

## **Appendix 10**

---

### **Meadowbank 2022 Annual Open Pit Geomechanical Inspection**

---

---

**September 2, 2022**

Christian Tremblay  
Interim Rock Mechanics Coordinator  
Agnico Eagle Mines Limited - Meadowbank Division - Nunavut  
Baker Lake, Nunavut  
Canada, X0C 0A0

**Knight Piésold Ltd.**  
1650 Main Street West  
North Bay, Ontario  
Canada, P1B 8G5  
T +1 705 476 2165  
E northbay@knightpiesold.com  
www.knightpiesold.com

Dear Christian,

**RE: Meadowbank Complex - Meadowbank Site - 2022 Annual Open Pit Geomechanical Inspection**

**1.0 INTRODUCTION**

Agnico Eagle Mines Limited (AEM) operates the Meadowbank Complex, in Nunavut, Canada. The complex consists of the Meadowbank and Amaruq Sites. The Meadowbank Site consists of the Portage, Goose, Vault, and Phaser deposits. The deposits were mined using a series of open pits and mining is now complete. An annual inspection of the open pits by a third-party is required under the Type-A, Part 1, Item 2 Water License for the mine. Mr. Ben Peacock of Knight Piésold Ltd. (KP) completed the inspection of the open pits with Mr. Thomas Dahm (Geotechnical Technician) of AEM from August 12 to 14, 2022.

**2.0 OPEN PITS INSPECTED**

Open pit mining at the Meadowbank Site ended in 2019 and this has resulted in decreased activity around the open pits. The open pits are partially flooded and several have been partially or completely backfilled with waste rock or tailings. In general, this has both reduced the likelihood of a failure occurring and the consequences if a failure occurs. Consequently, there has been a reduction in monitoring and inspections at the Meadowbank Site. However, it is important to note that hazards continue to be present and, in some cases, new hazards have developed as a result of these changes. The open pits included in the inspection and their current status are summarized in Table 1.

The results of the inspection are summarized in this letter and detailed in Appendix A.

**Table 1 Open Pits Inspected and their Status**

<b>Open Pit</b>	<b>Current Status</b>
Portage Pit A	Inactive, inactive in-pit waste rock dump, partially flooded and actively used for water management
Portage Pit B	Inactive, backfilled with waste rock (B Dump)
Portage Pit C	Inactive, backfilled with waste rock (C Dump)
Portage Pit D	Inactive, backfilled with waste rock (D Dump)
Portage Pit E	Inactive, inactive in-pit waste rock dump, partially flooded and actively used for tailings deposition
Goose Pit	Inactive, inactive in-pit waste rock dump, partially flooded, previously used for tailings deposition with the potential for future deposition
Vault Pit	Inactive, inactive in-pit waste rock dump, partially flooded
Phaser Pit	Inactive, partially flooded
BB Phaser Pit	Inactive, partially flooded

### 3.0 2021 INSPECTION RESULTS

#### 3.1 GENERAL

Observations made during the site visit were grouped according to the following four headings at AEM's request:

- **Priority 1 (P1):** A high priority or structural safety issue considered immediately dangerous to life, health or the environment. Also includes issues with a significant risk of regulatory enforcement.
- **Priority 2 (P2):** An issue that, if not corrected, could plausibly result in a structural safety issue leading to injury, environmental impact or significant regulatory enforcement. Also includes repeated deficiencies that demonstrate a systematic breakdown of procedures.
- **Priority 3 (P3):** Single occurrences of deficiencies or non-conformances that in isolation are unlikely to result in structural safety issues. Also includes recommendations for pro-active measures important to the validation of the open pit slope design.
- **Priority 4 (P4):** Opportunity for improvement, for example to meet industry best practices.

The findings from the 2021 annual inspection were reviewed and their current status is summarized in Table 2. Key observations made during the 2022 inspection are summarized in the following sections.

#### 3.2 PRIORITY 1 OBSERVATIONS

No P1 observations were made during the inspection.

### 3.3 PRIORITY 2 OBSERVATIONS

The following P2 observations were made:

1. The ABF Garage has been constructed on top of the C Dump. Settlement of the dump, and potential structural damage to the garage, is likely once the water level in Pit A and Pit E reaches the base of the dump. The garage is currently being relocated away from the waste rock dump. A seacan adjacent the garage is used to provide power to the dewatering infrastructure in Pit A and should also be relocated outside of the bermed-off area along the crest of the dump.
2. Settlement of the Goose Pit Waste Rock Dump, B Dump and D Dump is on-going. While extensometers have been installed on the D Dump, settlement of the other two dumps is not currently quantified. This limits the ability of the mine to quantify the risk to personnel accessing the open pit lakes below these dumps. A quantitative assessment of settlement should be implemented at the Goose Pit Waste Rock Dump and the B Dump. Possible options include extensometers, survey points, drone photogrammetry, etc.
3. The Ground Control Management Plan (GCMP) for the Meadowbank Site was last updated in 2018 and does not reflect the current state of operations or ground control activities. The GCMP should be reviewed and updated annually. The GCMP could be consolidated with the one for the Amaruq Site. In particular, the following should be completed:
  - a. Specify the inspection and monitoring commitments, including who is responsible for the inspections.
  - b. List/reference key sources of information for the Meadowbank open pits, including design reports and previous annual inspections so that the information is not lost.

### 3.4 PRIORITY 3 OBSERVATIONS

The following P3 observations were made:

1. Continue the monthly visual inspections of the Goose Pit, Portage Pit A, Portage Pit E, Vault Pit, Phaser Pit, B Dump, C Dump and D Dump. Specific comments include:
  - a. The ramps used to access the pit lakes at the Goose Pit, Portage Pit A, Portage Pit E, Vault Pit and Phaser Pit should be inspected when access is required. The inspections of the ramps should be documented in the inspection report.
  - b. The pre-access inspections for the Vault Pit should also include the in-pit waste dumps and Ring Road adjacent Vault Lake. The inspections of the Ring Road could be stopped if the potential for inrush from Vault Lake to the Vault Pit was otherwise mitigated (e.g., by breaching the Ring Road).
  - c. The inspections for the D Dump should include the seepage flowing from the toe of the dump as well as the capacity of the rockfall berm between the dump and the Pit E Northwest Ramp.
2. Continue to monitor the wireline extensometers at the D Dump. The current frequency of a reading every two weeks should be maintained until the movement of the dump stabilizes, the change in performance is better understood, or the deformation rate increases to a point where more frequent readings are required. The readings should be graphed (i.e., deformation rate and cumulative deformation vs time) to assist with the identification of trends in the data. Sudden changes in behaviour should trigger a review of the data.

3. A rockfall in June 2022 may have resulted in material overtopping the rockfall berm below the nose in the West wall of the Pit E Northwest Ramp. The size and capacity of the rockfall berm should be reviewed before the dewatering infrastructure is moved up the ramp to below this area.
4. Survey the approximate position of the tension cracks on the B Dump, D Dump and Goose Pit Dumps to better understand their position relative to the underlying open pit benches.
5. The hazard assessment map captures many, but not all, of the hazards identified during the annual inspection. Comments have also been provided on several of the risk ratings. The hazard map should be reviewed and updated to reflect the outcome of the annual inspection.
6. The berms restricting access to the Vault Waste Rock Dump have been removed to facilitate crushing operations. The berms should be replaced once access is no longer required.
7. Rockfall events that occur within the open pits are currently not recorded unless they meet the threshold for reporting to the regulator. Events should be recorded in a register if they occur within the open pits used for tailings and water management in areas where there is the potential for worker access.

### **3.5 PRIORITY 4 OBSERVATIONS**


The following P4 observations were made:


1. The visual inspections are currently completed on a monthly basis, regardless of the identified hazards. A formal process should be developed where the frequency of visual inspections is increased in response to defined criteria.
2. The visual inspections are completed by the Geotechnical Group. While several members of the group have experience monitoring open pit slopes, the group's focus is on the management of the dykes and tailings facilities. Recommend implementing an annual visual inspection of the open pits and in-pit waste rock dumps by the Rock Mechanics Group.
3. The infiltration of surface water is likely contributing to the settlement observed at the B Dump. The upper and lower platforms of the B Dump should be graded and the sinkholes/depressions filled in to prevent water ponding and to limit further infiltration.
4. Vibrating Wire Piezometers and thermistors are installed in the east wall of the Goose Pit and are not currently monitored. While these instruments are no longer required for geotechnical monitoring, the need to periodically monitor them from an environmental perspective should be reviewed given the potential for future tailings deposition in the open pit.

## 4.0 CLOSING

We trust this letter meets your present needs. Please do not hesitate to contact us should you require anything further.

Yours truly,

Prepared:   
Ben Peacock, P.Eng.  
Specialist Engineer | Associate

Reviewed:   
Robert A. Mercer, Ph.D., P.Eng.  
Principal Engineer

Approval that this document adheres to the Knight Piésold Quality System:



**Attachments:**

Table 2 Rev 0 Summary of Recommendations

Appendix A Meadowbank Complex - Meadowbank Site - 2022 Annual Open Pit Geomechanical Inspection

/bdp

TABLE 2  
**AGNICO EAGLE MINES LTD. - MEADOWBANK COMPLEX  
 MEADOWBANK SITE**  
**2022 ANNUAL OPEN PIT GEOMECHANICAL INSPECTION  
 SUMMARY OF RECOMMENDATIONS**

Component	Original Recommendation	2022 Status	2022 Recommendation	Priority
Geotechnical Inspections and Reporting, and Rockfall Log	As the pits transition into various states of closure or use for water management and tailings, the need for bi-weekly instrumentation monitoring and quarterly inspection summaries can be reduced or in some cases eliminated. In some other cases, the instrumentation has been re-purposed.  Complete transition to formal monthly geotechnical inspections supported by regular informal day-to-day observations.	Monthly inspections of the open pits and in-pit waste rock dumps are completed by the Geotechnical Group. The inspections are documented in a report with photos and a hazard map.  Inspections are often timed to occur shortly before Environmental Staff enter the open pits during the summer months for water sampling.	Continue to complete and document the monthly inspections of the open pit slopes and in-pit dumps. Specific comments include: - The ramps used to access the pit lakes at the Goose Pit, Portage Pit A, Portage Pit E, Vault Pit and Phaser Pit when access is required. The inspections of the ramps should be documented in the inspection report. - The pre-access inspections for the Vault Pit should also include the in-pit waste dumps and Ring Road adjacent Vault Lake. The inspections of the Ring Road could be stopped if the potential for inrush from Vault Lake to the Vault Pit was otherwise mitigated (e.g., by breaching the Ring Road). - The inspections for the D Dump should include the seepage flowing from the toe of the dump as well as the capacity of the rockfall berm between the dump and the Pit E Northwest Ramp.	P3
	The visual inspections are currently completed on a monthly basis, regardless of the identified hazards. A formal mechanism should be developed to increase the frequency of visual inspections in response to defined criteria.	This has not yet been completed.	Complete the original recommendation.	P4
	The visual inspections are completed by the Geotechnical Group. While several members of the group have experience monitoring open pit slopes, the group's focus is on the management of the dykes and tailings facilities. Recommend implementing an annual visual inspection of the open pits and in-pit waste rock dumps by the Rock Mechanics Group.	This has not yet been completed.	Complete the original recommendation.	P4
	The hazard assessment map captures many, but not all, of the hazards identified during the annual inspection. Comments have also been provided on several of the risk ratings. The hazard map should be reviewed and updated to reflect the outcome of the annual inspection.	While the hazard assessment has been regularly updated, additional hazards were identified during the annual inspection.	Review the hazard assessment and update it to reflect the hazards identified during the 2022 annual inspection.	P3
	Continue to record and report (as appropriate) rockfall events that are within the pits used for tailing and water management and where there is the potential for worker access.	Rockfalls are documented in the monthly inspection reports. A single rockfall was reported over the last year (Pit E, June 2022)	Rockfall events that are within the pits used for tailing and water management and where there is the potential for worker access should be documented in the rockfall register.	P4
	The Ground Control Management Plan (GCMP) for the Meadowbank Site has not been updated since 2018. Review and update the GCMP. The GCMP could be consolidated with the one for the Amaruq Site.	The GCMP for the Meadowbank Site still has not been updated or consolidated into the GCMP for the Amaruq Site.	Review and update the GCMP for the Meadowbank Site. The GCMP should be reviewed and updated annually. The GCMP could be consolidated with the one for the Amaruq Site.	P2
Instrumentation	Instruments relating the open pits and hence tailings management facilities are located at Goose Pit, Pit E (south crest), and Vault Pit. There are additional in-field instrumentation between Goose Pit and Pit E, and additional instrumentation along the dikes.  Some monitoring of instrumentation, such as TDR cables and inclinometers, can be suspended.  Monitoring of piezometers and thermistors installed behind the South Wall of Pit E and the East Wall of Goose Pit should continue to build a record of ground thermal and piezometric response to the addition of tailings.	The TDR cables, inclinometers and many of the piezometers and thermistors used to monitor the open pits have been decommissioned.  The piezometers and thermistors in the South Wall of Pit E continue to be monitored by the Geotechnical Group.  The piezometers and thermistors in the East Wall of the Goose Pit are no longer monitored as tailings deposition has stopped.	Recommend reviewing the need to periodically monitor the piezometers and thermistors in the East Wall of the Goose Pit given the potential for future tailings deposition.	P4
	There is an opportunity to use imagery from the site drone surveys to evaluate the subsidence of the Goose Pit Waste Rock Dump, B Dump, C Dump, D Dump and Vault Pit Waste Rock Dump using photogrammetry. Recommend completing an assessment on an annual basis to supplement the existing visual inspections.	Settlement continues to be observed at the Goose Pit Waste Rock Dump, B Dump and D Dump, all of which extend into open pit lakes that are periodically accessed. While extensometers have been installed on the D Dump, settlement of the other two dumps is not currently quantified. This limits the ability of the mine to quantify the hazard to personnel accessing the open pit lakes below these dumps.	Implement a quantitative assessment of settlement at the Goose Pit Waste Rock Dump and the B Dump. Possible options include extensometers, survey points, drone photogrammetry, etc.  Survey the approximate limits of the tension cracks on the B Dump, D Dump and Goose Pit Waste Rock Dump.	P2 P3
	Continue regular monthly inspections and informal day-to-day inspections.	There are no significant geotechnical concerns for the Pit A walls.  Most of the geotechnical hazards associated with the pit walls are submerged by the current pit lake level and no longer present a risk.	See recommendation on on-going inspections.	N/A
Portage Pit B and B Dump	Continue regular monthly inspections and informal day-to-day inspections.	There are no significant geotechnical concerns for the Pit B walls.  Most of the geotechnical hazards associated with the pit walls are submerged by the current pit lake level and no longer present a risk.	See recommendation on on-going inspections.	N/A
	Visual inspections of the dump platforms and dump faces should be included in the monthly inspections.	Monthly inspections are completed by the Geotechnical Group.	See recommendation on on-going inspections.	N/A
	Maintain the B Dump crests as closed and inactive and ensure barrier berms are installed to prevent vehicles from accessing the crest area.  A berm prevents access to the lower dump platform but access to the upper dump platform is unrestricted. Recommend constructing a berm to prevent access to the upper dump platform.	Berms now prevent access to both the upper and lower dump platforms.	None, considered closed.	N/A
	The possibility of a failure of the dump extending back to the adjacent Amaruq All Weather Road (AWR) was discussed during this inspection. It is not clear if the topography and bedrock profile below the B Dump and the Amaruq AWR would result in a scenario where a failure of the dump could impact the road. The topography and bedrock profile should be reviewed. If the road could be plausibly impacted, stability analyses should be completed.	Further discussions in 2022 and photos provided by AEM during construction of the dump in 2014 and 2015 suggest that the portion of the dump closest to the road is founded on the Pit A ramp and a failure of the dump would not extend back to the Amaruq Road. It is understood that SNC Lavalin is reviewing this in detail.	The SNC Lavalin study should be reviewed upon completion but, based on the available evidence, this recommendation is considered closed.	N/A
	The B Dump platform has experienced settlement and the formation of sinkholes and tension cracks. The sinkholes are on the main platform at approximately 5126 mRL; a depression was noted on the platform directly above. It is thought that ice and snow accumulate in the depression and contribute to sinkhole formation on the lower bench during freshet.  If practical the depression at the north end of the upper dump should be backfilled and graded to prevent the release of water to the lower dump platform and the ongoing development of sinkholes.	Neither the upper platform nor the lower platform have been graded to limit water ponding and infiltration.  The sinkholes do not appear to have changed significantly since 2021.  The area of settlement and tension cracks at the north end of the lower platform does not appear to have changed significantly since 2021.  The tension cracks along the western limit of the dump appear to have progressed since 2021.	If practical, the depression at the north end of the upper dump platform and the sinkholes on the lower dump platform should be backfilled and graded to prevent water ponding and to limit infiltration.  See recommendations on on-going inspections and instrumentation.	P4 N/A

**TABLE 2**  
**AGNICO EAGLE MINES LTD. - MEADOWBANK COMPLEX**  
**MEADOWBANK SITE**  
**2022 ANNUAL OPEN PIT GEOMECHANICAL INSPECTION**  
**SUMMARY OF RECOMMENDATIONS**

Component	Original Recommendation	2022 Status	2022 Recommendation	Priority
C Dump	Visual inspections of the dump platforms and dump faces should be included in the monthly inspections as water levels rise.	Monthly inspections are completed by the Geotechnical Group.	See recommendation on on-going inspections.	N/A
	The ABF garage structure has been constructed within 35 to 47 m from the dump crest. As the water in Pit A/B rises it will infiltrate the dump material. Settlement could occur that will affect the garage foundation and building structural integrity. An alternate location should be identified for the garage structure that is outside the tailings management areas.	The ABF Garage is in the process of being relocated away from the C Dump and tailings management areas.  A berm is present approximately 25 m back from the crest of the dump.  A seacan used to provide power to the dewatering infrastructure in Pit A is located inside the bermed-off area along the crest of the dump.	Complete the relocation of the ABF Garage.  Once the garage has been relocated, do not construct any other permanent structures on the dump.  The seacan used to provide power to the dewatering infrastructure in Pit A should be relocated outside of the bermed-off area along the crest of the dump.  The on-going use of the dump (outside of the bermed off areas) as a laydown is considered acceptable so long as no evidence of instability is observed.	P2
	Once the ABF structure has been relocated maintain the C Dump crest as closed and inactive with appropriate barrier berms.			
	No permanent facilities to be constructed on dump platform.			
D Dump	Continue visual monitoring as part of monthly inspections of the D Dump platforms, crests, and dump faces, waste rock dumps and recording of observations such as tension cracks, crest settlement, or dump profile changes as part of regular monthly site geotechnical inspections	Monthly inspections are completed by the Geotechnical Group.  Access to the dump platform is prevented by a berm.  The tension cracks on the southwest corner of the dump have continued to propagate, and new cracks have formed further from the crest. The cracks are being painted by the Geotechnical Group to track their change over time. No evidence of bulging of the toe of the slope was observed and rockfall has not been reported.	See recommendations on on-going inspections and instrumentation.  Continue to paint the tension cracks so that their progression can be understood.	N/A
	As the lake level in Pit E rises, additional platform settlement should be expected, and shallow sliver failures may occur on the dump face. Maintain and monitor the existing wireline extensometer to monitor dump stability in the area above the access ramp which will be used to access pump controls and the pump station during filling of the Pit E tailings area.	The wireline extensometers are maintained and monitored by the Geotechnical Group. Two additional extensometers (for a total of four) were installed in 2022. A TARP exists for the extensometers and they are currently measured every two weeks (approx.).  Extensometers #3 and 4 are installed across new tension cracks and have begun to register displacement of 1 to 2 mm/day.	Continue to monitor the wireline extensometers at the D Dump. The current frequency of a reading every two weeks should be maintained until the movement of the dump stabilizes, the change in dump performance is better understood, or the deformation rate increases to a point where more frequent readings are required. The readings should be graphed (i.e., deformation rate and cumulative deformation) to aid the identification of trends.	P3
Portage Pit E and Tailings Management Facility	Continue regular monthly inspections and informal day-to-day inspections.	Monthly inspections are completed by the Geotechnical Group.	See recommendation on on-going inspections.	N/A
	The South Wall Ramp is not used and pylons were in place to restrict access at the time of the visit. Recommend constructing a berm at the top of the ramp to prevent access.	A berm has been constructed to prevent access to the road.	None, considered closed.	N/A
	The rockfall protection berm on the west edge of the West Wall ramp should continue to be maintained as long as personnel access the pit for pump maintenance or moving of water reclaim line.	A second, larger berm rockfall berm was constructed in 2021. The berm has capacity to retain future rockfall. However, it is understood that a few individual rocks from a failure in June, 2022 may have landed on the ramp beyond the berms. It is expected that dewatering infrastructure will eventually be located below this failure.	Review the size and capacity of the rockfall berm below the nose in the West wall of the Pit E Northwest Ramp before the dewatering infrastructure is moved up the ramp to below this area.	P3
	Tailings are being discharged from the south end of the West Wall of the pit. Tailings are discharged over weak ultramafic rock which are susceptible to erosion and degradation of rock mass quality. Implement bi-weekly inspections (once every two weeks) of the ultramafic wall performance at the tailings discharge point to identify indicators of potential instability such as formation of tension cracks, erosion and degradation of the rock mass, bench scale instability.	Monthly inspections are completed by the Geotechnical Group. This frequency is considered appropriate based on the observed performance of the slope below the tailings discharge point to date.  Minor crest loss appears to have occurred on the bench directly below the discharge point since 2021.	See recommendation on on-going inspections.	N/A
Goose Pit, In-Pit Dump, and Tailings Management Facility	Continue regular monthly inspections and informal day-to-day inspections.	Monthly inspections are completed by the Geotechnical Group.  The walls of the Goose Pit continue to perform well and no geotechnical concerns were observed. Only the upper single bench remains visible above the current pit lake.	See recommendation on on-going inspections.	N/A
	The North in-pit Dump continues to display significant subsidence characterized by differential settlement and the development to of tension cracks. This is most likely in response to increasing water levels. The dump platform is inaccessible to vehicle traffic.  Maintain closure of the dump platforms to all vehicle and pedestrian traffic.  Continue visual monitoring and recording of observations as part of monthly site geotechnical inspections.	Monthly inspections are completed by the Geotechnical Group.  Access to the dump is prevented by a berm.  Differential settlement of the dump appears to have progressed since 2021. Personnel infrequently access the open pit for water quality monitoring, sediment sampling and bathymetry surveys.	See recommendation on instrumentation.	N/A
	The piezometers and thermistors in the East Wall of the Goose Pit are no longer monitored as tailings deposition has stopped. Recommend reviewing the need to monitor these instruments periodically given the potential for future tailings deposition.	These instruments are not currently monitored.	See recommendation on instrumentation.	N/A
	Since there are no longer any regular in-pit activities, regular inspections can be suspended, except for requirements prior to entering the pit for water sampling. General (informal) visual inspections can be undertaken when the opportunity presents.  The open pit slopes, in-pit dumps and Ring Road adjacent Vault Lake should be inspected prior to accessing the open pit.	Monthly inspections are completed by the Geotechnical Group and include the Ring Road and in-pit dumps.  The walls of Vault Pit continue to perform well. Rockfall hazards are present along the ramp, but the ramp is wide and the hazard is reasonably mitigated by maintaining distance from the benches.  There two in-pit dumps are performing well. Minor tension cracks were noted previously in the upper dump platform and have not increased in size or number.	See recommendation on on-going inspections.	N/A
Vault Pit and In-Pit Dumps	Maintain restricted access to the open pit and dumps.	Access to the open pit is restricted by a barricade on the main ramp (requiring personnel to contact the Geotechnical Group prior to entry) and berms across a secondary entrance. Access to the in-pit dumps is prevented by berms.	None, considered closed.	N/A
		Access to the Vault Waste Rock Dump has been re-established to facilitate crushing operations.	Re-establish berms to restrict access to the Vault waste rock dump (both access ramps) once access is no longer required.	P3
	Subsidence was observed on the Ring Road. In 2021, a berm was present at the north end of the Ring Road but not the south end. Access requirements to the Ring Road should be reviewed and berms constructed to prevent entrance to areas where access is no longer required. In particular, consider berms to prevent access to the areas of subsidence adjacent Pond D and Vault Lake.	Berms now prevent access to the Ring Road from both the north and south ends of the road. No significant change was observed in the subsidence of the road, this may be due to low water levels in Pond D and Vault Lake.	None, considered closed.	N/A



TABLE 2  
 AGNICO EAGLE MINES LTD. - MEADOWBANK COMPLEX  
 MEADOWBANK SITE  
 2022 ANNUAL OPEN PIT GEOMECHANICAL INSPECTION  
 SUMMARY OF RECOMMENDATIONS

Component	Original Recommendation	2022 Status	2022 Recommendation	Priority
Phaser Pit	Since there are no longer any regular in-pit activities, regular inspections can be suspended, with the exception of requirements prior to entering the pit for water sampling. General (informal) visual inspections can be undertaken when the opportunity presents.	Monthly inspections are completed by the Geotechnical Group.  The walls of Phaser Pit continue to perform well and there are no significant geotechnical concerns.  Access to the open pit is restricted by berms.	See recommendation on on-going inspections.	N/A
BB Phaser Pit	Since there are no longer any regular in-pit activities, regular inspections can be suspended, with the exception of requirements prior to entering the pit for water sampling. General (informal) visual inspections can be undertaken when the opportunity presents.	Monthly inspections are completed by the Geotechnical Group.  The open pit is flooded and no rock slopes are exposed.	See recommendation on on-going inspections.	N/A
	The access road separating BB Phaser Pit from Phaser Pit is still accessible. Sinkholes were observed in 2019. Deactivate road and berm off to prevent use.	A berm has been constructed to prevent access to the road.	None, considered closed.	N/A

I:\1101\00622\42\A\Correspondence\NB22-00### - Meadowbank Annual Open Pit Inspection\Table 2 Status of Recommendations.xlsm]Table

**NOTES:**

1. TABLE AFTER TABLE 8.1 FROM TETRA TECH (2021).
2. PRIORITY HAS BEEN UPDATED TO REFLECT THE RESULTS OF THE 2021 ANNUAL INSPECTION.

0	02SEP22	ISSUED WITH LETTER NB22-00962	MJR	BDP
REV	DATE	DESCRIPTION	PREP'D	RW'D

## **APPENDIX A**

### **Meadowbank Complex - Meadowbank Site - 2022 Annual Open Pit Geomechanical Inspection**

(Pages A-1 to A-53)



# Meadowbank Complex - Meadowbank Site

## 2022 Annual Open Pit Geomechanical Inspection

August 12 to 14, 2022

# Outline

Introduction

Observed Slope Performance

Monitoring and Inspections

Recommendations



# Introduction



# Introduction

## General

- Agnico Eagle Mines (AEM) operates the Meadowbank Complex in Nunavut. The complex consists of the Meadowbank and Amaruq Sites.
- The Meadowbank Site consists of the Portage, Goose, Vault and Phaser deposits. The deposits were mined using a series of open pits and mining is now complete. The Portage and Goose open pits are currently being used for tailings, waste rock and water management.
- An annual inspection of the open pits by a third-party is required under the Type-A, Part 1, Item 12 Water License for the mine.
- The 2022 annual inspection of the open pits was carried out by Ben Peacock, P.Eng. of Knight Piésold Ltd. and Thomas Dahm of AEM between August 12 and 14, 2022 and is summarized in this presentation.

# Introduction

## Meadowbank Site Open Pits

- The open pits at the Meadowbank Site that were reviewed and their current status are summarized below.
- Note that all elevations presented are in meters Relative Level (mRL), which uses a datum 5000 m below sea level. The presented drone photos are from 2021 as new photos are not available.

Open Pit	Current Status
Portage Pit A	Mining complete, actively used for water management, inactive in-pit dump
Portage Pit B	Backfilled with waste rock
Portage Pit C	Backfilled with waste rock
Portage Pit D	Backfilled with waste rock
Portage Pit E	Mining complete, active tailings deposition, inactive in-pit dump
Goose Pit	Mining complete, partially flooded, inactive tailings deposition with the potential for future deposition
Vault Pit	Mining complete, partially flooded, inactive in-pit dump
Phaser Pit	Mining complete, partially flooded
BB Phaser Pit	Mining complete, flooded



# Observed Slope Performance





# Observed Slope Performance

## Goose Open Pit - General

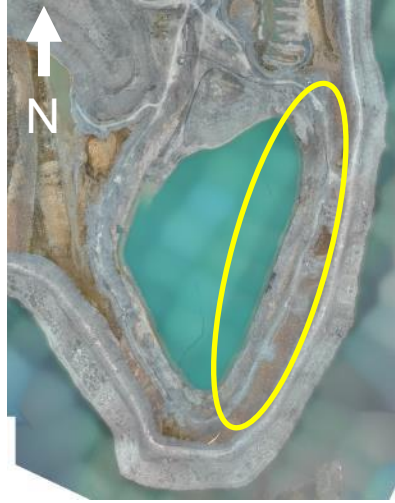
- The Goose open pit was inspected on August 12, 2022.
- Observations made during the inspection are summarized on the following slides. The approximate current pit geometry is shown at right.
- Mining of the open pit is complete. An inactive in-pit dump is present along the North Wall of the open pit (the North Waste Rock Dump).
- The open pit reached a final floor elevation of 4997 mRL, with a crest elevation of approximately 5130 mRL.
- Tailings was previously deposited in the open pit from a spigot point on the East Wall to an elevation of 5086 mRL. It is understood that future deposition of tailings is likely to be limited. The water elevation at the time of the inspection was approximately 5112 mRL.
- Access to the open pit is infrequent, typically limited to monthly water quality sampling when the pit lake is not frozen. Sediment sampling from a boat was on-going at the time of the inspection
- The East Wall of the open pit was instrumented with Time Domain Reflectometry (TDR) cables, Vibrating Wire Piezometers (VWPs) and thermistors. These instruments are no longer monitored from a geomechanical perspective. The instrumentation is discussed later in this presentation.



# Observed Slope Performance

## Goose Open Pit - East Wall

- A portion of a single bench is exposed above the current pit lake.
- The wall was established in the Intermediate Volcanics and is performing well.
- The former tailings discharge point is circled below. No erosion of the slope was noted.
- No particular geomechanical concerns were noted.



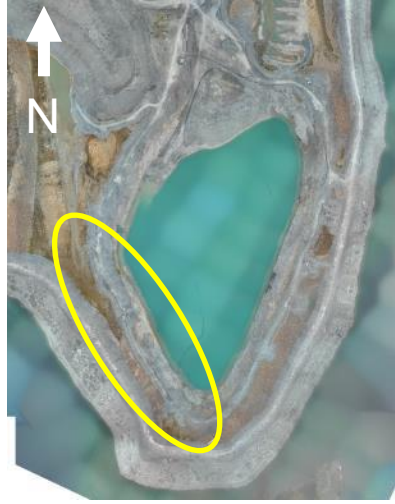
East Wall, Looking Southeast



# Observed Slope Performance

## Goose Open Pit - South Wall

- A portion of a single bench is exposed above the current pit lake.
- The wall is performing well.
- No particular geomechanical concerns were noted.



South Wall, Looking Southwest

# Observed Slope Performance

## Goose Open Pit - West Wall and Ramp

- At the time of the inspection, barricades were in place at the base of the ramp. These were moved to the top of the ramp during the inspection in order to better to restrict access to authorized personnel.
- The exposed bench faces along the ramp are relatively low and there is ample room to transit and work away from the wall. As a result, the rockfall risk is considered to be low.
- No particular geomechanical concerns were noted.



Looking West at Base of Ramp



Looking South Down Ramp, After Barricades Moved



# Observed Slope Performance

## Goose Open Pit - North Wall (North Waste Rock Dump)

- The dump has been subsiding since 2015. The settlement is attributed to the deposition of water in the open pit, through a combination of thawing snow/ice lenses within the dump, thawing frozen contacts between rock blocks, and increasing porewater pressure. An example of one of the scarps formed by the settlement is shown at lower right.
- The settlement is monitored visually as part of monthly inspections by the Geotechnical team.
- The dump is inactive and access is prevented by both a rockfill berm and the presence of water pipes across the access point.
- Recommend continuing the monthly visual monitoring as long as access is still required to the open pit. There is a need to better quantify the extents and rate of deformation. Survey pins, extensometers or drone photogrammetry are possible options.



Looking Northwest at the Dump, with Settlement and Scarps Visible



Dump Elev. 5125 mRL

Pit Lake Elev. 5112 mRL

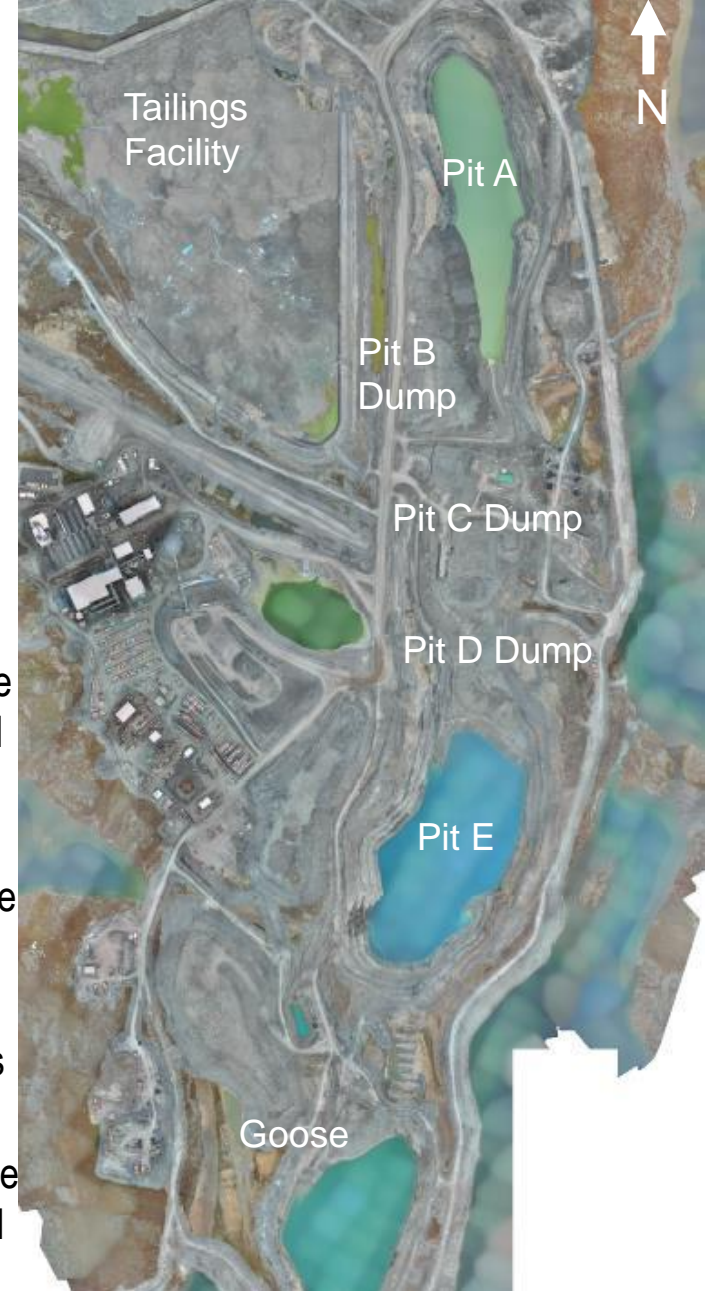


Looking West at Scarps on the Dump Platform

# Observed Slope Performance

## Portage Open Pits - General

- Pit A, Pit E, B Dump, C Dump and D Dump were inspected on August 12 and 13, 2022. Observations made during the inspection are summarized on the following slides.
- The approximate current pit geometry is shown at right.
- Mining of the open pits is complete.
- Pits B, C and D have been backfilled with waste rock. The waste rock dumps extend along the southwest wall of Pit A and the north wall of Pit E. The dumps are no longer active.
- Pit A is being used for water management. The water elevation was approximately 5085.7 mRL at the time of the inspection. Pit A has a final floor elevation of 4997 mRL and a crest elevation of approximately 5151 mRL.
- Tailings are being deposited in Pit E from a spigot point at the crest of the West Wall. The tailings were at an elevation of approximately 5058 mRL and the water at an elevation of approximately 5082.5 mRL at the time of the inspection. Pit E has a final floor elevation of 4976 mRL and a crest elevation of approximately 5130 mRL.
- Access to the open pits is infrequent, typically limited to monthly water quality sampling when the pit lakes are not frozen.
- The South Wall of Pit E was instrumented with TDR cables, an inclinometer, VWP's and thermistors. These instruments are no longer monitored from a geomechanical perspective. The instrumentation is discussed later in this presentation.



# Observed Slope Performance

## Pit A - West Wall

- Approximately two benches are exposed above the pit lake in this area.
- Local bench scale failures have previously occurred within the Ultramafics on this wall. No significant change was observed in the failures remaining above the pit lake since the 2020 and 2021 inspections.
- Several large voids are present within the Quartzite and were previously identified as a rockfall hazard. No significant change was observed since the 2020 and 2021 inspections.
- No particular geomechanical concerns were noted.



Pit A West Wall, Looking Northwest



# Observed Slope Performance

## Pit A - East Wall

- Approximately two benches are exposed above the pit lake in this area.
- Access to the East Ramp is now restricted by berms at the top and bottom of the ramp (circled in image below).
- The wall is performing well.
- No particular geomechanical concerns were noted.



Pit A East Wall, Looking Northeast



Berms on the East Ramp





# Observed Slope Performance

## Pit A - South Wall Ramp

- The south ramp is used to access the pit lake and water management infrastructure is present along the ramp.
- A rockfall berm is present along both sides of the ramp. The berm is in good condition and has capacity to retain any future rockfall.
- The PTO / Pump controls are located well up the ramp, away from the areas of greatest rockfall hazard associated with the dump and the highwall. The controls are also well away from the pit lake, mitigating the risk associated with a wave caused by a failure of the open pit slope or the dump. This is a good practice.
- Specific geotechnical considerations relating to Dump B are discussed on the next slide. Bulging of the toe of the dump slope was not observed.
- No particular geomechanical concerns were noted.

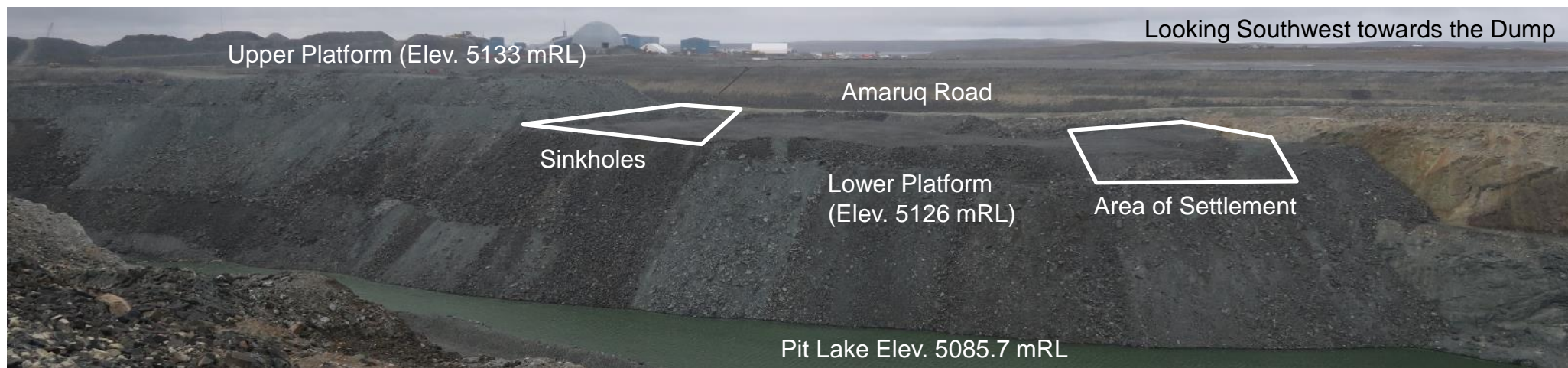


South Ramp, Looking North with PTO/Pump Controls at Left

# Observed Slope Performance

## B Dump

- The Pit B Dump consists of an Upper and Lower Platform, both of which are inactive. Access to both platforms is now prevented by berms.
- Failures of the dump slope are possible as the pit lake elevation rises, but have not been observed to date. Such a failure could cause a large wave in the pit lake, as discussed on the previous slide.
- The northern end of the Lower Platform above the pit lake has settled and tension cracks are present. Sinkholes and tension cracks have also formed at the southern end of the Lower Platform. These are discussed on the following slides.
- A geotechnical inspection of the dump is completed on a monthly basis. The dump is not instrumented. Recommend continuing the inspections, particularly while access continues to the Pit A South Ramp below the dump.



# Observed Slope Performance

## B Dump

- The potential for a failure of the dump back towards the Amaruq Road was identified in 2021 as it was not clear if the road is partially constructed on the dump.
- Further discussions in 2022 and photos provided by AEM during construction of the dump in 2014 and 2015 suggest that the portion of the dump closest to the road is founded on the Pit A ramp and a failure of the dump would not extend back to the Amaruq Road. It is understood that SNC Lavalin is completing a detailed review.



2014 Construction of Dump B, looking Southwest

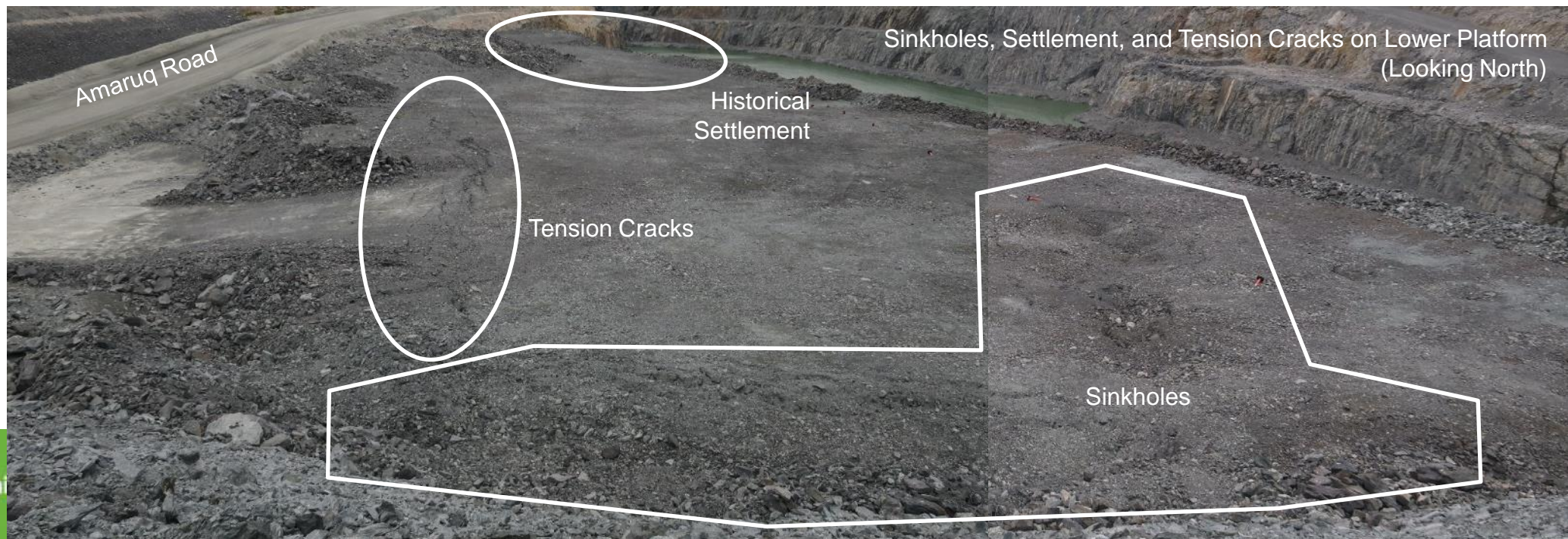


2015 Construction of Dump B, looking South

# Observed Slope Performance

## B Dump - Lower Dump Platform

- There has been limited change in the sinkholes and area of settlement since the 2021 inspection. No obvious bulging of the toe of the dump slope was observed.
- The tension cracks along the western limit of the dump appear to have progressed. The tension cracks are far from the dump crest and it is not clear if they indicate deep-seated movement of the dump or simply differential settlement across the position of the bench/ramp below the dump.
- Continue to monitor the settlement and tension cracks on the dump. Recommend surveying the cracks so that their development over time can be monitored and so that their position relative to the geometry of Pit B below the dump can be understood.
- The recommendation from the previous inspection to grade the Lower Platform in order to limit water infiltration remains applicable.



# Observed Slope Performance

## B Dump - Upper Dump Platform

- Evidence of instability was not observed on the Upper Platform.
- The Upper Platform is graded so that water flows to a low point above the area of the Lower Platform where sinkholes have formed. This is a likely cause of the sinkholes. The recommendations from the previous annual inspection remain applicable; recommend filling the low point and re-grading the dump so that water is directed away from this area.
- Recommend constructing a berm to prevent access to the Upper Platform.



On Upper Platform, Looking North

# Observed Slope Performance

## C Dump

- The C Dump, which backfilled Pit C, is located between Pits A and E and is inactive. Access to the dump platform is permitted but a berm has been constructed approximately 25 m back from the crest.
- The ABF Garage was constructed on the C Dump platform in 2020, approximately 35 to 45 m from the crest of the dump. As the water elevation in Pit A and the water/tailings elevation in Pit E reach and surpass the base of the dump, settlement of the dump is expected.
- As part of the 2020 annual inspection report, it was recommended that the garage be relocated outside of the immediate vicinity of the open pits, waste dumps and tailings/water management areas and that access to the C Dump be prevented with a berm.
- The ABF Garage is currently in the process of being dismantled and moved off of the dump. This is endorsed.
- The seacan used to provide power to the Pit A pumps is inside the berm constructed along the crest and should be moved outside of the berm.
- As no evidence of instability has been observed, the on-going use of the dump as a laydown is considered acceptable (at least for now).

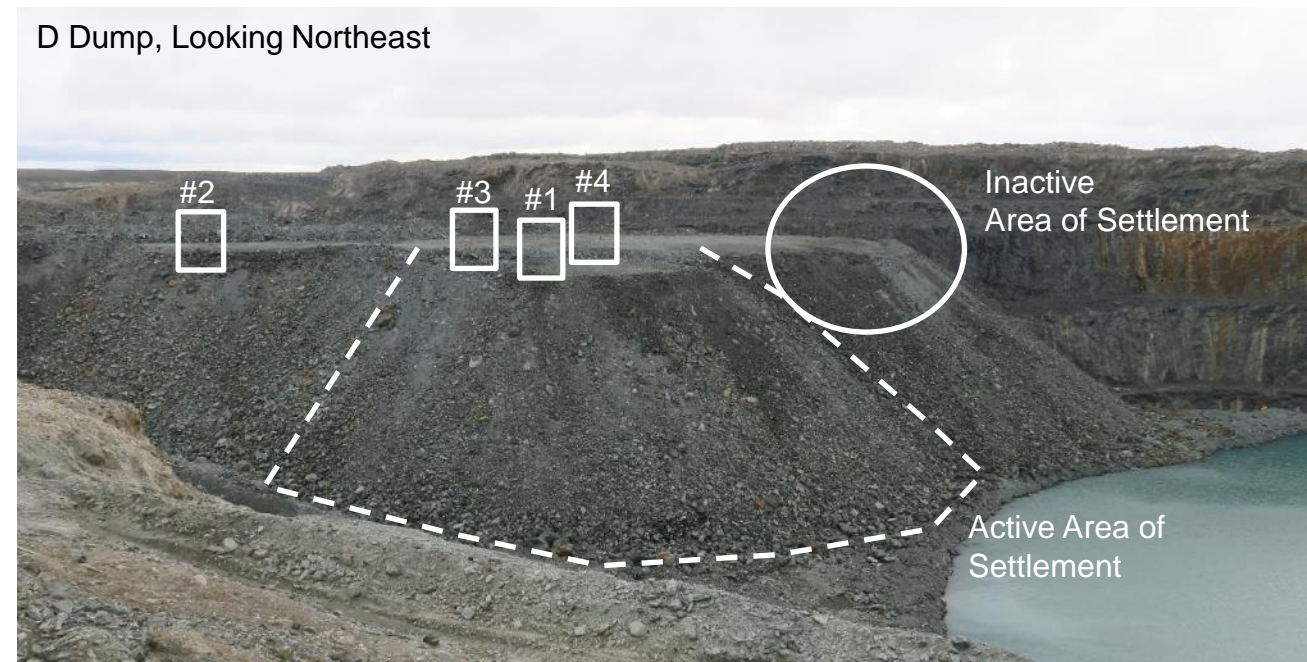


C Dump, Looking East

# Observed Slope Performance

## D Dump

- The D Dump backfilled Pit D and forms the north wall of Pit E. The Pit E Northwest ramp runs along the western toe of the dump.
- Access to the top of the dump is restricted by a berm.
- The southwestern end of the dump started to settle in 2017. Tension cracks are visible in this area as well as along the crest immediately to the north. The current conditions are described on the following slides.
- Four wirelines extensometers have been installed at the crest of the dump in the area of settlement and tensions cracks and are discussed on a following slide.
- The dewatering pumps for Pit E are located at the toe of the dump. As the pumps are moved up the Northwest Ramp, the exposure of personnel to the dump will decrease.



# Observed Slope Performance

## D Dump - North End

- The north end of the dump is adjacent the Pit E Northwest ramp. Tension cracks previously formed along the crest of the dump in this area. There has been limited change in the tension cracks since the 2020 inspection and bulging of the toe of the slope was not observed.
- Seepage was observed at the toe of the dump in this area for the first time during this inspection. The seepage is clear. The source has not been confirmed, but is speculated to be water from the East Dyke that is discharged into Dump C and flows through the dumps. The seepage should be monitored.
- Wireline extensometer #2 was installed at the crest of the dump in the area of the tensions cracks in 2019. The extensometer is monitored monthly. The data are discussed later in this presentation but the deformation rate is currently less than 1mm/day.
- The monitoring and the monthly visual inspections should continue while access to the Pit E Northwest ramp is still required.



Tension Cracks at  
Crest by  
Extensometer #2,  
Looking North

Seepage from  
Toe of Dump

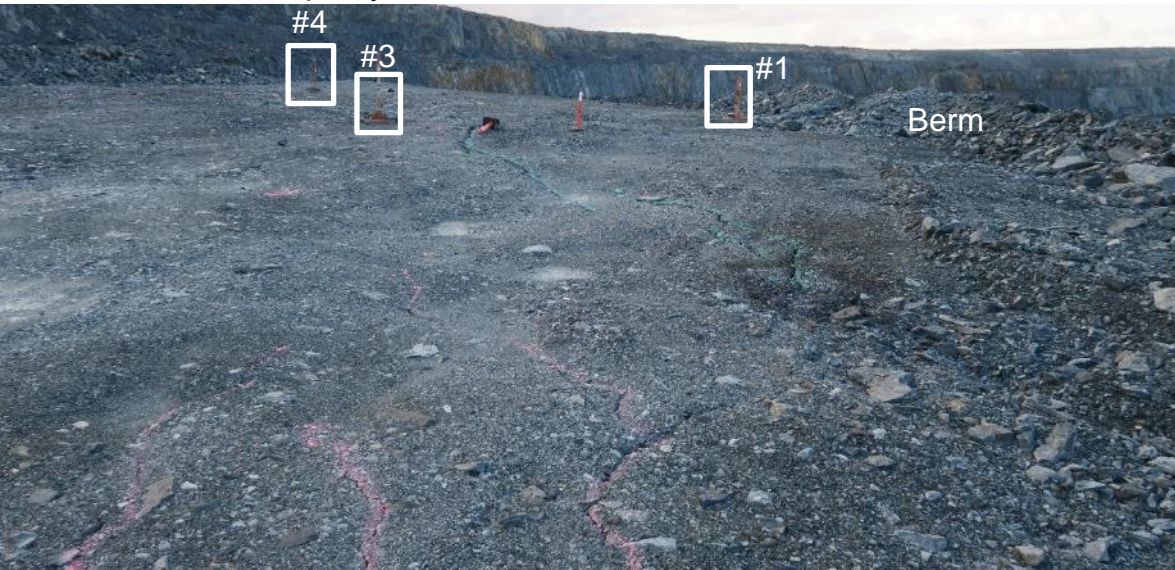
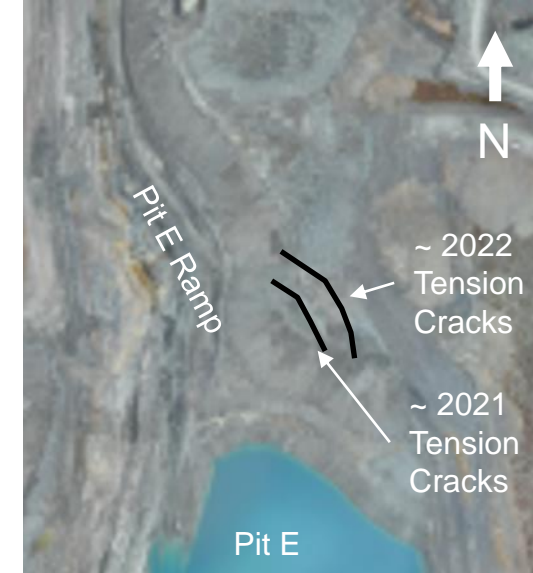




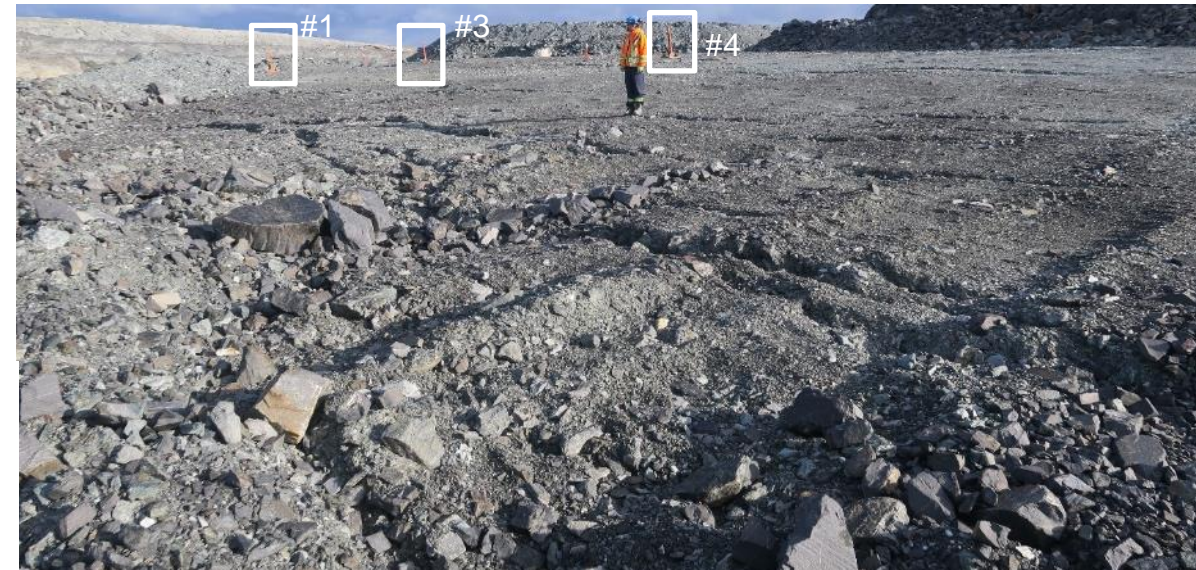
# Observed Slope Performance

## D Dump - South End

- Deformation and settlement of the southwest corner of the dump has been on-going since 2017. This was previously restricted to a small portion of the dump. A berm was installed to restrict access and Extensometer #1 was installed to monitor the deformation.
- Since the 2021 inspection, a network of tension cracks have developed 10 to 20 m behind Extensometer #1. Extensometers #3 and #4 have been installed behind the most recent tension cracks. The extensometer data is discussed on the next slide.
- The Geotechnical Group has been painting the cracks to track their change over time. This is endorsed and should continue.
- The tension cracks suggest that the direction of movement is to the southwest (i.e., towards the point where the Pit E Ramp terminates in the pit lake) rather than to the south, directly towards the pit lake. The reason for this is not currently known.
- On-going deformation of the dump could result in a rockfall hazard to the ramp. A berm is currently in place at the toe of the dump but its capacity and evidence of rockfall should be monitored.



Tension Cracks on Dump, Looking Southeast

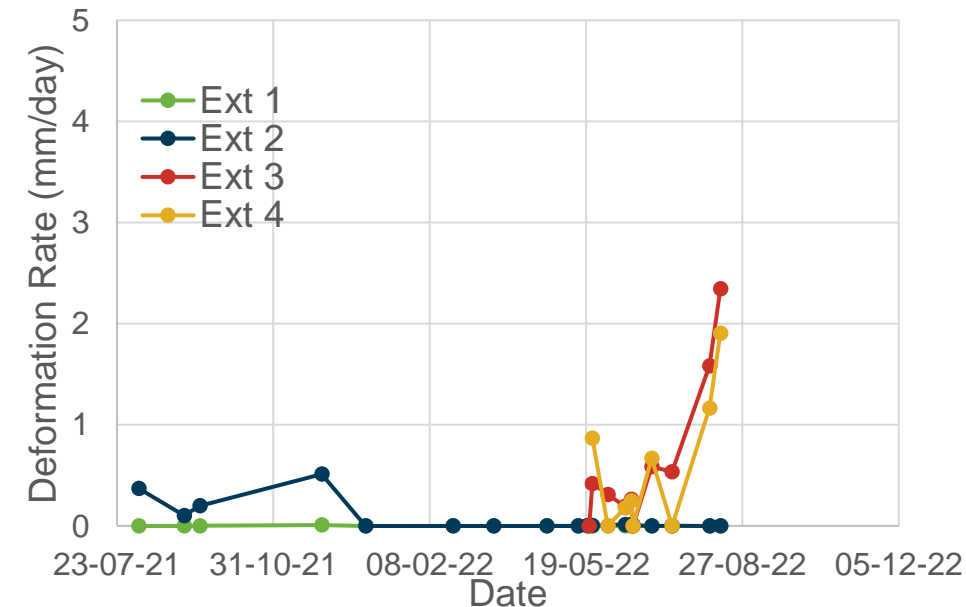
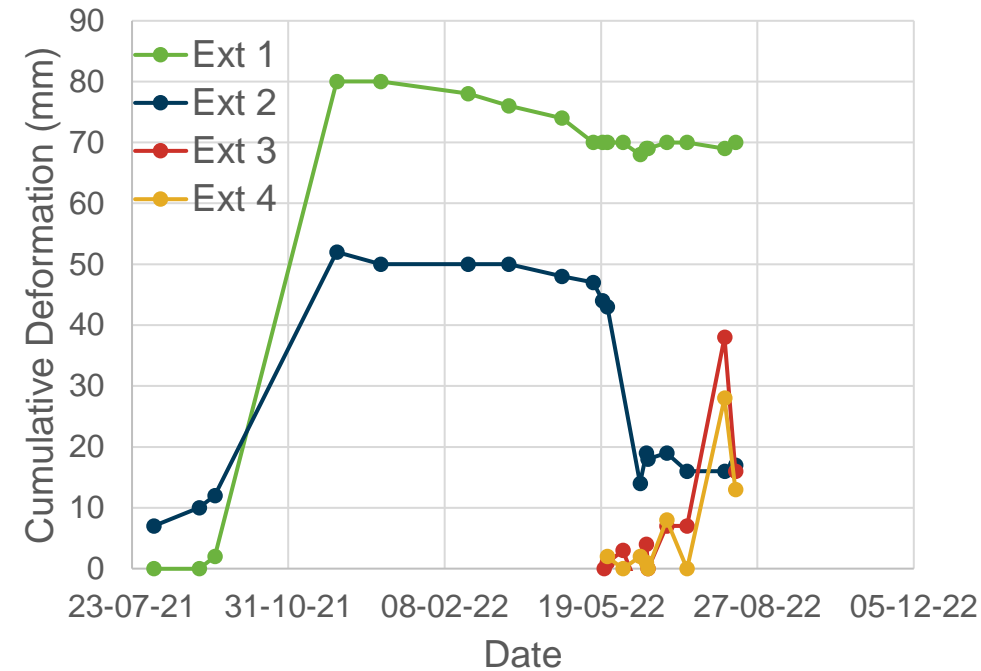


Tension Cracks on Dump, Looking Northwest

# Observed Slope Performance

## D Dump - Extensometers

- A total of four wireline extensometers were installed at the crest of Dump D and above the northern ramp into Pit E in response to the development of tension cracks on the upper platform of the dump.
- The Geotechnical Group commit to monitoring the extensometers on a monthly basis. In practice it is typically done every two weeks.
- Monthly readings are available since June, 2021 for the first two extensometers and since May, 2022 for the second two extensometers, although the data have occasionally been reset. The data are shown at right.
- Both Ext 1 and 2 reported a significant increase in displacement in December 2021. No action was taken and the cause is unknown. While the deformation rate was less than the trigger of 50 mm/day, the sudden change in rate should have triggered a review.
- Observations suggest that the extents of the displacement zone have now extended beyond Ext 1 and it is only capable of measuring relative displacement within the deforming volume. The extensometer was relocated during the inspection.
- Both Ext 3 and 4 are reporting a steady increase in deformation rate as of June, 2022. This suggests a change in conditions and readings should continue to be collected every two weeks until the deformation stabilizes or the slope behaviour is better understood.
- In all cases, the current rate of <5 mm/day is much less than the 50 mm/day threshold that would trigger a response under the procedure. Continue monitoring the extensometers.



# Observed Slope Performance

## Pit E - East Wall

- Approximately three benches are exposed above the pit lake in this area.
- The wall is performing well.
- No particular geomechanical concerns.



East Wall, Looking East



# Observed Slope Performance

## Pit E - South Wall and Ramp

- The South Wall was established in Ultramafics and has experienced a series of bench-scale instabilities and rock falls. Approximately three benches are exposed above the pit lake in this area.
- A berm prevents access to the South Wall Ramp.
- No rockfalls have been reported since the 2021 inspection.



South Wall, Looking Southeast

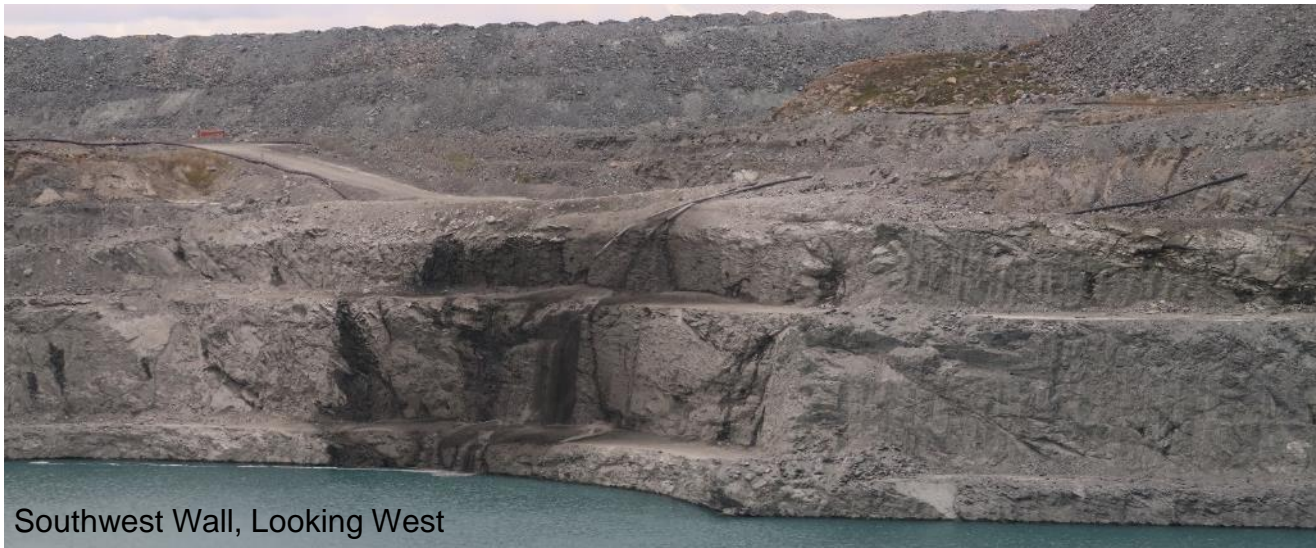


Berm at top of Ramp

# Observed Slope Performance

## Pit E - Southwest Wall

- The wall consists of Ultramafics overlying Intermediate Volcanics and is intersected by the Bay Fault. Approximately three benches in the Ultramafics are exposed above the pit lake. The wall is within talik associated with the Third Portage Lake.
- Tailings are discharged from a line at the crest of this wall. There have been concerns about the potential for erosion of the benches or slope instability due to water infiltration. While evidence of limited erosion (crest loss) of the bench directly below the discharge point was observed, no evidence of slope instability was observed at the time of the inspection. Similarly, no settlement of the adjacent crest road was observed. The wall is performing well.
- Recommend continuing the monthly visual inspections to monitor the area for bench degradation, erosion, tension cracks, seeps, etc.



Southwest Wall, Looking West



Tailings Discharge Point

# Observed Slope Performance

## Pit E - Northwest Wall and Ramp

- The Northwest Ramp is used to access the pit lake and water management infrastructure is present along the ramp.
- Many of the hazards identified during previous inspections have been flooded by the rising pit lake and no longer pose a risk to personnel.
- A rockfall berm was previously constructed and has been effective at managing rockfalls. The capacity of the berm reduced over time and a second berm was constructed in 2021 further away from the wall. The two berms appear suitable to retain most rockfalls, but it is still possible that they could be overtopped in some circumstances. Geotechnical inspections of the area should continue while access to the ramp is still required.
- The water management infrastructure is located on the outside of the ramp, which effectively reduces exposure. However, in the future it will need to be relocated further up the ramp, below some of the current rockfall hazards. Exposure to personnel and equipment will need to be re-assessed at that time.



Lower Ramp, with Pumps, Looking Southwest

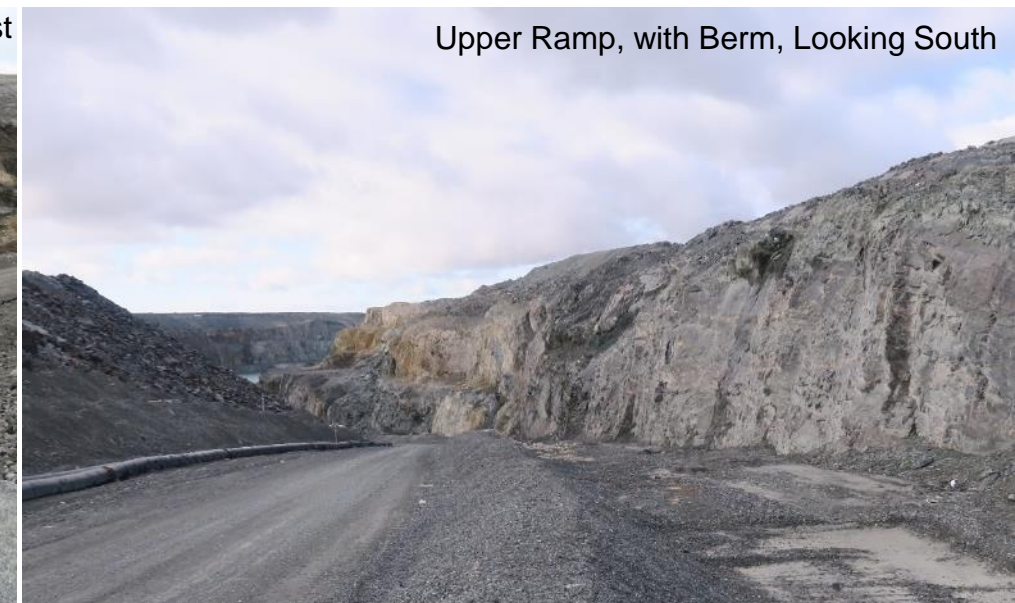
# Observed Slope Performance

## Pit E - Northwest Wall and Ramp (Cont'd)

- Dump D is located along the eastern side of the ramp. Tension cracks are present along a portion of the crest above the ramp and wireline extensometers have been installed to monitor the dump (see previous slide on Dump D). Bulging of the toe was not observed. A rockfall berm is in place at the toe of the dump and has capacity. Geotechnical inspections and monitoring of the dump should continue while access to the ramp is still required.
- The Bay Fault intersects the Northwest Wall adjacent the ramp. Several rockfalls have occurred along the wall in the past and rockfalls are expected to continue to occur. Examples of several potential instabilities are shown on the next slide (numbered below for reference).



Lower Ramp, with Pumps, Looking Southwest



Upper Ramp, with Berm, Looking South

# Observed Slope Performance

## Pit E - Northwest Wall and Ramp (Potential Hazards)

### Area 1 (Looking South)

- The nose in the Northwest Wall is intersected by the Bay Fault. The zone of reduced rock mass quality associated with the fault has ravelled over time, resulting in rockfalls.
- A block was identified at the crest of the bench that represents a rockfall hazard. The block is expected to be retained by the rockfall berms.



### Area 2 (Looking North)

- A large detached and potentially unstable block was identified on the southern side of the nose during the 2020 inspection. The block has the potential to overtop the rockfall berm and should continue to be monitored.
- A small rockfall is thought to have occurred at this area in June, 2022. A rock may have overtopped the berm. The size and capacity of the berm should be reviewed before the dewatering infrastructure is moved up the ramp to below this area.





# Observed Slope Performance

## Pit E - Northwest Wall and Ramp (Potential Hazards)

### Area 3 (Looking North)

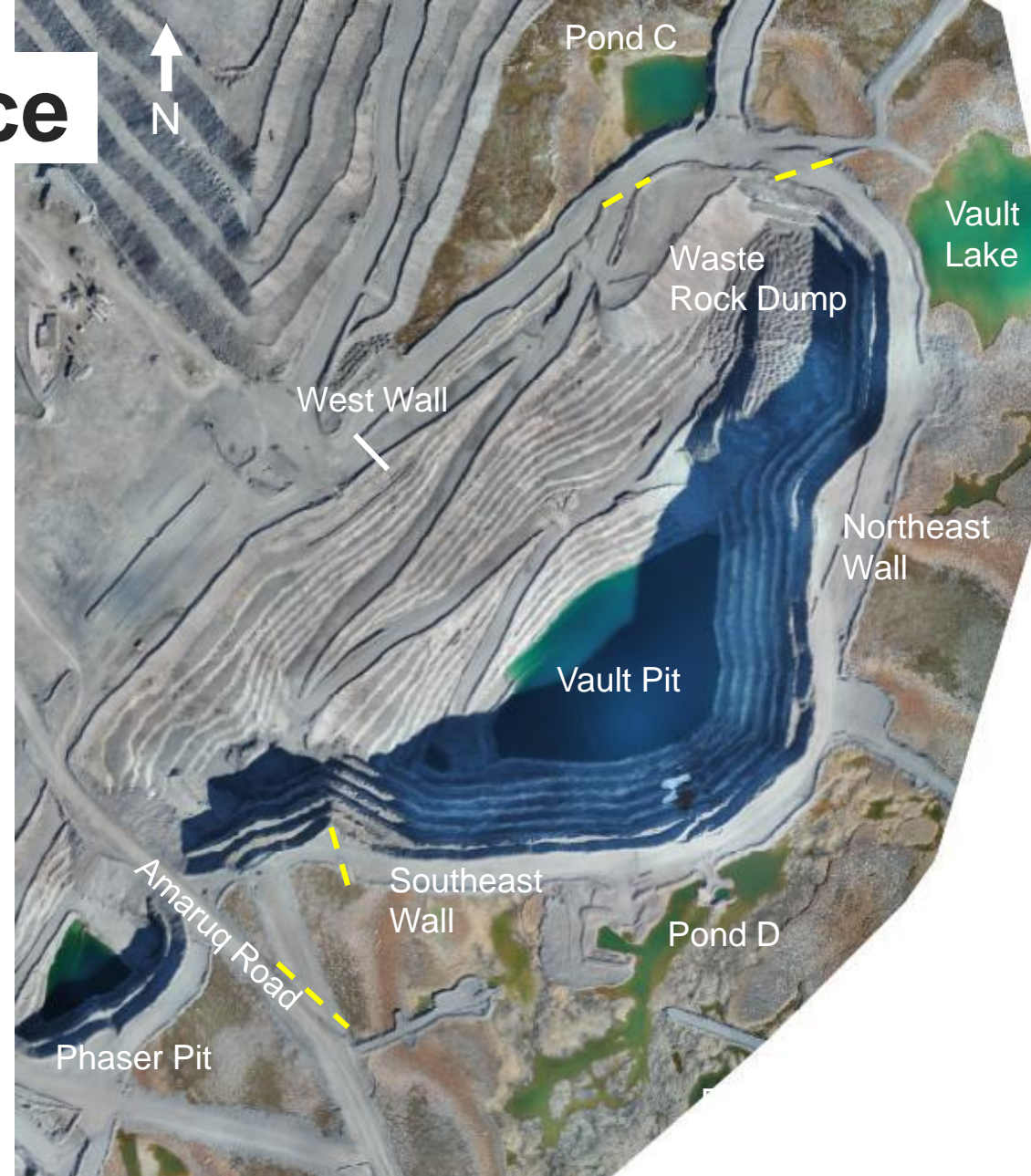
- A potentially dilating slab block was identified along the contact of the fault zone and represents a rockfall hazard.
- The block has the potential to overtop the rockfall berm and should continue to be monitored.



# Observed Slope Performance

## Vault Open Pit - General

- The Vault open pit was inspected on August 13, 2022. Observations made during the inspection are summarized on the following slides.
- The approximate current pit geometry is shown at right.
- Mining of the open pit was completed in March, 2019. An inactive in-pit dump is present along the North Wall of the open pit.
- The open pit reached a final floor elevation of 4955 mRL, with a crest elevation of approximately 5137 mRL.
- Access to the open pit is limited to monthly water quality sampling when the pit lake is not frozen.
- At the time of the inspection, access to the open pit was restricted by a barricade. Access to the ring road is restricted by berms at the north and south ends of the road. The barricade (white) and berms (yellow) are shown at right.
- The open pit is partially flooded. The elevation of the pit lake was last measured in June, 2022 when it was approximately 5039 mRL.
- The Amaruq All Weather Road (AWR) crosses between the Vault and Phaser Pits on a rockfill embankment.



# Observed Slope Performance

## Vault Open Pit - Northeast Wall

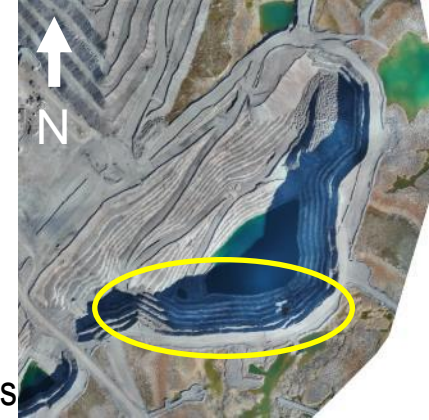
- The wall is performing well.
- No particular geomechanical concerns.
- The North Waste Rock Dump is described on a subsequent slide.



# Observed Slope Performance

## Vault Open Pit - Southeast Wall

- The wall is performing well.
- Water has been observed flowing from Pond D, to the south of the pit, under the ring road and down the wall during previous inspections. However, no flow below the road at the crest of the wall was observed at the time of this inspection.
- The ice wall continues to form each winter on and below the talik zone in this wall (roughly where the iron staining is present on the wall). Limited seepage through rock was observed at the time of the inspection.
- No particular geomechanical concerns. The area should continue to be visually inspected.



Southeast Wall, Looking South



# Observed Slope Performance

## Vault Open Pit - Southwest Wall

- The Amaruq AWR crosses a saddle between the Vault and Phaser pits on a rockfill embankment.
- No evidence of instability in the AWR embankment was observed. No tension cracks on the surface of the road or bulging of the embankment toe were noted. The embankment is included in the geotechnical inspections.
- The stability of the Amaruq AWR embankment could be adversely impacted if the water level in the Phaser Pit on the other side of the embankment increases and water ponds behind the embankment. No seepage was observed at the time of the inspection. The presence of seepage should continue to be evaluated as part of the monthly inspections.



# Observed Slope Performance

## Vault Open Pit - West Wall

- The West Wall is located along the footwall of the deposit, which dips at approximately 20° to the east (mine grid). The wall was established with 7 m high single benches without pre-shear and commonly failed or were scaled back to the foliation.
- The ramp is located along this wall. At the time of the inspection, access to the ramp was restricted by a barricade. Personnel must contact the Geotechnical Group before entering the open pit; this is understood to be limited to monthly water quality monitoring during the summer.
- While the ramp is inspected as part of the monthly geotechnical inspections, the condition of the ramp is not documented in the inspection report. The ramp should be included in the inspection report. The inspections should continue to consider the open pit walls and in-pit dumps, as well as the integrity of the Ring Road between the open pit and Vault Lake as a failure could result in a wave in the pit lake or inrush to the open pit.



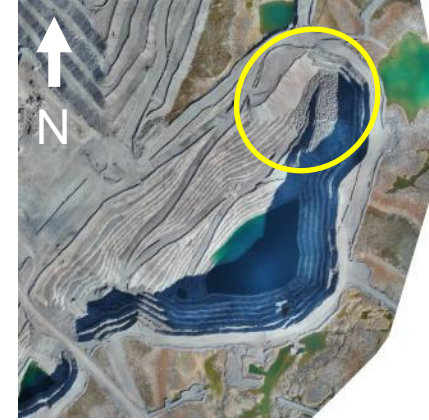
West Wall, Looking North



Barricade at Top of Ramp

# Observed Slope Performance

## Vault Open Pit - North Waste Rock Dump



- A waste rock dump was constructed at the north end of the Vault Pit. The dump is inactive and consists of two platforms with elevations at approximately 5133 mRI and 5082 mRL.
- Settlement and tension cracks were observed at the crest of the upper platform at the north end of dump during the 2019 inspection. There appears to have been little change since that time. The affected area is relatively small and is not above the ramp. Consider including this area in the monthly visual inspections.
- No other evidence of instability was observed during the inspection.
- Access to the dump is now prevented with a berm.



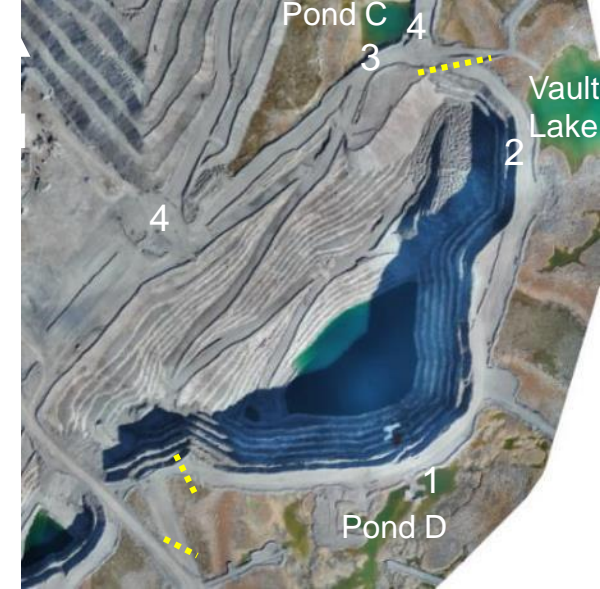
# Observed Slope Performance

## Vault Open Pit - Ring Road

- A berm has been constructed at both ends of the Ring Road to prevent access (yellow dashed lines at right). Several geotechnical hazards have previously been identified along the road:

1. Seepage from Pond D has flowed under the road and down the pit wall in 2019 and 2021. This was not observed during the current inspection; the water level in Pond D is low.
2. Subsidence of the road has occurred adjacent Vault Lake. No change was observed since 2021.

No seepage was observed below road. The potential for a sudden inrush of water from Vault Lake into the open pit was previously identified as a hazard in the event of a breach or erosion of the Ring Road in this area. As a result, it is recommended that the area be inspected prior to accessing the open pit. Alternatively, the road could be purposely breached in this area to eliminate the hazard.



Area 2 Looking South with Subsidence Circled



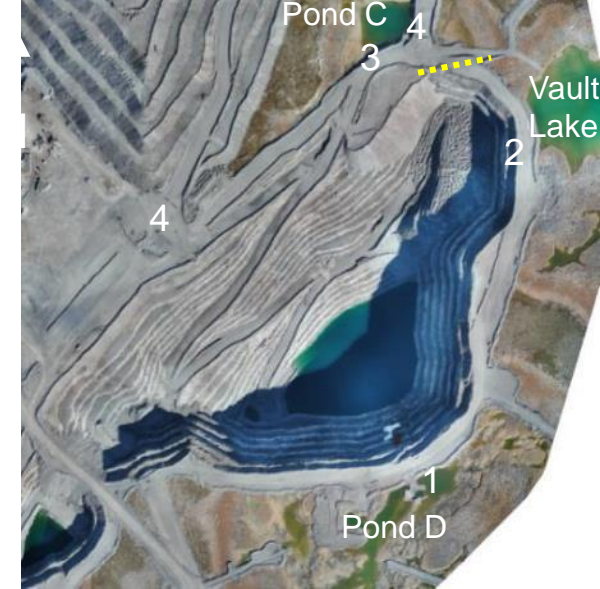
Vault  
Lake



# Observed Slope Performance

## Vault Open Pit - Ring Road (Cont'd)

3. Subsidence of the road previously occurred adjacent Pond C. The subsidence has been backfilled and regraded since the 2021 inspection.
4. The ramps to the waste rock dump are only partially blocked by berms. It is understood that the berms were completed in 2022 but have since been removed to allow access to the dump for the crushing operation. The berms should be re-built once access is no longer required.



# Observed Slope Performance

## Phaser and BB Phaser Pits - General

- The Phaser and BB Phaser open pits were inspected on August 13, 2022. Observations made during the inspection are summarized on the following slides.
- Mining of the open pits is complete. The approximate current pit geometry is shown at right.
- The open pits are partially flooded. The elevations of the pit lakes are not recorded, but estimates are shown at right.
- Access to the open pits is limited to monthly water quality sampling when the pit lake is not frozen.
- At the time of the inspection, the accesses to the open pits were barricaded by berms (shown as dashed lines at right). This now includes the road between the two open pits.
- Note that the Amaruq All Weather Road (AWR) crosses between the Vault and Phaser Pits on a rockfill embankment.
- AEM continues to complete monthly geotechnical inspections of the open pits as on-going access to the pits is still required for water quality sampling. The AWR is also included in the inspections. These inspections should continue, though the open pit inspections could be discontinued during periods when water quality sampling is not occurring.



# Observed Slope Performance

## Phaser Open Pit - General

- The open pit is partially flooded, limiting the current rock exposures to a single bench. No particular concerns were noted.
- Access to the open pit is prevented by a berm.
- No evidence of instability was observed in the Amaruq AWR embankment.
- Water inflow, likely from the BB Phaser pit, was noted at the south end of the pit in 2021. No inflow was observed during the current inspection. The stability of the Amaruq AWR embankment could be adversely impacted if the water level in the Phaser pit increases and water ponds behind the embankment. A visual assessment of the water level in the open pit should be incorporated into the monthly inspections. Note that the pit lake elevation does not appear to have significantly changed since the 2021 inspection.



Looking Southwest



# Observed Slope Performance

## BB Phaser Open Pit - General

- The open pit is flooded, with no rock slopes visible. The pit lake elevation is several meters higher than what was observed during the 2021 inspection.
- Access to the open pit is prevented by a berm.
- No particular geomechanical concerns were noted.



# Monitoring and Inspections



# Monitoring and Inspections

## Inspections

- Visual inspections are completed by the Geotechnical Group on a monthly basis and a summary report and map issued.
- The Rock Mechanics Group does not currently commit to any inspections of the Meadowbanks pits. Thomas Dahm of the Geotechnical Group has open pit rock mechanics experience and completes the monthly inspections. However, who completes the inspections could change over time. Recommend implementing an annual inspection of the open pits and in-pit dumps by the Rock Mechanics Group in areas where access is still required.
- A selection of the inspection reports were reviewed and the following discussed:
  - Most of the key hazards identified during the 2022 annual inspection are included in the monthly reports. However, the ramps used to access the pit lakes in the Portage Pit A and Vault Pit are not. Recommend including these areas in the inspections, at least during periods when access to the ramp is required (e.g., for pump maintenance or water quality sampling).
  - The inspections include a series of standard photos from the same positions. This is a good practice as it allows changes to be tracked over time.
- While the frequency of the visual inspections is reasonable, recommend having a formal mechanism in place to increase the inspection frequencies in the some situations (e.g., if an instability occurs). This commonly takes the form of a Trigger Action Response Plan (TARP).
- No reportable failures have occurred since the 2021 annual inspection. A small rockfall may have occurred at a pre-existing failure along the North Ramp of Pit E. The rockfall was mentioned in the June inspection report.
- Rockfalls at Meadowbank continue to not be tracked in a rockfall database. Recommend recording and reporting (as appropriate) rockfall events that occur within the open pits used for tailings and water management in areas where there is the potential for worker access.



# Monitoring and Inspections

## Instrumentation

### Piezometers and Thermistors

- A series of piezometers and thermistors were installed at many of the open pits. These instruments are no longer monitored from a geomechanical perspective.
- The VWP and thermistors at Pit E are monitored by the Geotechnical Group from an environmental perspective given the deposition of tailings in the open pit.
- The VWPs and thermistors at the Goose Pit are no longer monitored from an environmental perspective as tailings deposition has stopped. Recommend reviewing the need to monitor these instruments periodically given the potential for future tailings deposition.

### TDRs and Inclinometers

- TDR cables were installed at Pit E and the Goose Pit and an inclinometer was installed at Pit E. These instruments are no longer monitored.

### Extensometers

- Four wireline extensometers have been installed on Dump D. The Geotechnical Group commit to monitoring the extensometers on a monthly basis, with more frequent readings depending on the observed displacement. Monitoring requirements are set out in the procedure “Wireline Extensometer Monitoring in Rock Storage Facility”. The procedure also defines displacement rate thresholds and the associated responses.
- The extensometer data is not plotted, making the identification of trends difficult (e.g., the shift in the data from Ext 1 and 2 in December, 2021 or the current increase in deformation rate in Ext 3 and 4). Recommend setting up standard graphs of deformation rate and cumulative deformation versus time.
- The extensometers provide point measurements of displacement and are limited to Dump D. Settlement and tension cracks have been observed at most of the in-pit dumps. Quantitative monitoring is recommended for Dump B and the Goose Pit in-pit dump to better quantify the risk associated with a failure of the dump when personnel are accessing the open pit lakes (for dewatering, water quality sampling, or sediment sampling). This could be accomplished with additional extensometers, survey pins and/or drone photogrammetry.



# Monitoring and Inspections

## Ground Control Management Plan (GCMP)

- The GCMP for the Meadowbank Site was last updated in 2018 and does not reflect the current state of operations or ground control activities.
- Most importantly, there is a need to document the inspection and monitoring requirements. In addition, key sources of information on the open pits should be referenced (e.g., a list of reports) so that the information is not lost. This could be included as a section in the GCMP for the Amaruq Site rather than maintaining the GCMP for the Meadowbank Site a stand-alone document.
- Regardless of the approach, this needs to be resolved as a priority. The completed document should be reviewed and updated on an annual basis.

# Recommendations



# Recommendations

## Priorities

The inspection recommendations have been grouped into four categories at AEM's request:

- **Priority 1 (P1):** A high priority or structural safety issue considered immediately dangerous to life, health or the environment. Also includes issues with a significant risk of regulatory enforcement.
- **Priority 2 (P2):** An issue that, if not corrected, could plausibly result in a structural safety issue leading to injury, environmental impact or significant regulatory enforcement. Also includes repeated deficiencies that demonstrate a systematic breakdown of procedures.
- **Priority 3 (P3):** Single occurrences of deficiencies or non-conformances that in isolation are unlikely to result in structural safety issues. Also includes recommendations for pro-active measures important to the validation of the open pit slope design.
- **Priority 4 (P4):** Opportunity for improvement, for example to meet industry best practices.

The recommendations contained in this presentation are briefly summarized by category on the following slides.

# Recommendations

## P1 and P2

### Priority 1 (P1):

- None identified

### Priority 2 (P2):

1. Complete the relocation of the ABF Garage and associated infrastructure away from the C Dump and the tailings management areas. The seacan used to provide power to the dewatering infrastructure in Pit A should be relocated outside of the bermed-off area along the crest of the dump.
2. Implement a quantitative assessment of settlement at the Goose Pit Waste Rock Dump and the B Dump. Possible options include extensometers, survey points, drone photogrammetry, etc.
3. Review and update the Ground Control Management Plan (GCMP) for the Meadowbank Site. The GCMP should be reviewed and updated annually. The GCMP could be consolidated with the one for the Amaruq Site. In particular, the following should be completed:
  - a) Specify the inspection and monitoring commitments, including the associated Trigger Action Response Plan (TARP). Specify who is responsible for the inspections.
  - b) List / reference key sources of information for the Meadowbank open pits, including design reports and previous annual inspections so that the information is not lost.

# Recommendations

## P3

### Priority 3 (P3):

1. Continue the monthly visual inspections of the Goose Pit, Portage Pit A, Portage Pit E, Vault Pit, Phaser Pit, B Dump, C Dump and D Dump. Specific comments include:
  - The ramps used to access the pit lakes at the Goose Pit, Portage Pit A, Portage Pit E, Vault Pit and Phaser Pit should be inspected when access is required. The inspections of the ramps should be documented in the inspection report.
  - The pre-access inspections for the Vault Pit should also include the in-pit waste dumps and Ring Road adjacent Vault Lake. The inspections of the Ring Road could be stopped if the potential for inrush from Vault Lake to the Vault Pit was otherwise mitigated (e.g., by breaching the Ring Road).
  - The inspections for the D Dump should include the seepage flowing from the toe of the dump as well as the capacity of the rockfall berm between the dump and the Pit E Northwest Ramp.
2. Continue to monitor the wireline extensometers at the D Dump. The current frequency of a reading every two weeks should be maintained until the movement of the dump stabilizes, the change in dump performance is better understood, or the deformation rate increases to a point where more frequent readings are required. The readings should be graphed (i.e., deformation rate and cumulative deformation vs time) to assist with the identification of trends in the data. Sudden changes in behaviour (e.g., the increase in deformation from 2 to 80 mm between two readings in 2021) should trigger a review of the data.
3. Review the size and capacity of the rockfall berm below the nose in the West wall of the Pit E Northwest Ramp before the dewatering infrastructure is moved up the ramp to below this area.

# Recommendations

## P3 and P4

### Priority 3 (P3):

4. Survey the approximate limits of the tension cracks on the B Dump, D Dump and Goose Pit Waste Rock Dump.
5. Review the hazard assessment and update it to reflect the hazards identified during the 2022 annual inspection.
6. Re-establish berms to restrict access to the Vault waste rock dump (both access ramps) once access is no longer required.
7. Record and report (as appropriate) rockfall events that occur within open pits used for tailings and water management in areas where there is worker access.

### Priority 4 (P4):

1. Implement a formal mechanism to increase the frequency of visual inspections in response to defined criteria.
2. Implement an annual visual inspection of the open pits and in-pit waste rock dumps by the Rock Mechanics Group.
3. Grade the upper and lower platforms of the B Dump and fill the sinkholes/depressions in order to prevent water ponding and limit infiltration.
4. Review the need to periodically monitor the VWP's and thermistors installed in the east wall of the Goose Pit from an environmental perspective given the potential for future tailings deposition in the open pit.

A photograph of two individuals on snowmobiles in a snowy, open field. The person on the left is wearing a black jacket and orange pants, while the person on the right is in a green jacket. In the background, there are several shipping containers, one of which is emitting a plume of white smoke. Two orange flags are visible on tall poles. The sky is clear and blue.

**THANK  
YOU**