam raise done last year was removed to proceed with the final closure design and construction. The work was overseen by the EOR representative to ensure quality assurance. A summary construction report (Stantec 2021b) was submitted to document the work done in Cell 3.

Cell 5 cover was completed in 2021 along with the surface water channel and outlet through Dam M. The work was overseen by the EOR representative to ensure quality assurance. A summary construction report (Stantec 2021c) was submitted to document the work done in Cell 5.

An engineered spillway was constructed through the Divider Dyke along the old culvert alignment. The spillway is passively controlling the Cell 4 water level at El. 484m. The lowered water effectively rendered the Divider Dyke to be an overland feature as it will no longer retain Cell 4 water. As the water was lowered to below the dam, the seepages noted last year were not observed in 2021. The closure work was overseen by the EOR representative to ensure quality assurance. A summary construction report (Stantec 2021d) was submitted to document the work done in the Divider Dyke.

There was visual evidence of a couple of small sand boils noted along the toe of Dam N, although they were not actively showing seepage or flow at the time of inspection. Based on communication with the site engineer, it is surmised the sand boils were caused by excess pore pressure from construction traffic on the Cell N cover. This area has been monitored since and no active flow was observed: The area will be monitored in 2022 during the Cell N construction.

There are no notable new deformations within Dam J, Dam 3D and the northern portions of Dam L. Minor crest erosions that were noted the previous year showed no signs of worsening throughout 2021.

4.0 RECOMMENDATIONS

Table 4-1 summarizes the observations and recommendations from the 2021 inspection, together with the findings from the 2020 inspection for comparison. The estimated freeboards were recorded by site engineering representative on September 9^{th}, 2021.

Table 4-1: Inspection Observation and Recommendations

Inspection Item	2021 Inspection			2020 Inspection	
	Estimated Freeboard (m)	Observation	Recommendations	Observations	Recommendations
Perimeter Dams					
Dam 1A	6.25	Minor erosion on slopes with some deep erosion gullies. The damaged thermistor was repaired.	Repair deep erosion gullies if new deformation is observed.	Minor erosion on slopes with some deep erosion gullies. The thermistor was damaged.	Repair deep erosion gullies. Repair the thermistor if practicable.
Dam 1B	5.74	Pond 2 water was approximately >50m upstream from the dam.	Surface maintenance, e.g., grading and backfilling if new deformation is observed.	Pond 2 water was approximately 50m upstream from the dam.	Surface maintenance, e.g., grading and backfilling.
Dam 1C	5.66	Pond 2 water was approximately >50m upstream from the dam.	Surface maintenance e.g., grading and backfilling if new deformation is observed.	Pond 2 water was approximately 50m upstream from the dam.	Surface maintenance e.g., grading and backfilling.
Dam 2	6.30	Minor erosion in the slopes. Seepage was not observed. Water was found in the seepage collection pond.	Repair the thermistor if practicable. Surface maintenance e.g., grading and backfilling if new deformation is observed. Pump seepage back into Pond 2.	Minor erosion in the slopes. Minor seepage was observed (<1L/min). Water was found in the seepage collection pond.	Surface maintenance e.g., grading and backfilling. Pump seepage back into Pond 2 (this was done after inspection overseen by EOR representative)
Dam 3	No water is impounded by this dam	Minor erosion in the downstream slope.	Surface maintenance e.g., grading and backfilling if new deformation is observed.	Minor erosion in the downstream slope.	Surface maintenance e.g., grading and backfilling.
Dam 4	5.95	Minor erosion in the slopes and wave erosion at HWM. One of the thermistors is damaged but could not be repaired in 2021 due to timing.	Surface and toe maintenance e.g., grading and backfilling if new deformation is observed. Repair the thermistor if practicable.	Minor erosion in the slopes and wave erosion at HWM. One of the thermistors is damaged.	Surface and toe maintenance e.g., grading and backfilling. Repair the thermistor if practicable.
Dam 5	N/A(1)	Minor erosion on surface.	Surface maintenance e.g., grading and backfilling if new deformation is observed.	Cell 3 water is approximately 70m upstream from the dam. Minor erosion on surface.	Surface maintenance e.g., grading and backfilling.

Inspection Item	2021 Inspection			2020 Inspection	
	Estimated Freeboard (m)	Observation	Recommendations	Observations	Recommendations
Dam 6	N/A(1)	Shallow erosion occurred near the north abutment and immediately repaired with coarse sand gravel.	Monitor the repaired location for deformation and future freshet flow.	Ponding in a natural low at the south abutment. Erosion gullies in the downstream slope.	Surface maintenance e.g. grading and backfilling. Monitor the ponded water level near the south abutment.
Internal Dams					
Dam 3D	No water is impounded by this dam	Minor erosion in the slopes.	Surface and slope maintenance e.g., grading and backfilling if new deformation is observed.	Minor erosion in the slopes.	Surface and slope maintenance e.g., grading and backfilling.
Dam J	4.80	Over-steepened slope due to previous highwater erosion.	Repair the eroded slope with compacted sand and gravel if new deformation is observed prior to final closure.	Over-steepened slope due to erosion.	Repair the eroded slope with compacted sand and gravel.
Dam K	N/A(1)	Dam was resloped according to final closure design to 2H:1V or flatter with compacted sand with gravel.	Monitor the resloped location for deformation.	A reinforced buttress was constructed along the eroded toe. The erosion gullies at the crest have been repaired.	Finalize the re-slope of the buttress to 2H:1V design to achieve final closure configuration.
Dam L	4.72	Cell 3 cover was completed with surface channel leading to the outlet structure near the south abutment in Dam L. Work as done according to closure design and overseen by site engineer. All temporary structure from last year were removed prior to closure construction.	Monitor the outlet structure for deformation and performance issues.	A section of the dam was breached without authorization and backfilled without engineering supervision. The dam was raised by 0.8m temporary to manage freshet.	Monitor the proximity of the breach location for seepage, instability, and potential downstream damage from the water discharge.
Dam M	No water is impounded by this dam	No new observable deformations along Dam M, including the 2020 incident area. Cell 5 cover is completed, and ponding	Repair the sloughed section of the buttress and the localized failed section once the water level is lowered. Re-slope the	Sloughing in localized sections of the buttress due to raised water level during 2020 freshet. A construction incident has caused a	Repair the sloughed section of the buttress and the localized failed section once the water level is lowered. Re-slope the

Inspection Item	2021 Inspection			2020 Inspection	
	Estimated Freeboard (m)	Observation	Recommendations	Observations	Recommendations
		associated risks are mitigated on along Dam M.	buttress to 2H:1V design for final closure.	localized minor failure to the downstream face of the dam.	buttress to 2H:1V design for final closure.
Dam N	No water is impounded by this dam	The Cell N cover was partially covered. Temporary water management was built along the north to minimize 2022 freshet run-on. Small sand boils were observed along the toe near the north abutment.	Monitor the water level behind Dam N and manage the water when practicable in 2022. Monitor the sand boils and reroute traffic where necessary.	A shallow channel was constructed to manage 2020 freshet. It was backfilled under engineering oversight. Material was stockpiled on the dam in preparation for cover placement.	Monitor the water level behind Dam N and lower the water when practicable to yield minimum 1m freeboard. Monitor the dam around the stockpile for deformation.
Divider Dykes	N/A(3)	The closure spillway was constructed as per design. Cell 4 water level will be passively managed to be below the toe of the Divider Dyke. All seepages observed previously stopped and not expected to recur as the water level will be below the dam.	Monitor the spillway for deformation and performance issues.	The dam was raised by 0.8m temporary to manage freshet. The old erosion and crest were repaired. New seepages are observed at the downstream toe. These were monitored throughout the 2020 closure activities.	Continue to monitor the seepages until the closure spillway is constructed. Repair any erosion from the seepage as needed in 2021.

Notes:
1. Water is not adjacent to the dam to determine available freeboard.
2. Freeboard at the lowest point of the dam and below the minimum requirement stated in the Water License (NWB 2020).
3. A spillway is constructed to passively manage water to be below the dam structure.

4.1 MONITORING FOR POTENTIAL ISSUES AND DSR

Cell N was partially covered this year which created a risk that the 2022 freshet runoff could exceed the reduced capacity of Cell N and cause erosion over Dam N. This risk was mitigated by a temporary ditch construction along the north edge of Cell N to route runoff around the cell. To further mitigate the risk of erosion, it is recommended that active water management (such as pumping) be planned prior to 2022 freshet in the event the water level in Cell N exceeds freeboard minimum.

A couple of sand boils were found along the toe of Dam N near the north abutment. These were attributed to construction traffic over the dam. Further monitoring is recommended around the area prior to and during final closure construction. Alternative traffic patterns may be needed to avoid the sand boils if more are found.

Considering the last DSR was completed back in 2015, it is recommended that another be completed in 2022. This DSR should be completed by a 3rd party qualified professional to review the dam safety and protocols.

4.2 MAINTENANCE AND REPAIR PRIORITIES

In regards to the repairs and maintenance documented in Table 4.1, it is recommended that the following repairs be prioritized:

1. Finish the cover at Cell N.
2. Reslope Dam M according to the closure design.
3. Monitor the sand boils in Dam N and reroute traffic if found.
4. Monitor the water level behind Dam N and manage the water level to maintain minimum freeboard.

After the completion of the priority repairs, LMI should consider carrying out the following repairs:

- Repair the thermistor at Dam 4 if practicable.
- Monitor the seepage at Dam 2 and manage it as necessary by pumping the seepage back into Pond 2.
- General repairs of downstream surfaces and upstream slope erosion if new deformations are found.

5.0 REFERENCES

Penner, E. and Crawford, C.B., 1983. Frost Action and Foundations, published as DBR paper no. 1090 of the Division of Building Research, National Research Council of Canada, March 1983.

Kinross Gold Corporation (Kinross) 2006. Final Abandonment and Restoration Plan and 2006 Response to Technical Review Comments – Lupin Mine. Prepared for Nunavut Water Board, 2006.

MEND Report 1.20.1 (MEND) 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Material, December 2009.

Province of British Columbia, Water Management Branch (BCWMB) 2011. Dam Safety Guidelines, Inspection & Maintenance of Dams. Prepared by Dam Safety Section. ISBN 0-7726-3520-X. March 2016.

SRK Consulting Ltd. (SRK) 2012. Lupin Mine Site 2012 Geotechnical Inspection Follow-up Risk Assessment and Water Quality Review. Prepared for Lupin Mines Incorporated, 2012.

Canadian Dam Association (CDA) 2014. Technical Bulletin, Application of Dam Safety Guidelines to Mining Dams, 2014.

Nunavut Water Board (NWB) 2020. Nunavut Water License 2AM-LUP2032, issued to Lupin Mines Incorporated, February 2020.

SRK Consulting Ltd. (SRK) 2016. Lupin Mine Tailings Management Facility 2015 Dam Safety Review. Prepared for Lupin Mine Incorporated, January 2016.

Norwest Corporation, 2016. 2016 Lupin Mine Tailings Containment Area Geotechnical Inspection Report, submitted to Lupin Mine Incorporated, October 2016.

Norwest Corporation, 2017. 2017 Lupin Mine Tailings Containment Area Geotechnical Inspection Report, submitted to Lupin Mine Incorporated, August 2017.

Stantec Consulting, 2018. 2018 Lupin Mine Tailings Area Inspection Report, Annual Geotechnical Inspection of the Tailings Containment Area. Report submitted to Lupin Mine Incorporated, November 16, 2018.

Stantec Consulting, 2019. 2019 Lupin Mine Tailings Area Inspection Report, Annual Geotechnical Inspection of the Tailings Containment Area. Report submitted to Lupin Mine Incorporated, October 24, 2019.

Stantec Consulting, 2020. 2020 Lupin Mine Tailings Area Inspection Report, Annual Geotechnical Inspection of the Tailings Containment Area. Report submitted to Lupin Mine Incorporated, November 17, 2020.

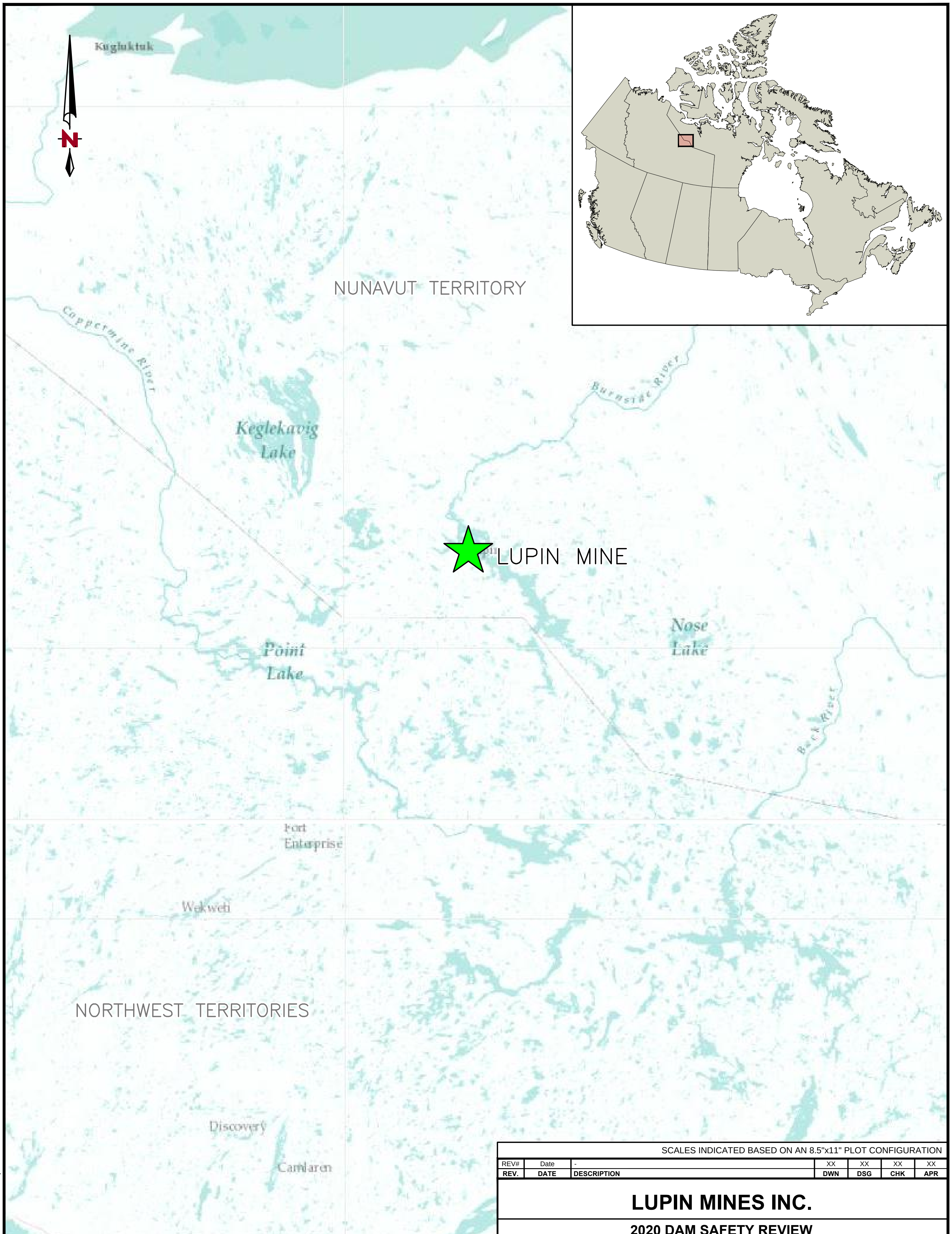
Stantec Consulting, 2021a. Lupin Mine Reclamation, 2021 Construction Summary Report – Dam K Reslope. November 19, 2021.

Stantec Consulting, 2021b. Lupin Mine Reclamation, 2021 Construction Summary Report – Cell 3. November 19, 2021.

References

Stantec Consulting, 2021c. Lupin Mine Reclamation, 2021 Construction Summary Report – Cell 5. November 19, 2021.

Stantec Consulting, 2021a. Lupin Mine Reclamation, 2021 Construction Summary Report – Divider Dyke Spillway. November 19, 2021.



SCALES INDICATED BASED ON AN 8.5"x11" PLOT CONFIGURATION

REV#	Date	-	XX	XX	XX	XX
REV.	DATE	DESCRIPTION	DWN	DSG	CHK	APR

LUPIN MINES INC.

2020 DAM SAFETY REVIEW

SCALE:	AS SHOWN
DATE:	2016-10-20
CO-ORD. SYS.:	UTM-NAD83-12
DRW'N BY:	KM
DSG'N BY:	--
REV'D BY:	AT
APP'D BY:	SE

SITE LOCATION

Stantec

PROJECT NO.:	FIG. NO.:	REV.:
129500081	1	A

DATE: 9/29/2017 TIME: 16:00:20 PLOT SCALE: 1:3.872

FILENAME: Z:\924-2_DSI\DISC\DRAFTING\01.SITE LOCATION.DWG
XREF FILE(S):
IMAGE FILE(S): Lupin-Site Location-N Lupin-Site Location-S

FILENAME: Z:\924-2_DSI\DISC\DRAFTING\02.SITE OVERVIEW.DWG
XREF FILE(S):
IMAGE FILE(S): Lupin-NE Lupin-NW Lupin-SW lupin_mine_wv2_2012aug21_north lupin_mine_wv2_2012aug21_south
DATE: 9/29/2017 TIME: 16:03:34 PLOT SCALE: 1:3.872

SCALES INDICATED BASED ON AN 8.5"x11" PLOT CONFIGURATION

REV#	Date	-	XX	XX	XX	XX
REV.	DATE	DESCRIPTION	DWN	DSG	CHK	APR

LUPIN MINES INC.

2020 DAM SAFETY REVIEW

SCALE:	AS SHOWN
DATE:	2016-10-20
CO-ORD. SYS.:	UTM-NAD83-12
DRW'N BY:	KM
DSG'N BY:	--
REV'D BY:	AT
APP'D BY:	SE

SITE OVERVIEW

Stantec

PROJECT NO.:	FIG. NO.:	REV.:
129500081	2	A

PLOT SCALE: 1:3,872 TIME: 16:06:18 DATE: 9/29/2017

FILENAME: Z:\924-2_DSI\DISC\DRAFTING\03.MILL SITE AND SUPPORT FACILITY.DWG
XREF FILE(S):
IMAGE FILE(S): lupin_mine_wv2_2012aug21_north

100m 0 100 200 400m

SCALE 1:6000

SCALES INDICATED BASED ON AN 8.5"x11" PLOT CONFIGURATION

REV#	Date	-	XX	XX	XX	XX
REV.	DATE	DESCRIPTION	DWN	DSG	CHK	APR

LUPIN MINES INC.

2020 DAM SAFETY REVIEW

SCALE:	AS SHOWN
DATE:	2016-10-20
CO-ORD. SYS.:	UTM-NAD83-12
DRW'N BY:	KM
DSG'N BY:	--
REV'D BY:	AT
APP'D BY:	SE

MILL SITE AND SUPPORT FACILITY PLAN

Stantec

PROJECT NO.:	FIG. NO.:	REV.:
129500081	3	A

LEGEND

THERMISTORS STATUS

- ACTIVELY MONITORED
- DAMAGED
- MONITORED DURING DSR-NO CALIBRATION DATA
- UNLOCATED-LOCATION ESTIMATED FROM HISTORICAL MAP
- VOLUMETRIC WATER CONTENT SENSOR STRINGS
- TEST PITS

500m 0 500 1000m

SCALE 1:20,000

SCALES INDICATED BASED ON AN 8.5"x11" PLOT CONFIGURATION

LUPIN MINES INC.

2020 DAM SAFETY REVIEW

TAILINGS CONTAINMENT AREA

SCALE:	AS SHOWN
DATE:	2019-09-26
CO-ORD. SYS.:	UTM83-12
DRW'N BY:	KM
DSG'N BY:	--
REV'D BY:	AT
APP'D BY:	SE

Stantec

PROJECT NO.:	FIG. NO.:	REV.:
129500081	4	A

FILENAME: V:\1295\ACTIVE\129500082\DISC\DRAFTING\04_TAILINGS CONTAINMENT AREA\04.TAILINGS CONTAINMENT AREA.DWG
XREF FILE(S):
IMAGE FILE(S): lupin mine wv2 2012aug21 north lupin mine wv2 2012aug21 south
DATE: 11/12/2019 TIME: 08:47:19 PLOT SCALE: 1:3.872

Appendix A Photographic Log

Photo 1: Looking northwest at the upstream slope of Dam 1A

Photo 2: Looking northwest at the crest of Dam 1A

Photo 3: Looking northwest at the downstream slope of Dam 1A

Photo 4: View of the repaired thermistor at Dam 1A.

Photo 5: Looking south at the upstream slope of Dam 1B.

Photo 6: Looking south at the downstream slope of Dam 1B.

LMI	**Lupin Mine Incorporated** **2021 Dam Safety Inspection**
Site Inspection Photograph Log for Dam 1A and 1B	
Stantec	PN: 129500081 FIGURE 1 REV. A

Photo 7: Looking south at the crest of Dam 1C

Photo 8: Looking southeast at the upstream slope of Dam 1C.

Photo 9: Looking south at the downstream slope of Dam 1C.

Photo 10: Looking southwest at the upstream slope of Dam 2.

Photo 11: Looking southwest at the downstream slope of Dam 2 with the seepage collection pond.

Photo 12: Looking south at the crest of Dam 2.

LMI	Lupin Mine Incorporated
	2021 Dam Safety Inspection
Site Inspection Photograph Log for Dam 1C and 2	
Stantec	PN: 129500081 FIGURE 2 REV. A

Photo 13: Looking northwest at the surface ditch along Dam 3.

Photo 14: Looking northwest at the surface water management on Dam 3.

Photo 15: Looking north at the surface ditch spillway on Dam 3.

LMI	**Lupin Mine Incorporated**
	2021 Dam Safety Inspection
Site Inspection Photograph Log for Dam 3	
Stantec	PN: 129500081 · FIGURE 3 · REV. A

Photo 16: Looking east from the west abutment at the crest slope of Dam 4

Photo 17: Looking north from the west abutment at the upstream slope of Dam 4

Photo 18: View of the erosion at the D/S crest of Dam 4 near the east abutment

Photo 19: Looking east at the downstream slope of Dam 4.

LMI	**Lupin Mine Incorporated**
	2021 Dam Safety Inspection

Site Inspection Photograph Log

for Dam 4

Stantec | PN: 129500081 | FIGURE 4 | REV. A

Photo 20: Looking southeast at the crest of Dam 5

Photo 21: Looking east at the upstream slope of Dam 5.

Photo 22: Looking southeast at the downstream crest of Dam 5.

Photo 23: Looking south at the crest of Dam 6

Photo 24: Looking southwest at the erosion repair at Dam 6.

LMI	**Lupin Mine Incorporated**
	2021 Dam Safety Inspection
Site Inspection Photograph Log for Dam 5 and 6	
Stantec	PN: 129500081 FIGURE 5 REV. A

Photo 25: Looking south at the upstream crest of Dam J, adjacent to Pond 1.

Photo 26: Looking south at the crest of Dam J.

Photo 27: Looking south at the downstream slope of Dam J, adjacent to Pond 2.

Photo 28: Exposing the damaged section of the damaged D3D thermistor

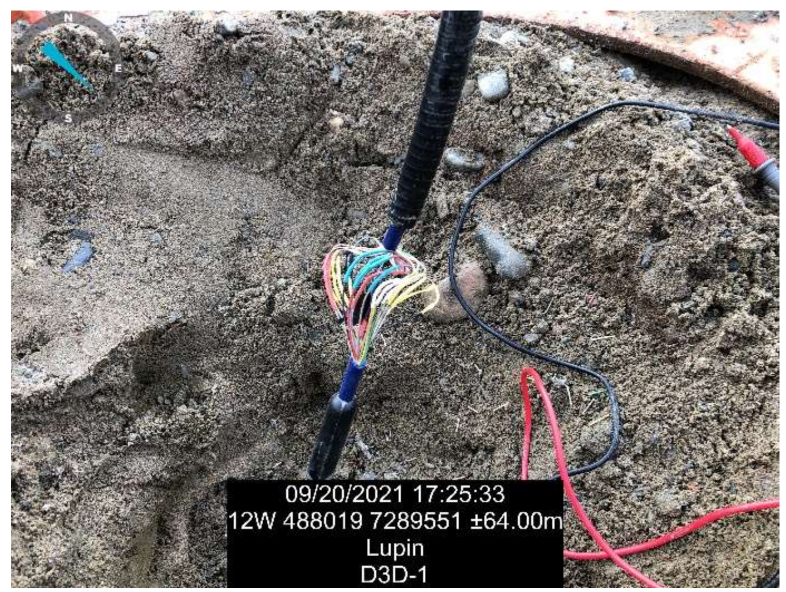


Photo 29: Reconnecting the damaged cables.

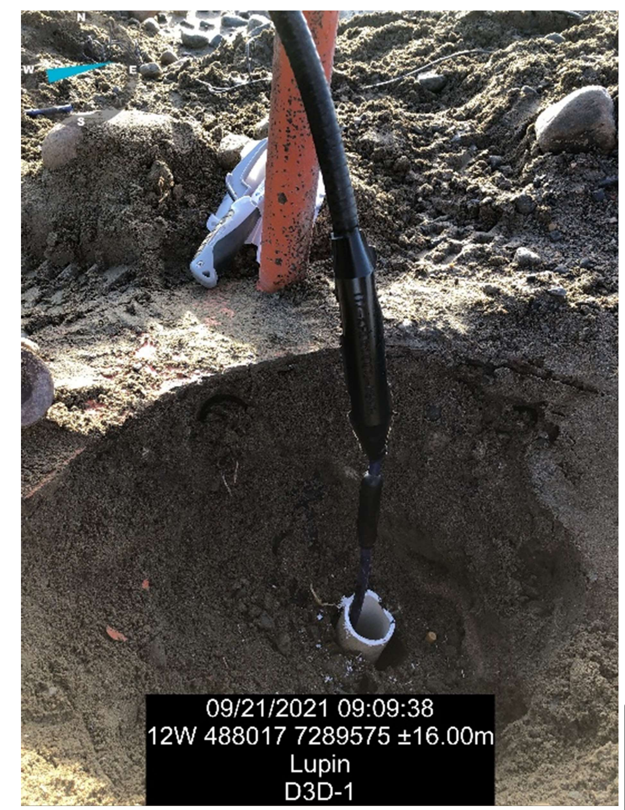


Photo 30: Finalized repair of the D3D thermistor.

LMI	Lupin Mine Incorporated
	2021 Dam Safety Inspection

Site Inspection Photograph Log for Dam 3D and J

Stantec	PN: 129500081	FIGURE 6	REV. A

Photo 31: Looking southwest at the resloping being constructed over the buttress at Dam K.

Photo 32: Looking southwest on the ongoing resloping work over the compacted buttress.

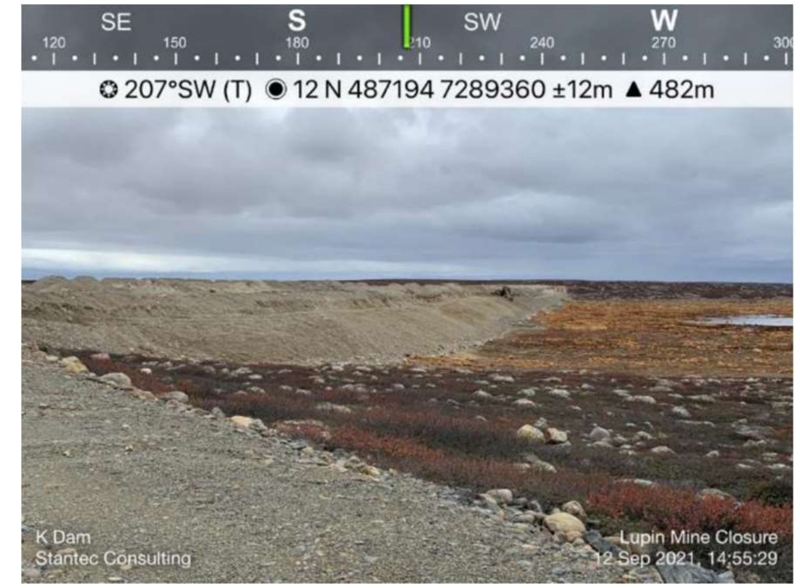


Photo 33: Looking southwest toward the south abutment of the reslope with compaction being carried out by the excavator.

Photo 34: Looking northeast at the reslope with thin layered compaction being carried out by the excavator.

Photo 35: Looking northeast at the reslope with thin layered compaction being carried out by the excavator.

Photo 37: Looking southwest from the north abutment of the reinforcement buttress.

LMI	Lupin Mine Incorporated
	2021 Dam Safety Inspection
Site Inspection Photograph Log for Dam K	
Stantec	PN: 129500081 FIGURE 7 REV. A

Photo 38: Looking east at the Cell 3 surface channel.

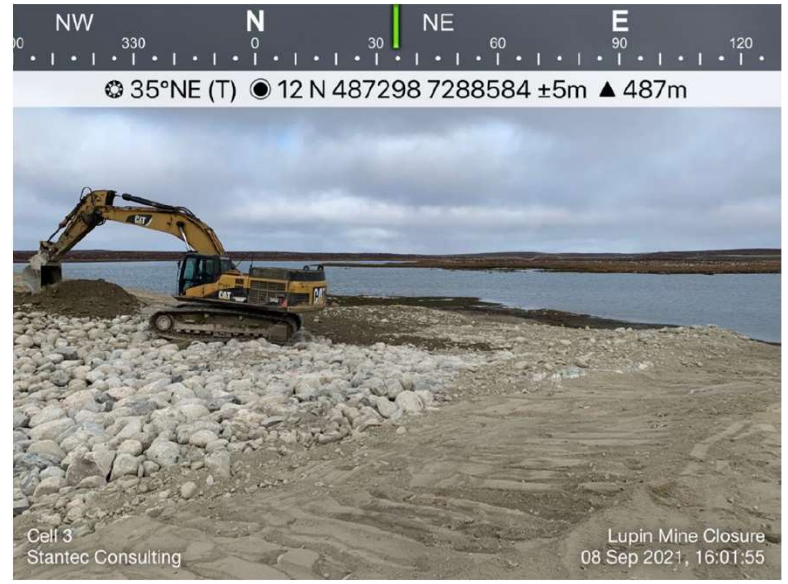


Photo 39: Construction of the Cell 3 outlet with fill to meet design grade.

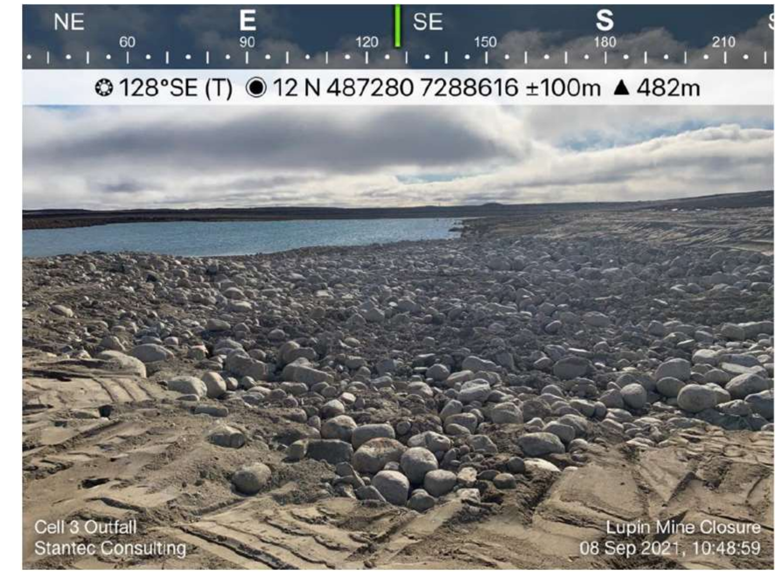


Photo 40: Cell 3 outlet armoring.

Photo 41: Cell 3 outlet that need to be field extended for transition into the shoreline.

Photo 42: Looking at the Cell 3 surface channel tie-in upstream of the outlet.

Photo 43: Looking north at the Dam L crest from the south abutment.

LMI	Lupin Mine Incorporated 2021 Dam Safety Inspection
Site Inspection Photograph Log for Cell 3 Surface Ditch and Dam L	
Stantec	PN: 129500081 | FIGURE 8 | REV. A

Photo 44: Looking northwest at the crest of Dam M with Cell 5 to the right.

Photo 45: Looking northwest at the reinforcement buttress of Dam M at the toe of the dam.

Photo 46: Look at the north abutment of Dam M with Cell N at the left and Cell 5 at the right

Photo 47: Looking at the D/S of Dam M from the crest of Dam N

Photo 48: Looking northwest at the downstream slope of Dam N with Pond 2.

Photo 49: The tailings boils observed near the north abutment of Dam N

LMI	Lupin Mine Incorporated
	2021 Dam Safety Inspection
Site Inspection Photograph Log for Dam M and N	
Stantec	PN: 129500081 FIGURE 9 REV. A

Photo 50: Looking north at the repaired upstream slope and crest of the southern divider dyke.

Photo 51: Looking northeast at the downstream slope and the ole seepage zones at the toe of the divider dyke. No seepage was observed.

Photo 52: Looking southwest at one of the old seepage zone at the toe and no seepage is observed.

Photo 53: the newly constructed Cell 4 spillway through the Divider Dyke.

Photo 54: the inlet of Cell 4 spillway through the Divider Dyke.

Photo 55: the outlet of Cell 4 spillway through the Divider Dyke into the Chain Lake area.

LMI	Lupin Mine Incorporated
	2021 Dam Safety Inspection
Site Inspection Photograph Log for Divider Dykes	

Stantec | PN: 129500081 | FIGURE 10 | REV. A