Appendix 11

Whale Tail 2021 Annual Open Pit Geomechanical Inspection

March 24, 2022

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Christian Tremblay
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Canada, X0C 0A0

Dear Christian,

RE: Meadowbank Complex - Amaruq Site - 2021 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 Amaruq Site consists of the Whale Tail and IVR V1 open pits and an exploration ramp. Knight Piésold Ltd. (KP) has been providing geomechanical support for the Amaruq Site since 2015, including developing the open pit slope geometry recommendations and completing the annual third-party inspections of the open pits required under the water license for the mine.

The 2021 annual inspection of the open pits at the Amaruq Site was completed by Mr. Ben Peacock, P.Eng., of KP from September 15 to 17, 2021. Note that a detailed review of the slope performance and design basis for the Whale Tail Open Pit is currently in progress. As a result, the annual inspection did not focus on the design or design verification of the open pit slopes.

2.0 OPEN PITS INSPECTED

The open pits and surface excavations in rock that were included in the inspection and their current status is summarized in Table 1.

Table 1 Open Pits Inspected and their Status

Open Pit	Current Status
Whale Tail Open Pit	Active mining
IVR V1 Open Pit	Active mining
Attenuation Pond 5 (AP5)	Inactive, partially flooded

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

3.0 INSPECTION RESULTS

3.1 GENERAL

The inspection was completed by Ben Peacock of KP. Several AEM staff participated in the inspection, with different staff taking part on different days. Those involved included:

- Christian Tremblay (Interim Rock Mechanics Coordinator)
- Mathieu Giroux (Rock Mechanics Engineer)
- Vincent Duranleau (Rock Mechanics Technician)
- Veronique Falmagne (Senior Advisor Mining)
- Jane Alcott (Mining Engineering Superintendent - CSD)

Cameron Clayton of Tetra Tech Canada Inc. also participated in the first two days of the inspection.

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 observations and associated recommendations were reviewed with AEM during the site visit.

3.2 PRIORITY 1 OBSERVATIONS

No P1 observations were made during the inspection.

3.3 PRIORITY 2 OBSERVATIONS

The following P2 observations were made for specific areas of the open pits:

1. **WHL North Wall Rockfall Hazard -** In general, scaling of the bench faces appears to be well done and it is clear that AEM focusses on this aspect of slope management. However, a block was observed on the north wall. The material represents a rockfall hazard and should be removed.
2. **WHL South Wall Wedge -** A potentially unstable wedge has been identified below the ramp in the south wall. Radar data suggests that the wedge is deforming in response to blasting. Instrumentation (e.g., a crackmeter) should be installed to allow the deformation to be more accurately monitored. A Trigger Action Response Plan (TARP) should be developed for the instrumentation. If deformation of the wedge continues, options for stabilizing the wedge should be reviewed.
3. **WHL Southwest Wall Rockfall Hazard -** The Phase 3 pushback has resulted in overspill and rockfall on the ramp and the benches above the ramp. A rockfall berm has been constructed along the inside of the upper portion of the ramp. However, the berm is now close to being full and does not cover the lower portion of the ramp. The rockfall berm should be extended so that the full length of the ramp below the Phase 3 pushback is protected. The existing berm should be cleaned out to re-establish

adequate capacity for future rockfall and periodic inspections of the berm completed in order to identify if future cleaning is required.

4. **WHL Phase 3 Pushback Rockfall Hazard -** A temporary wall was developed in the blocky diorite without pre-shear. The bench face represents a rockfall hazard and a rockfall berm should be established below the temporary wall.
5. **IVR V1 Northwest Wall Rockfall Hazard -** The poor performance of the bench faces and the reduced catch bench width in this sector represent a rockfall hazard and a rockfall berm should be established below the wall.
6. **IVR V1 Northeast Wall Rockfall Hazard -** Several potentially unstable wedges were observed on the north wall. The wedges represent a rockfall hazard and should be removed.
7. **WHL Northeast Wall Design Study -** Additional rock mass characterization and stability analyses are planned in order to confirm the revised slope design for this design sector. This study should be completed. On-going structural mapping of the pushback is recommended to support this process.
8. **IVR V1 Northeast Wall Design Review and Trials -** The benches in this sector have not performed as expected. Variable bench performance and reduced catch bench width appear to be associated with variations in lithology and rock mass structure, as well as drill and blast practices. A trial of a revised bench design is planned and is endorsed. The performance of the wall should be reviewed.

The following general P2 observations were made:

9. **Rockfall Hazard Management -** Brittle, bench-scale failures and rockfalls are the most likely failure mode at the mine. As Slope Stability Radar (SSR) is not well suited to predicting these failures in advance, managing these failures relies on bench design, scaling and visual inspections. Additional measures for managing the risk associated with these failures have been discussed. Complete a risk-based review of the management of rockfalls at the mine to select the appropriate monitoring tool(s), operational practice(s), or design solution.
10. **Surface Monitoring Instrumentation -** The mine does not currently monitor any geomechanical or hydrogeological instrumentation in the vicinity of the open pits. Develop and implement an instrumentation program, including vibrating wire piezometers, thermistors, and instruments that can monitor sub-surface deformation (e.g., inclinometers or Time Domain Reflectometry cables). The instrumentation program should be developed using a risk-based approach.
11. **Wall Performance Review -** AEM has committed to reviewing the performance of the open pit slopes every four months. A review has not been completed in the last year and should be undertaken and documented. The review should include a discussion of the major geomechanical hazards (including any slope failures), a comparison of the planned and achieved slope geometry, as well as a comparison of the collected geomechanical data to the design basis that was used to develop open pit slope geometry recommendations.
12. **Blasting Study -** Drill and blast practices have been a factor in poor bench performance in both of the open pits, including increased backbreak, undercutting of the bench face and hard toes. The blast design does not vary to account for different lithologies or the orientation of the foliation and quality control is limited. A blasting study is on-going and should be completed. It is recommended that opportunities to sequence blasts away from the final open pit walls be considered.
13. **Roles and Responsibilities -** The role and responsibilities of each member of the rock mechanics team should be clearly defined. There are competing claims on the available resources, and commitments are sometimes missed. Consider completing a time study to track the time staff spend on individual tasks.

3.4 PRIORITY 3 OBSERVATIONS

The following P3 observations were made for specific areas of the open pits:

1. **WHL East Wall Rockfall Hazard -** Several potentially unstable blocks have been identified along the crest of one of the benches on this wall. The area was previously scaled by a rope crew. The blocks should be included in the regular visual inspections. As the blocks are difficult to observe, the inspections should be periodically supplemented with monitoring using the drone.
2. **WHL Southeast Wall Ponded Water -** Surface water is ponding at the base of the former Quarry 1. Access to the area is restricted. Infiltration of this water may be associated with seeps in the southeast wall and could contribute to slope instabilities. The regular visual inspections should document the ponded water.
3. **IVR V1 Northeast and Southeast Wall Structures -** Persistent cross-cutting structures have locally limited the achieved bench geometry on the southeast wall and are associated with the wedges identified on the northeast wall. These structures should be mapped so that potential instabilities on future benches can be anticipated.
4. **AP5 Access -** As access to AP5 is not currently required, recommend constructing a berm at the top of the ramp to restrict access.

The following general P3 observations were made:

5. **Bench Approval Process -** The bench approval process is an integral part of the mine's management of rockfall hazards. The process is well established but has not been formally defined and whether or not a bench has been approved is not tracked. A formal procedure and/or checklist should be developed and a method established for tracking which benches have been approved.
6. **Geotechnical Hazard Maps -** Hazard maps for the open pit slopes are issued after each inspection, documenting the observed hazards and recommended mitigation measures. While the maps are an effective tool, they primarily consider hazard rather than risk. The maps form the basis for AEM's risk-based Work Close to Pit Wall procedure, which is a key process used by the mine to manage geotechnical risk. There is a potential disconnect between the risk-based procedure and the hazard map. It is recommended that the mine provide additional guidance on assessing the risks associated with the identified hazards, accounting for the consequences of a hazard occurring and the mitigating measures in place. This will help identify areas requiring additional mitigation. Consider developing a Trigger Action Response Plan (TARP) to assist with the categorization of common hazards.
7. **Drone Inspections -** The mine commits to monthly drone inspections of the catch benches between May and September, but these are not regularly completed. The commitment should be reviewed and aligned with current needs and capabilities. For example, the drone inspections could focus on specific identified hazards and be supplemented by a biannual or quarterly inspection of the catch bench condition.
8. **Slope Stability Radar Alarms -** The current strategy for the SSR involves adjusting the alarm parameters on a case-by-case basis. This process is informal and relies on an experienced operator who is familiar with the historical slope performance and is comfortable interpreting the data. With the recent addition of new staff to the rock mechanics team, recommend providing more detailed guidance on the selection and adjustment of alarms. It is understood that a draft memo is in progress. The default alarms should continue to be regularly reviewed.
9. **Slope Stability Radar Coverage Review -** The SSR is a key component of the mine's monitoring program. As a result of the Phase 3 pushback, the radar that covers the northern walls of the Whale

Tail Open pit will need to be moved repeatedly in 2022. The mine plan should be reviewed from the perspective of radar placement and coverage.

10. **Surface Instrumentation Program -** The monitoring of surface deformation is limited to the SSR. An additional method of monitoring surface deformation is recommended to complement the SSR. The objective is to determine the true vector of any displacement and to establish a long-term baseline. Options include survey prisms or GPS beacons.
11. **Sub-Surface Instrumentation Program -** The mine does not currently monitor any geomechanical or hydrogeological instrumentation in the vicinity of the open pits. There is a need to develop and implement an instrumentation program, including vibrating wire piezometers, thermistors, and instruments that can monitor sub-surface deformation (e.g., inclinometers or Time Domain Reflectometry cables). The instrumentation program should be developed using a risk-based approach.

3.5 PRIORITY 4 OBSERVATIONS

The following P4 observations were made:

1. **Geotechnical Inspection Frequency -** Formal visual geotechnical inspections of the open pit are completed twice a month. Additional inspections are completed on an ad hoc basis. It is recommended that a procedure be developed to adjust the frequency of the geotechnical inspections of particular areas based on the observed slope performance (e.g., if a deformation rate is exceeded) and the risk associated with a particular slope.
2. **Geotechnical Inspection Photos -** Photos are taken as part of the inspections. It is recommended that a series of standard photos (i.e. similar perspectives) be incorporated into the formal inspections to facilitate the tracking of changes in the slope performance over longer time periods.
3. **Hazard Tracking Database -** Identified hazards and the associated corrective measures are tracked in a database along with the due date and associated risk rating. This is a good practice. However, overdue items are not flagged. A mechanism should be developed to flag overdue corrective measures.
4. **Rockfall Database -** Rock falls are documented in a database along with key characteristics (e.g., rock type, failure mode, discontinuity orientation, tonnage, etc.). This is an important practice, but the data are sometimes incomplete. The data should be consistently collected for all documented failures (to the extent possible) to facilitate back-analyses and a review of possible trends.
5. **Input to Mine Design -** The rock mechanics team regularly provides input to the mine planning and design process. In some cases, this input is not formally documented or is only briefly summarized. It is recommended that input to the Four Month Rolling (4MR) Mine Plan be formally documented and that the reviews completed for the Budget Mine Plan be documented in greater detailed.
6. **Reporting -** Consider developing a monthly dashboard report to summarize key statistics and providing a brief overview of key hazards. The objective is to summarize the work completed by the team and to demonstrate compliance with the commitments in the GCMP. This will also help determine whether additional resources are required to meet these commitments.
7. **Skills Matrix -** Several new staff have joined the rock mechanics team in the past year. Consider developing a skills matrix to help identify training needs.

8. **Ground Control Management Plan -** The Ground Control Management Plan (GCMP) is well-written and suitable document but has not been updated since July 2020. Several opportunities to improve the GCMP were identified during the site visit and discussed with the rock mechanics staff. These include adding a brief overview of the deposit geology and mine plan and clarifying several points. The GCMP should be reviewed and updated annually.

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,
Knight Piésold Ltd.

REGISTERED PROFESSIONAL ENGINEER
B.D. PEACOCK
LICENSEE
2022-03-24
NT/NU

PERMIT TO PRACTICE
KNIGHT PIESOLD LTD.
Signature
Date 2022-03-24
PERMIT NUMBER: P 547
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

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:
Appendix A Meadowbank Complex - Amaruq Site - 2021 Annual Geomechanical Inspection

/mjr

Knight Piésold CONSULTING

APPENDIX A

Meadowbank Complex - Amaruq Site - 2021 Annual Geomechanical Inspection

(Pages A-1 to A-57)

Meadowbank Complex - Amaruq Site

2021 Annual Geomechanical Inspection

September 16 to 20, 2021

Outline

- Introduction
- Whale Tail Open Pit
- IVR V1 Open Pit
- AP5
- Monitoring and Inspections
- Ground Control Program

Introduction

Introduction

General

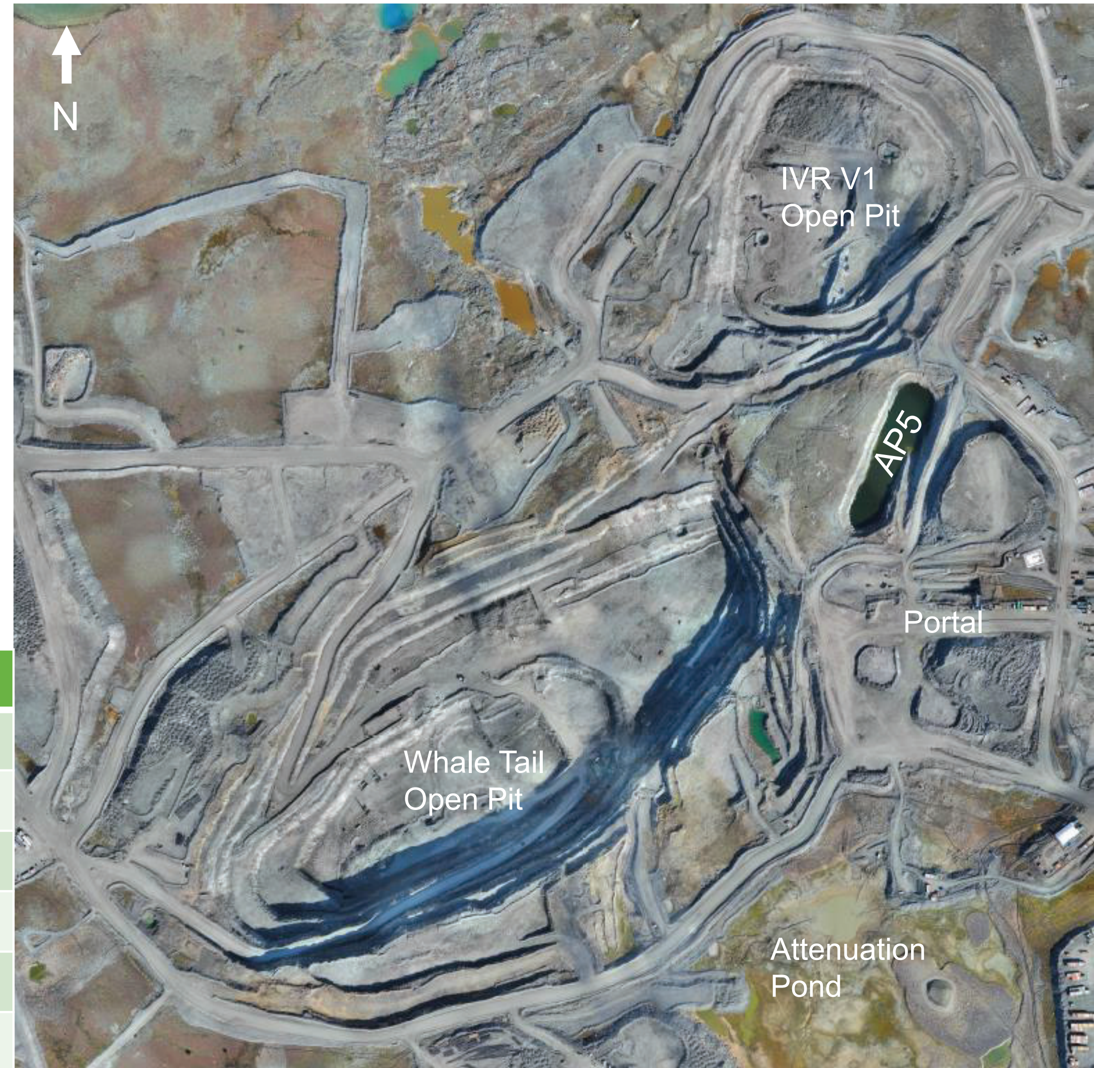
- Agnico Eagle Mines (AEM) operates the Meadowbank Complex in Nunavut. The complex consists of the Meadowbank and Amaruq Sites.
- The Amaruq Site consists of the Whale Tail and IVR deposits. The Whale Tail Open Pit entered commercial production in 2019 and the IVR V1 Open Pit entered production in 2020. An exploration ramp has been developed at the Whale Tail deposit and preparations for underground mining are underway.
- Knight Piésold (KP) has been providing geomechanical support for the Amaruq Site since 2016, including a 2018 feasibility design for the Whale Tail Open Pit, a 2019 feasibility design for the IVR V1 and V2 Open Pits, and several design studies for the underground mine.
- KP completed the 2019 and 2020 annual inspections for the Whale Tail Open Pit. In 2021, AEM retained KP to complete the annual inspection of the open pits at both the Meadowbank and Amaruq sites, as well as the exploration ramp at the Amaruq Site. The inspection was completed during a site visit from September 13 to September 20, 2021. The inspections for the Whale Tail Open Pit and IVR VI Open Pit are summarized in this presentation, along with other related discussion topics.
- Note that a detailed review of the Whale Tail Open Pit slope performance and design is currently in progress. In order to avoid duplication, this presentation does not address the design or design verification of the open pit slopes.

Introduction

Inspection

- The following open pits and surface excavations at the Amaruq Site were reviewed on September 15, 16, and 17, 2021 (shown at right):
  - Whale Tail (WHL) Open Pit
  - IVR V1 Open Pit
  - AP5
- The participants were as follows:

Name	Company	Day 1	Day 2	Day 3
Christian Tremblay	AEM	X	X	
Mathieu Giroux	AEM		X	
Vincent Duranleau	AEM	X		X
Veronique Falmagne	AEM (Corporate)		X	X
Jane Alcott	AEM (CSD)		X	
Cameron Clayton	Tetra Tech	X	X	

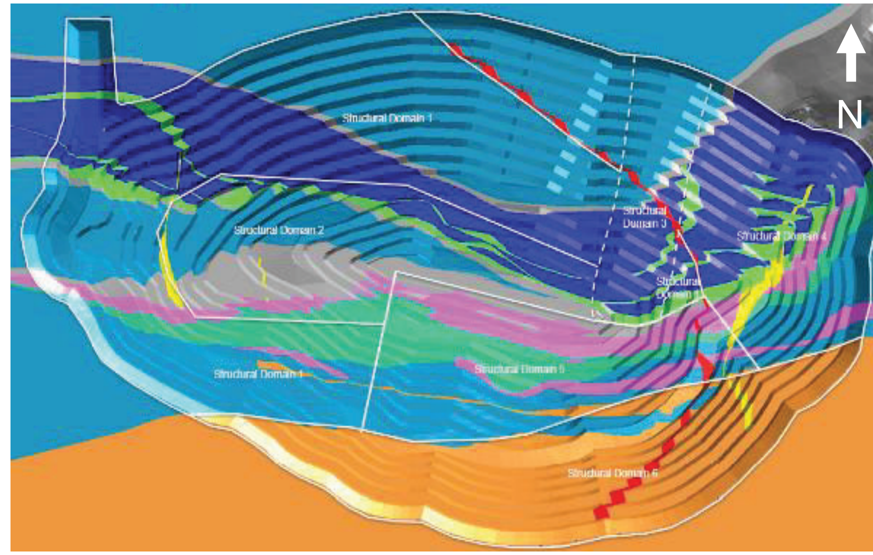


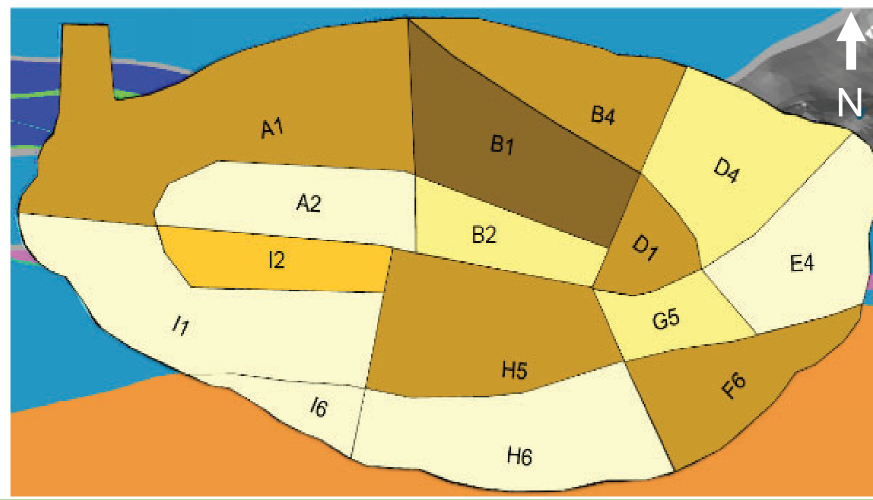
Whale Tail Open Pit

Whale Tail Open Pit

Overview

- The WHL-001-010F design is shown at right for reference as it formed the basis for the slope geometry recommendations. This design is superseded by the current WHL-001-011F design.
- The WHL-001-010F and WHL-001-011F designs are very similar and a comparison is shown on the next slide.
- The Structural Domains (which control the achievable slope geometry in many cases) are shown at upper right along with the lithologies expected in the final open pit walls.
- The design sectors and the Feasibility Study slope geometry recommendations are shown at lower right.





LITHOLOGY LEGEND:

- GREYWACKE
- CHERT
- KOMATIITE - NORTH LIMB
- KOMATIITE - SOUTH LIMB
- IRON FORMATION
- MAFIC VOLCANICS
- DIORITE
- RAMP FAULT

Base Bench Geometry

BASE CASE
BFA: 75°
Bench Width: 10 m
Bench Height: 21 m
IRA: 53°

KOMATIITE
BFA: 75°
Bench Width: 10.5 m
Bench Height: 21 m
IRA: 52°

Bench Geometry Controlled by Bench-Scale Failures

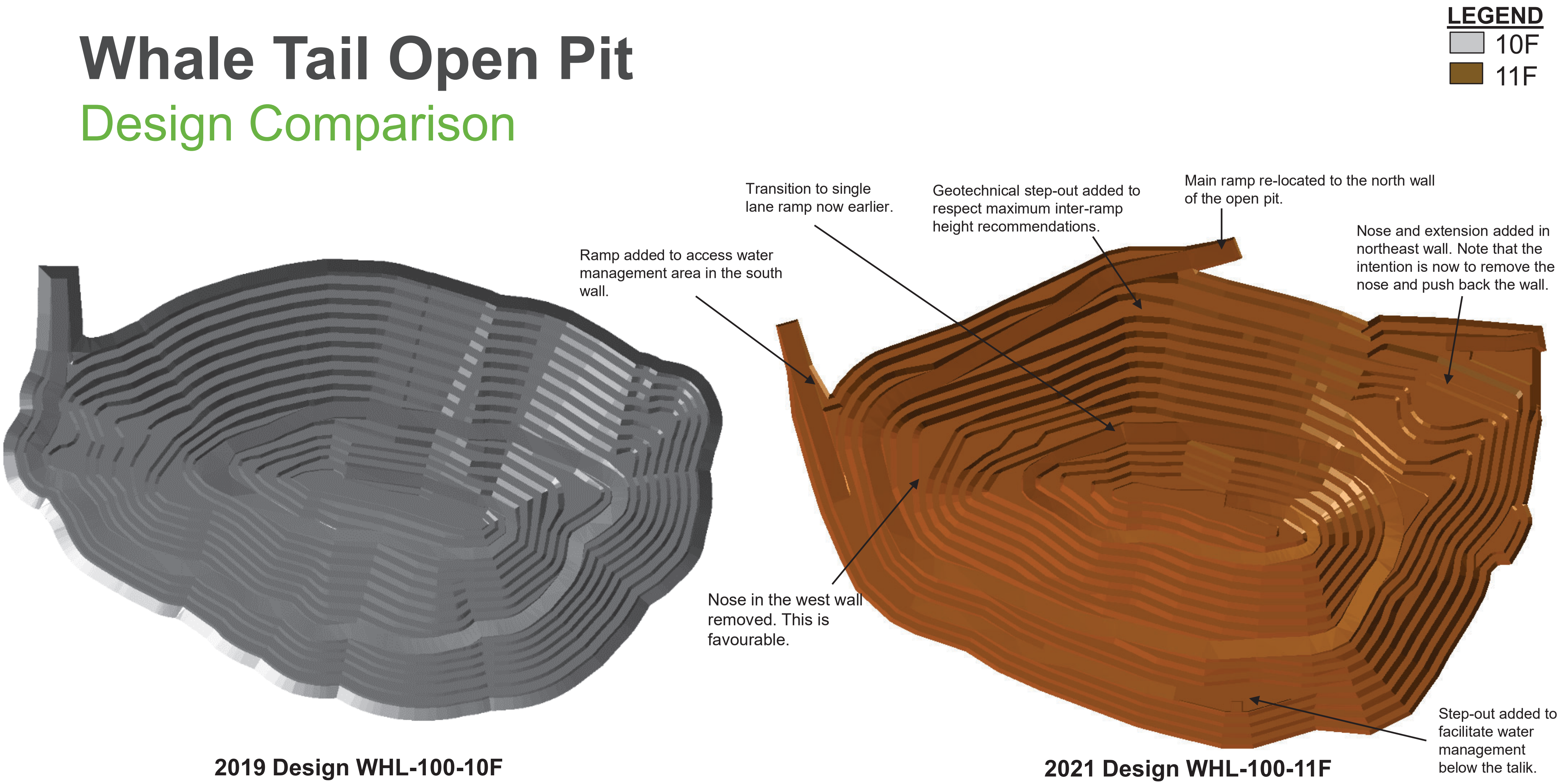
BFA: 65°
Bench Width: 10 m
Bench Height: 21 m
IRA: 47°

BFA: 65°
Bench Width: 10.5 m
Bench Height: 21 m
IRA: 46°

BFA: 65°
Bench Width: 13 m
Bench Height: 21 m
IRA: 43°

Whale Tail Open Pit

Design Comparison



Whale Tail Open Pit

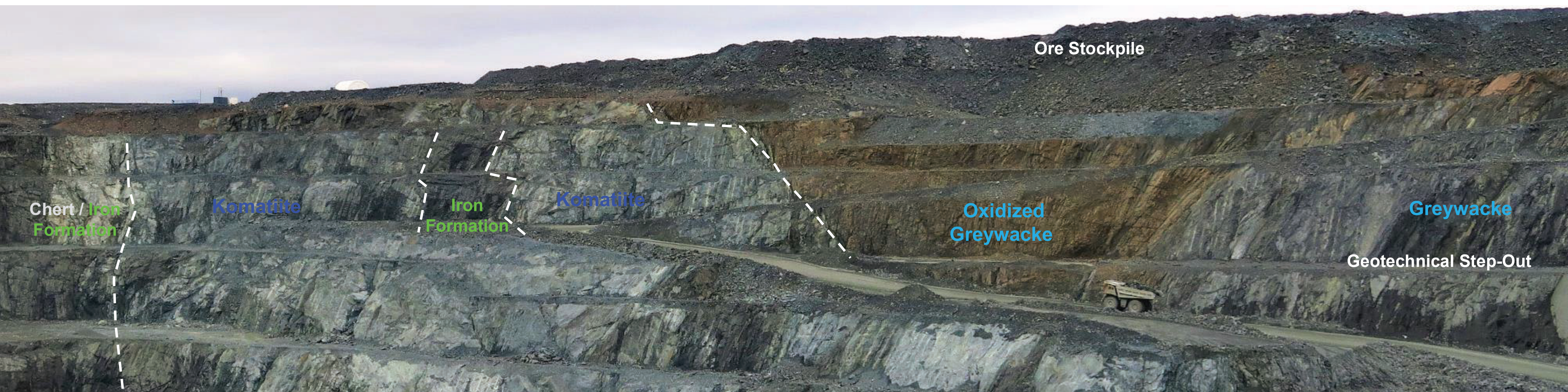
Inspection

- The Whale Tail open pit was inspected on September 15, 16, and 17, 2021. Observations made during the inspection are summarized on the following slides.
- The approximate open pit geometry at the time of the visit is shown at right. The approximate final crest position (Phase 3) is marked by the dashed yellow line, and the walls inspected are labelled relative to mine north.

Whale Tail Open Pit

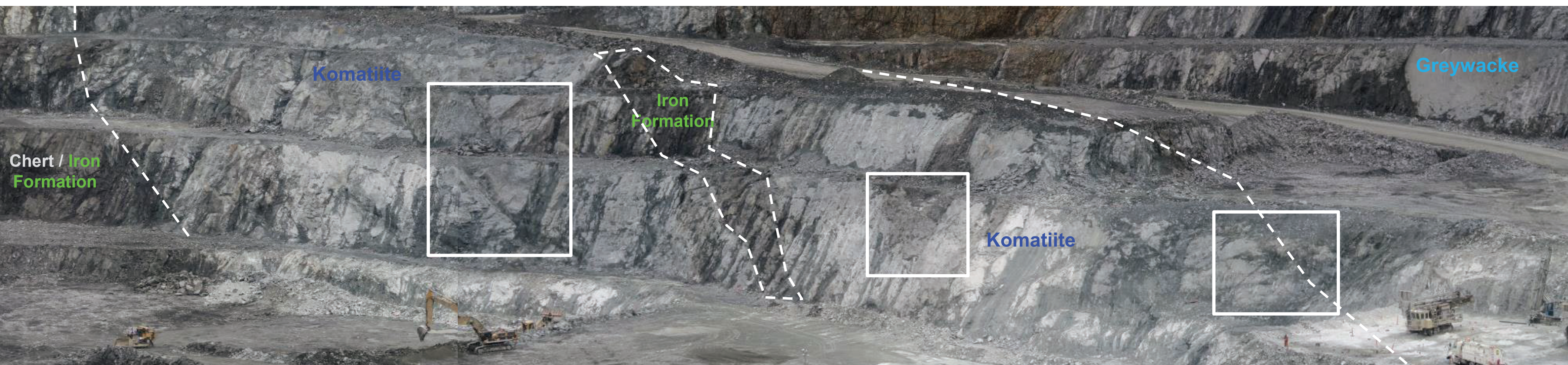
Observations - Northwest Wall

- Final wall in Design Sector A1.
- The benches are generally performing well. There have been no further failures in the Komatiite since the last inspection.
- The Oxidized Greywacke is thought to be associated with a talik zone below what was the western end of Whale Tail Lake. It is of lower rock mass quality than the Greywacke and is prone to ravelling. The exposures along the ramp are limited in height and rockfall has not been a concern to date. If ravelling increases, a rockfall berm could be constructed along the inside of the ramp through this unit.
- Seepage was observed along the sheared contact between the Oxidized Greywacke and the Komatiite.



Whale Tail Open Pit
Observations - Phase 1 North Wall

- Interim wall in Phase 1.
- Performance of the revised bench design introduced following the last annual inspection is consistent with expectations. Several bench-scale failures have occurred on benches established using the revised design in this sector, when the foliation locally dips at a shallower angle than the bench face. However, the frequency and size of these failures (< 250 tonnes) has reduced. The failures are outlined in white below.
- AEM continues to complete extensive scaling in this sector in order to remove potential hazards and reduce the likelihood of a failure.
- It is expected that bench-scale failures will still occur in the Komatiite, predominantly during freshet.



Whale Tail Open Pit

Observations - North Wall

- Final wall in Design Sector B1 / B4.
- The benches are performing better than expected, with the bench face often standing steeper than the foliation.
- However, many of the pre-shear drillholes have been drilled at an angle shallower than the planned 60°, reducing the effective bench width. Drill and blast practices have been discussed in detail as part of the on-going design verification review of the WHL open pit. A drilling and blasting study has been undertaken by the mine and a drill and blast quality control program has been recommended.

Whale Tail Open Pit

Observations - North Wall (Cont'd)

- The toes of the benches have been locally undercut. This has the potential to result in rockfall or bench-scale instabilities.
- A loose block was observed on the face during the visit (shown at right). The block should be scaled down.
- Drilling, blasting, and/or excavation practices are the likely cause of the undercutting. It is understood that this area has been reviewed with the shovel operators in an effort to avoid similar conditions in the future. The potential contribution of drill and blast should be considered during the drilling and blasting study.

Whale Tail Open Pit

Observations - Northeast Wall

- Final wall in Design Sector D4.
- Four bench-scale failures have occurred along the foliation within the Komatiite in this sector in 2021. The failures have been reviewed in detail as part of the on-going WHL open pit design verification review. The failures are primarily kinematic but contributing factors include a reduction in rock mass quality within the Komatiite, the presence of brittle structures, and the infiltration of surface water due to the presence of talik.
- A rockfall berm was constructed below the failures and a temporary step-out left in order to separate mining activities from the failures.
- A revised design has been developed for this design sector and a pushback has been initiated to re-establish the slope. Further analyses are planned.

Whale Tail Open Pit

Observations - Northeast Wall Pushback

- Pushback to re-stablish the final wall in Design Sector D4.
- Revised design incorporates a reduction in BFA to 55°, a reduction in bench height to 14 m (double benching) and an increase in bench width to 11 m
- While only two benches had been established at the time of the inspection, the bench faces were breaking back to the foliation as expected and were performing well.
- On-going rock mass characterization, with a particular focus on the orientation of the foliation, is recommended for this sector.

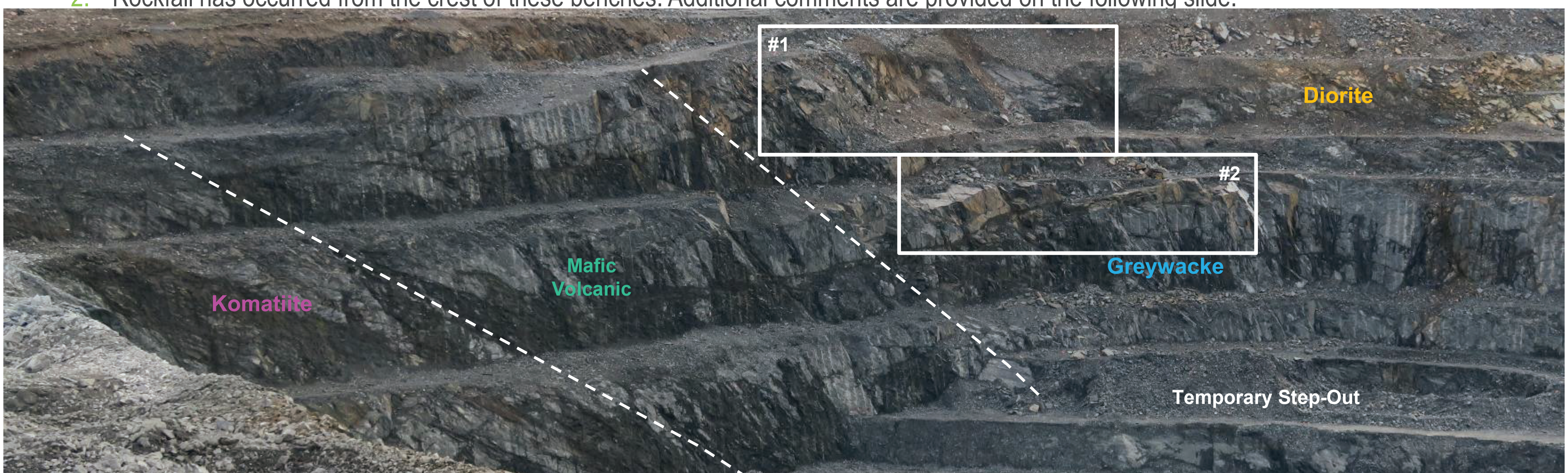
Whale Tail Open Pit

Observations - Blasting

- During the site visit, a relatively large choke blast was taken in the northeast corner of Phase 2. The blast was sequenced so that energy was directed towards the final wall. This will result in increased blast damage to the final walls, particularly when the dominant structure is oriented perpendicular to the wall (as the foliation is in the end wall in this case).
- As part of the on-going blasting study, recommend reviewing the blasting strategy. Where practical, direct blasts away from the final walls.
- From discussions with site staff, there is also a need to implement a drill and blast quality control program and a blast monitoring program.

Whale Tail Open Pit
Observations - East Wall

- Final wall in Design Sector E4.
- The wall is performing well in the Komatiite and the Mafic Volcanics. The Greywacke near the Diorite has not performed as well, with crest loss, rockfall, and hard toes occurring. Specific areas of note are listed below and outlined on the photo.
  1. Material from a former in-pit dump remains on the face of the upper bench. A rockfall berm was constructed to retain ravelling material and has adequate capacity to retain future rockfall.
  2. Rockfall has occurred from the crest of these benches. Additional comments are provided on the following slide.



Whale Tail Open Pit

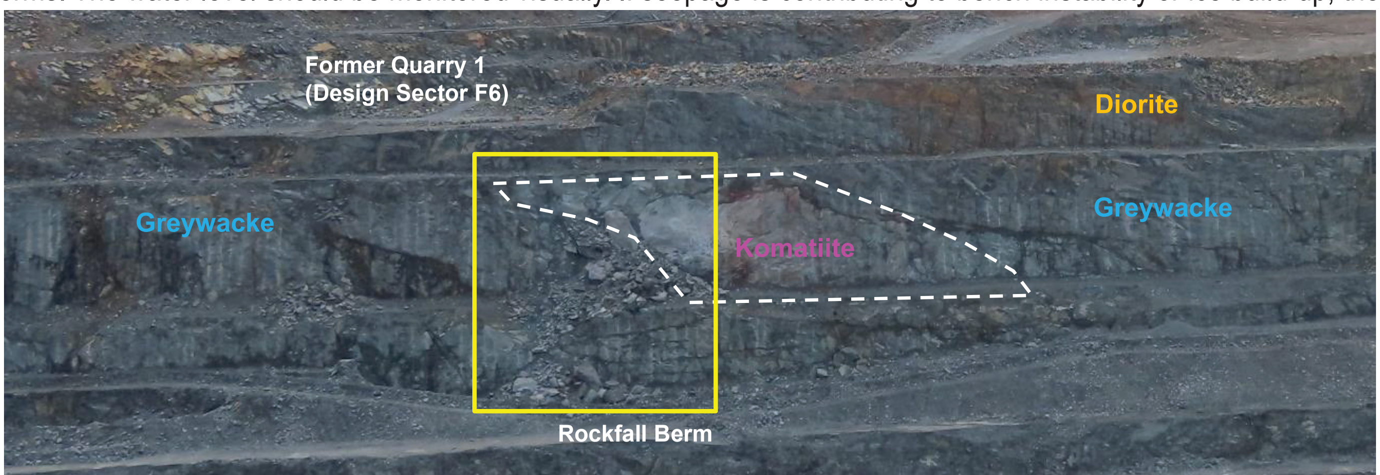
Observations - East Wall (Cont'd)

- A rockfall occurred in the southeast corner of this sector in 2021. In response, a rope scaling contractor (Vertika) was brought in to scale the wall (resulting in the loose observed on the catch benches). A series of curvilinear features, potentially associated with Whale Tail lake, are present in this area (outlined in yellow, below right) and likely contributed to the rockfall.
- A temporary step-out has been left below the area to reduce the exposure to personnel. The intention is to scale the area, clean the catch benches and recover the step-out as part of the Phase 3 pushback. This is a reasonable plan. If rockfall hazard persists, could consider additional measures such as mesh.
- Two potentially unstable blocks were observed during the visit (outlined in white, below left). These blocks should be monitored as part of the regular visual inspections. Recommend using the drone to facilitate these inspections given the difficult position of the blocks.

Whale Tail Open Pit

Observations - Phase 2 Southeast Wall

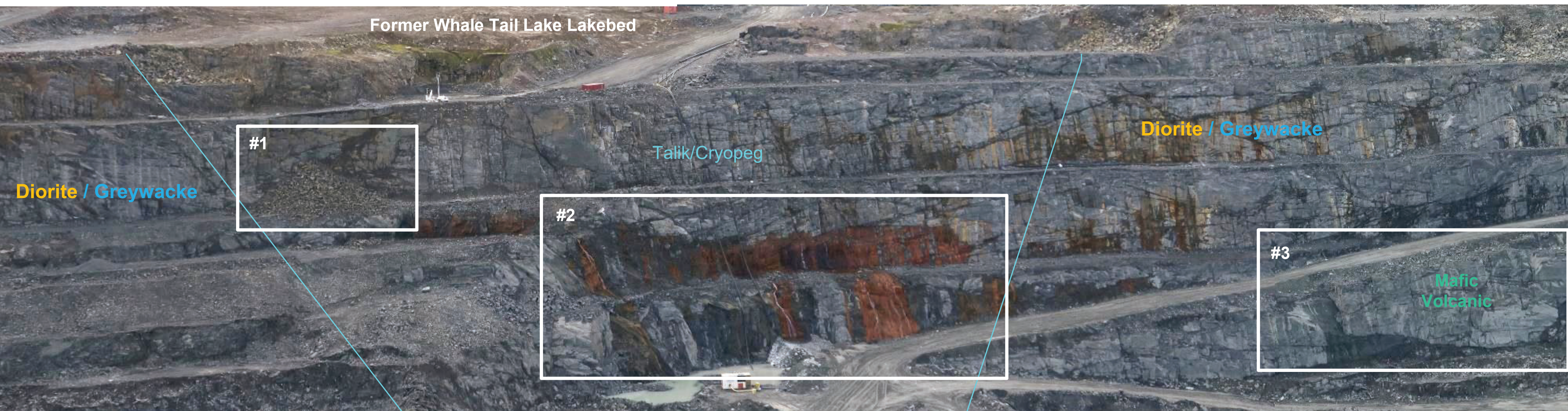
- Interim wall approximately within Design Sector G5. Also referred to as Phase 2 South (G5).
- A progressive bench-scale failure occurred along a sub-vertical contact between the Komatiite and the Greywacke between June and July 2021 (outlined in yellow below). The cumulative tonnage of the failed material was approximately 1,700 tonnes, the majority of which was retained on the catch bench immediately below the failure. A rockfall berm was constructed below the failure. The failure will be mined out during the Phase 3 pushback. It is likely that localized bench-scale failures will occur on adversely oriented contacts as mining progresses.
- Otherwise, the wall is generally performing well.
- Water is ponding at the base of the former Quarry 1 and infiltrating water may be the cause of the seeps observed in the wall. Access to the area is currently restricted by berms. The water level should be monitored visually. If seepage is contributing to bench instability or ice build-up, the water should be removed.



Whale Tail Open Pit

Observations - Phase 2 South Wall

- Interim wall approximately within Design Sector H5. Also referred to as Phase 2 South (H5).
- The wall is generally performing well. Specific areas of note are listed below and outlined on the photo. Details are included on the following slides.
  1. A bench-scale failure occurred along a sub-vertical contact between the Diorite and Greywacke in July, 2021.
  2. Seepage within with the talik associated with Whale Tail Lake occurs in this sector.
  3. A possible unstable block was identified below the ramp.



Whale Tail Open Pit

Observations - Phase 2 South Wall (Cont'd)

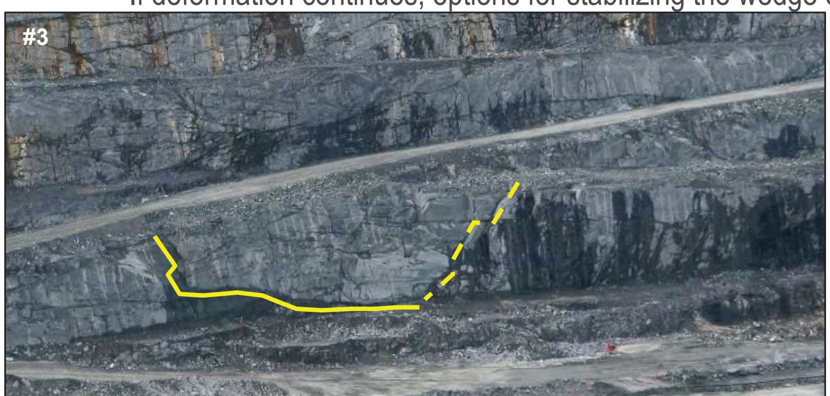
1. The 750 tonne failure occurred along a sub-vertical contact between the Greywacke and Diorite. The Greywacke is notably blocky in proximity to the contact. All but a few blocks were retained on the catch bench immediately below the failure. The failure will be mined out during the Phase 3 pushback. It is likely that localized bench-scale failures will occur on adversely oriented contacts as mining progresses.
2. Prominent seeps are present in the lower South Wall, concentrated along sub-horizontal structures. The estimated inflow rate varies between 60 to 80 m^3/hr over the winter months, increasing to 160 to 180 m^3/hr over the summer months. The seepage is expected to result in the formation of ice walls that will pose an ice fall hazard, particularly in the spring. A water-management pushback has been planned (circled at lower right) to help mitigate this risk, which is endorsed. The groundwater flow into the open pit should continue to be studied so that mitigation measures can be refined.

Whale Tail Open Pit

Observations - Phase 2 South Wall (Cont'd)

3. A potentially unstable daylighting wedge was identified below the ramp in the South Wall. The wedge appears to be forming on the local Joint Set A (solid yellow line) and a series of cross-cutting structures (dashed yellow line).

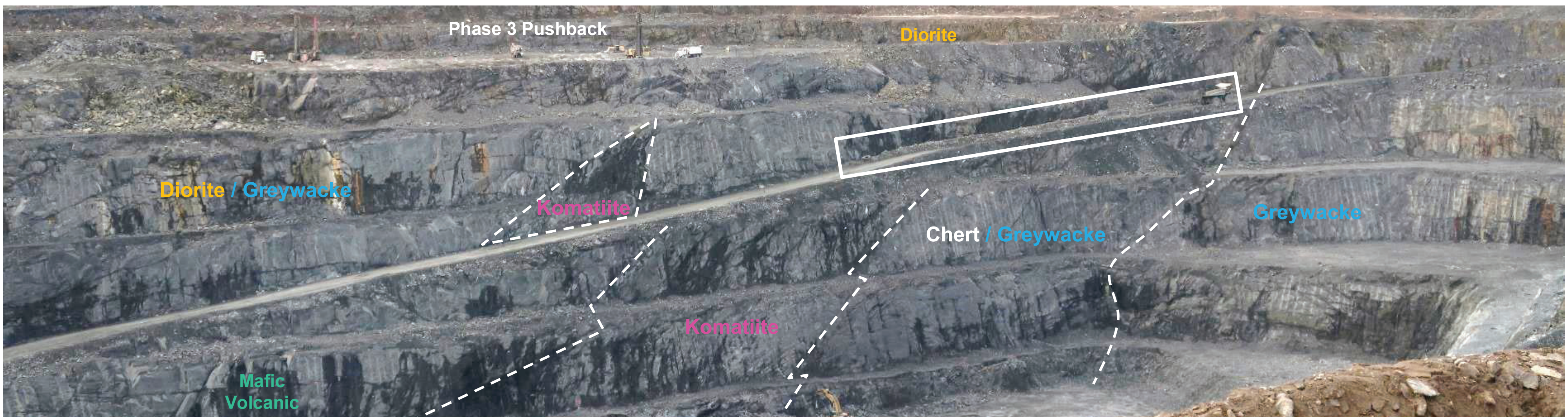
- The mine has completed a preliminary stability assessment in Sedge that suggests the wedge has a FoS < 1 (0.9) if the structures are cohesionless and persistent (e.g., no rock bridging). This is likely conservative for a wedge of this size but still indicates that the wedge may not be stable.
- An initial review of the radar data suggests that blasts are causing the wedge to displace (e.g., displacement of 2-3 mm was observed after a blast on September 9). The deformation is focussed on the eastern end of the wedge (circled below), where the wedge is thinnest.
- As the wedge undercuts the ramp, it is recommended that instrumentation be installed to monitor any displacement. As an initial option, a wireline extensometer could be installed. Longer term, a crackmeter or survey prisms should be installed to allow for automated monitoring. In all cases a TARP should be developed for the instrumentation.
- If deformation continues, options for stabilizing the wedge could include constructing a rockfill buttress below it and/or installing dowels to anchor the wedge.



Whale Tail Open Pit

Observations - Phase 2 Southwest Wall

- Interim wall approximately within Design Sector I1. Also referred to as Phase 2 South (I1).
- The wall is generally performing well.
- The Phase 3 pushback is in progress above this wall. Spillover represents a rockfall hazard for traffic on the ramp. A rockfall berm has been constructed on the inside of the upper ramp, where rockfall has occurred (outlined in white below). The berm had limited capacity remaining at the time of the visit. The berm should be cleaned out and extended along the full length of the ramp below the pushback. The berm should be inspected and cleaned periodically.



Whale Tail Open Pit

Observations - Phase 3 Pushback

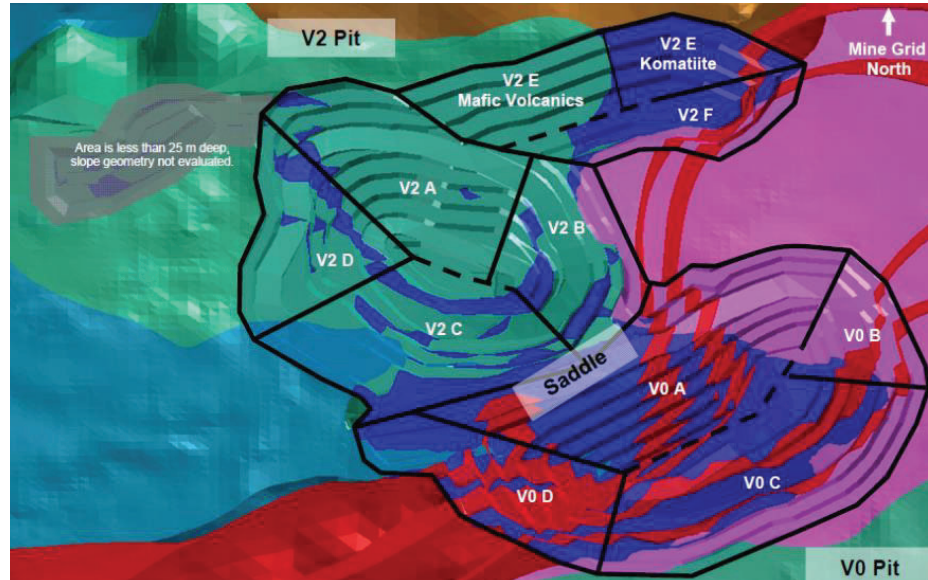
- Temporary wall within the Phase 3 Pushback. Approximately corresponds to Design Sectors H6 and I6.
- The wall was established without pre-shear, as is standard practice for temporary walls. As a result, the condition of the face and crest is poor, and a rockfall hazard exists.
- Due to the pushback geometry, the working area is limited in places. A vehicle was observed parked at the toe of the bench. This is not consistent with the site's Work Close to Pit Wall procedure. The vehicle was moved. A berm should be constructed below the wall to prevent access and retain any rockfall.

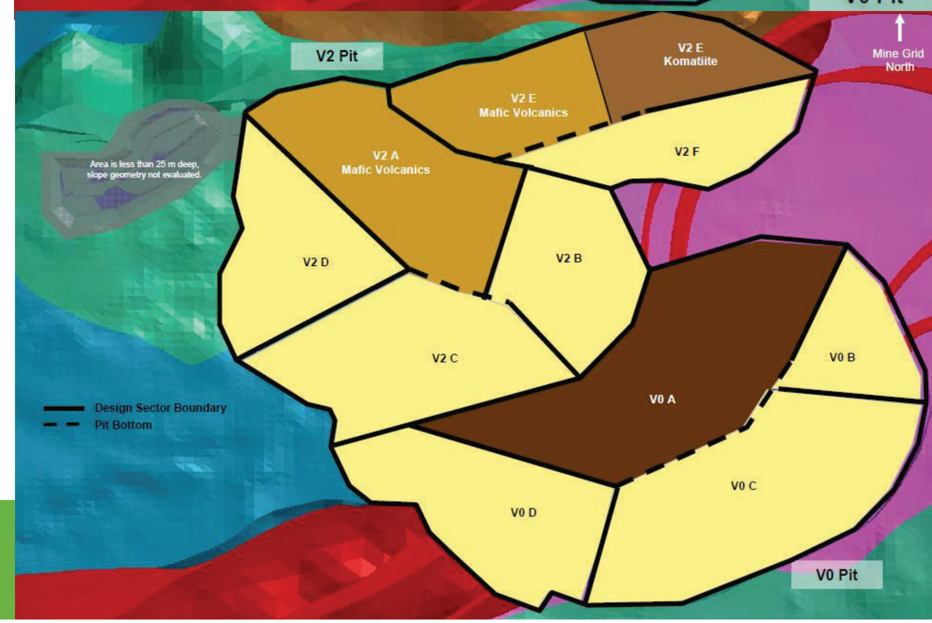
IVR V1 OPEN PIT

IVR V1 Open Pit

Overview

- The IVR-001-004C design for the IVR V1 and V2 open pits is shown at right for reference. Note that the V1 open pit was previously referred to as the V0 open pit and most design documents issued by KP refer to it as such.
- An updated design, IVR-001-006C, has been developed for the V1 open pit and is shown on the next slide.
- The Structural Domains (which control the achievable slope geometry in many cases) are shown at upper right along with the lithologies expected in the final open pit walls.
- The design sectors and the Feasibility Study slope geometry recommendations are shown at lower right.





LEGEND:

- GREYWACKE (S3)
- CHERT (S10, S10E, S10mSi & S10sSi)
- KOMATIITE-0a - NORTH LIMB (V4-0a & V4Bio)
- KOMATIITE-0b - SOUTH LIMB (V4-0b & V4Bio)
- MAFIC VOLCANICS (V3 & I3A)
- BRITTLE STRUCTURES

Base Bench Geometry

BFA: 75°
Bench Width: 10.5 m
Bench Height: 21 m
IRA: 52°

Bench Geometry Controlled by Bench-Scale Failures

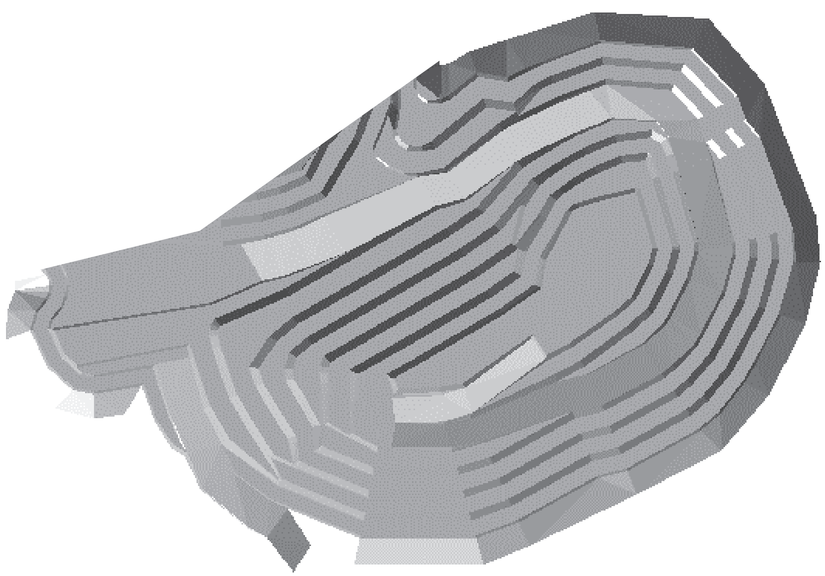
V2 A & V2 E
BFA: 75°
Bench Width: 10 m
Bench Height: 14 m
IRA: 46°

V2 E
BFA: 50°
Bench Width: 8 m
Bench Height: 14 m
IRA: 35°

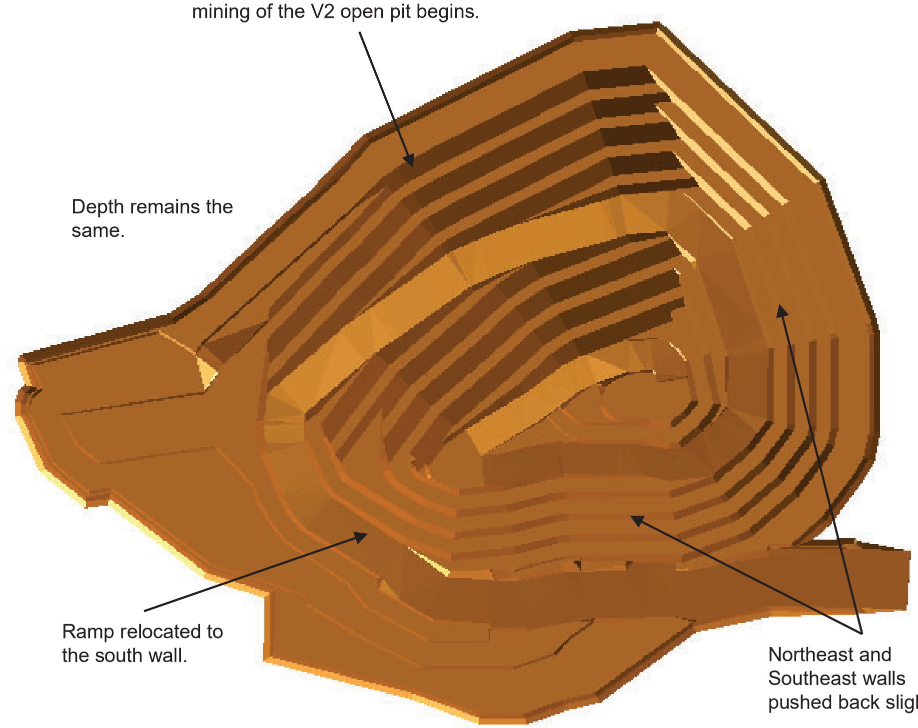
V0 A
BFA: 45°
Bench Width: 8 m
Bench Height: 14 m
IRA: 32°

IVR V1 Open Pit

Design Comparison



Design IVR-001-04C



Design IVR-001-06C

IVR V1 Open Pit

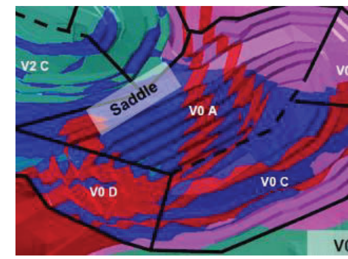
General

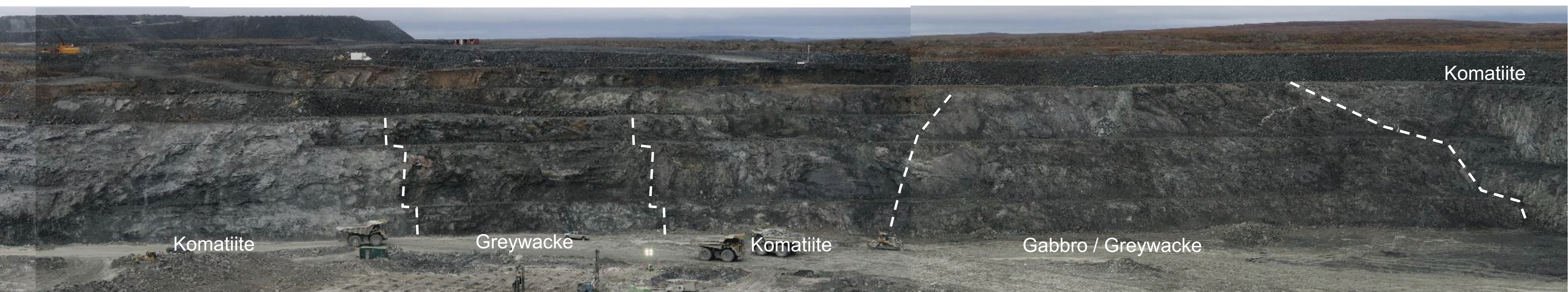
- The IVR V1 open pit was inspected on September 15 and 16, 2021. Observations made during the inspection are summarized on the following slides.
- The approximate current pit geometry is shown at right. The walls inspected are labelled relative to mine north.

IVR V1 Open Pit

Observations - Northwest Wall

- Final wall in Design Sector V0A. This sector encompasses the footwall of the deposit. The slope geometry was expected to be controlled by the potential for bench and inter-ramp scale planar failures on the foliation (Joint Set A).
- The bench design consists of a 45° bench face angle, 8 m bench width and a 14 m bench height (7 m benches in a double-bench configuration). Due to the shallow bench face angle, the bench faces are established with staggered blast holes (“stab” holes) rather than angled pre-shear holes in the final walls.
- While the initial benches broke to the foliation, the remainder have not performed as expected. This is discussed further on the following slide.
- The slope was expected to be established in the Komatiite and to be intersected by numerous brittle structures. However, mapping by Geology has identified intervals of Greywacke and Gabbro in the slope. These units are more competent.



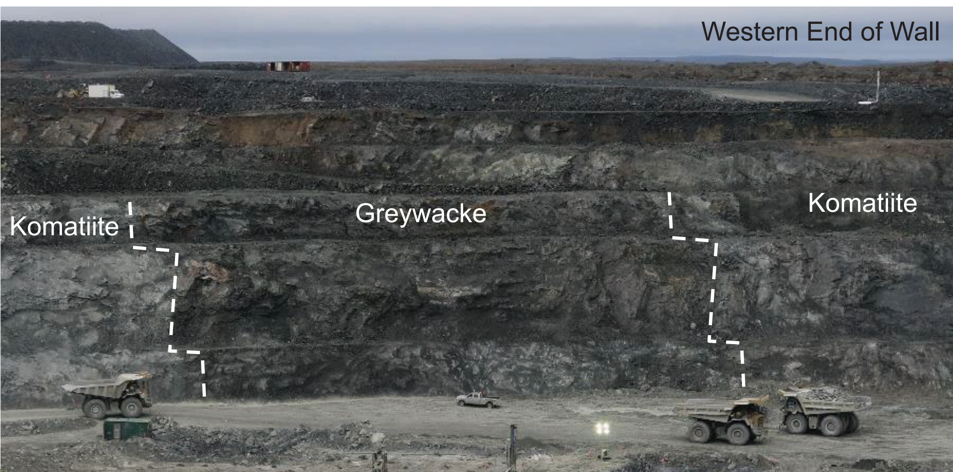


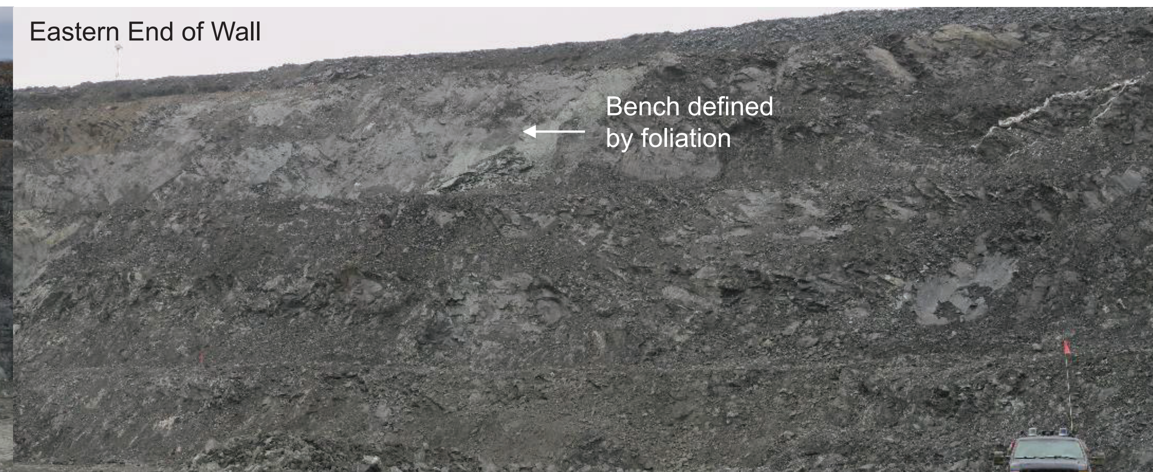
IVR V1 Open Pit

Observations - Northwest Wall (Cont'd)

The performance of the Northwest Wall varies significantly along the wall. Observations suggests that this is linked to:

- **Lithology:** Bench faces steeper than the dip of the foliation have been achieved in an interval of Greywacke at the western end of the wall. The Greywacke is more competent than the Komatiite and is associated with increased discontinuity shear strength.
- **Foliation Orientation:** The foliation was expected to be parallel to the wall. Where this has occurred (e.g., the upper benches at the eastern end of the wall), the foliation has typically defined the bench face. However, the strike of the foliation was observed to vary by at least 60° along the wall. Where the foliation is not parallel to the wall, the staggered blastholes induce significant damage to the rock mass, resulting in back break and an irregular bench geometry.
- **Drilling and Blasting:** Discussions with the Drill & Blast Engineer suggested that the depth of the blast holes is poorly controlled and over-drilling is a common problem. Poor depth control will strongly influence the effectiveness of the staggered blastholes used to establish these benches.





IVR V1 Open Pit

Observations - Northeast Wall (Cont'd)

- A revised bench design will be trialled for this sector, incorporating a bench face established at 55° with pre-shear holes. The bench width will be increased to 12 m in order to maintain the design inter-ramp angle. Given the performance of the benches established with staggered blast holes, this approach is endorsed.
- The encountered rock mass characteristics and their impact on the slope performance should be reviewed in greater detail in this sector in order to validate the change in bench design. Recommend documenting the lithology, rock mass structure, and bench performance at regular intervals along the Northeast Wall in order to support the review.
- It was noted that the upper two to three benches will be mined out when mining of the adjacent IVR V2 open pit begins.
- The reduced catch bench capacity and poor condition of the bench faces represent a rockfall hazard (as shown in the photo on the right). A rockfall berm should be constructed at the toe of the slope, along the ramp.

IVR V1 Open Pit

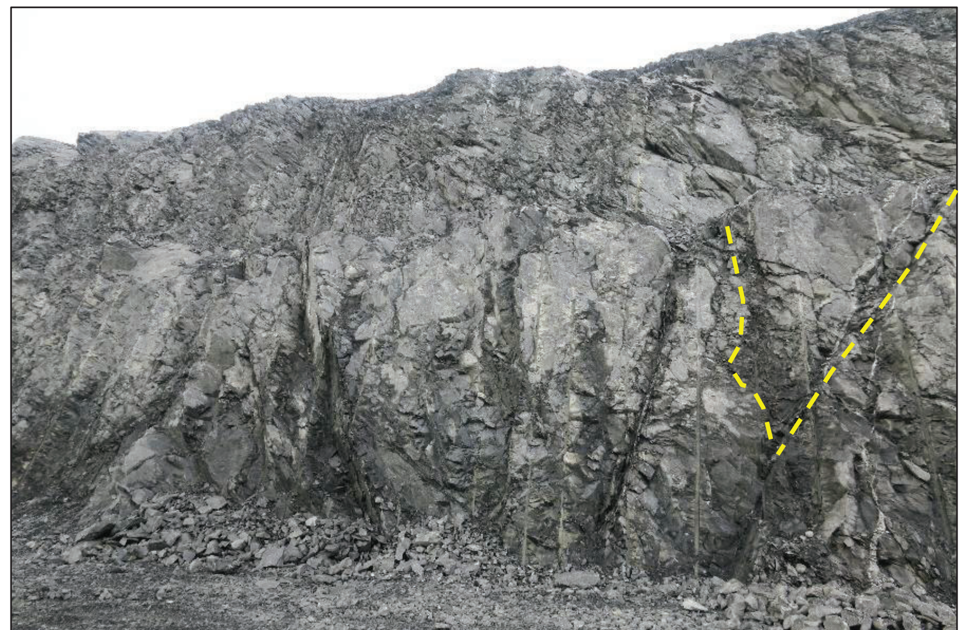
Observations - Northeast Wall

- Final wall in Design Sector V0B.
- In general, the wall is performing well. The foliation is oriented perpendicular to the wall.
- However, cross-cutting structures have resulted in numerous small wedges and it is understood that significant scaling was required when the benches were established. It is expected that the benches will ravel over time. At the time of the inspection, very little material was observed on the catch benches.
- Several potential wedges were observed and are described on the following slide.

IVR V1 Open Pit

Observations - Northeast Wall (Cont'd)

- Several potential wedges were observed (examples are shown below). Recommend attempting to scale these wedges to eliminate the potential hazard.
- The wedges appear to be forming on persistent, planar, and relatively widely spaced cross-cutting features (the right hand structure in the examples below). Recommend mapping these structures so that potential wedges on future benches can be anticipated.



IVR V1 Open Pit

Observations - Southeast Wall

- Final wall in Design Sector V0C.
- In general the wall is performing well.
- The persistent cross-cutting features that were associated with the potential wedges in the Northeast Wall are also present in this sector and have locally controlled the achieved bench geometry (examples circled below). These structures were not prominent in the discontinuity orientation data used to design the open pit. The structures should be mapped and their potential impact on the slope performance reviewed.

IVR V1 Open Pit
Observations - Southwest Wall

- Final wall in Design Sector V0D.
- The wall is generally performing well. While the benches are primarily within the Komatiite and Brittle Structures, the wall is oriented perpendicular to the foliation.

AP5

AP5
Observations

- Attenuation Pond 5 is located to the east of the WHL open pit and was inspected on September 17, 2021.
- The pond is partially flooded, with one to two benches exposed above the pond water level. As a result, a detailed inspection could not be completed.
- No stability concerns were identified in the exposed slopes.
- The pumps and pipelines have been removed from the pond.
- The pond is not currently being used and access to the ramp and the pond is not restricted. It is understood that water management infrastructure will be installed in the future. Recommend placing pylons at the top of the ramp to restrict access while it is not being used.

Monitoring and Inspections

Monitoring and Inspections

General

- The slope monitoring program at the mine currently consists of the following primary components:
  - Observations and Ground Control Log Book entries from mine personnel
  - Visual Inspections
    - Routine and special geotechnical inspections
    - Official wall inspections
    - Bench approvals
    - Drone surveys
  - Slope Stability Radar (SSR) monitoring
  - Instrumentation
- Note that instrumentation is not currently used, though vibrating wire piezometers and thermistors were installed in the past and additional instruments are planned in the future.

Slope Monitoring

Visual Inspections

- The frequency of each visual inspection, the person responsible and the communication of the results of the inspection are defined in the GCMP (at right).
- In addition to the inspections noted at right, the mine also implements a bench approval procedure.
- The routine and special visual inspections are documented with photos and summarized in emails. They focus on specific identified or reported hazards.
- The official wall inspections are completed by a multi-disciplinary group and consider all of the open pit walls rather than specific hazards. The inspections are documented with photos and in a formal report.
- Identified hazards are discussed, a risk rating assigned, and mitigation measures agreed upon.

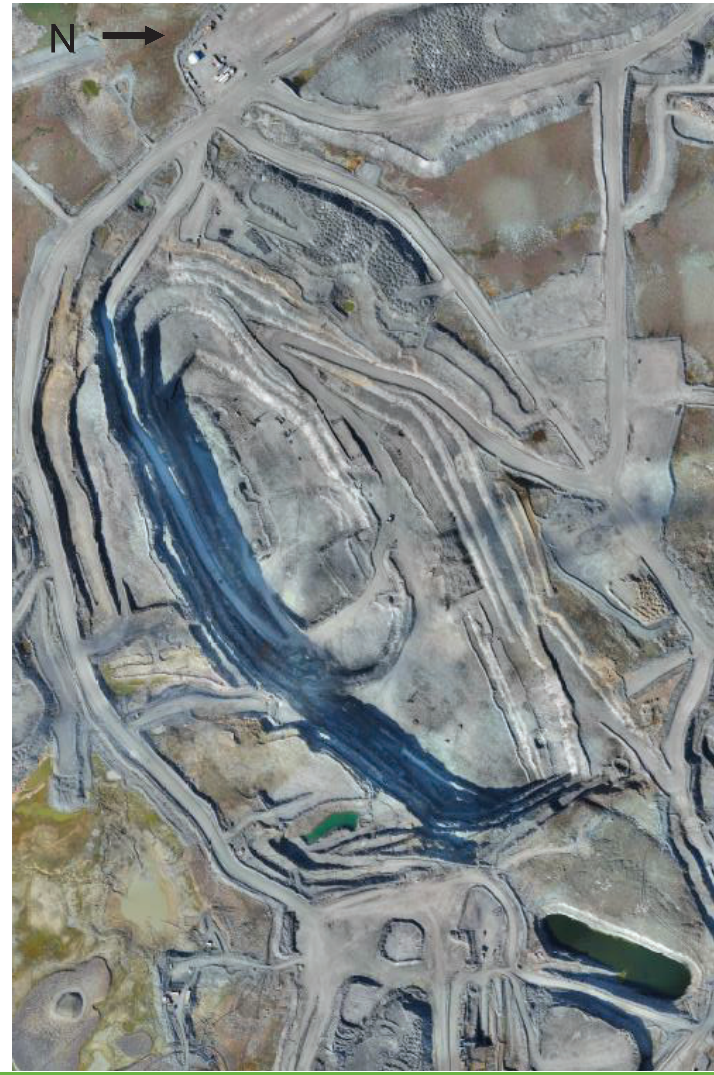
Table 5-5: Summary of Inspection Program

Structure	Responsible	Type	Frequency	Reporting	Distribution List
Whale Tail pit and IVR pit	Geotechnical Engineer or Technician	Routine visual inspection	1 x 2 days	Email highlighting the main observation and conclusions	Meadowbank Mine Operation Supervisors
		Official wall inspection	Biweekly	Wall inspection map and report	Surveyors, Grade control, Mine Ops, E&I, Environment, Mine inspector, Geology team
		Special visualization inspection	After each of these events: •New potential geotechnical hazard was identified by personnel working in the open pit and/or reported in the ground control book. • Rockfall (in area of event) •Earthquake	Ground control book and email highlighting the main observation and conclusions	Meadowbank Mine Operation Supervisors, Geotechnical coordinator
	Geotechnical Engineer and third-party reviewer	Annual pit slope performance	Once per year	Annual pit slope performance review	Geotechnical Team, Mine inspector, Regulators
	Geotechnical Engineer and Mine inspector expert	Mine inspector geotechnical inspection	Once per year	Whale Tail Project Mine Inspector review	Mine manager

Slope Monitoring

Visual Inspections - Drone Surveys

- Site-wide drone surveys are completed by the Survey department approximately once a month from May to September.
- The GCMP includes a commitment to also use the drone to examine the catch benches and known geotechnical hazards but it is understood that this is not currently done.
- Several areas were identified during the site visit that could benefit from drone inspections (e.g., block at the crest of the slope in Design Sector E4).
- A new drone has been obtained which will allow increased use during winter.



Monitoring and Inspections

Visual Inspections - Comments

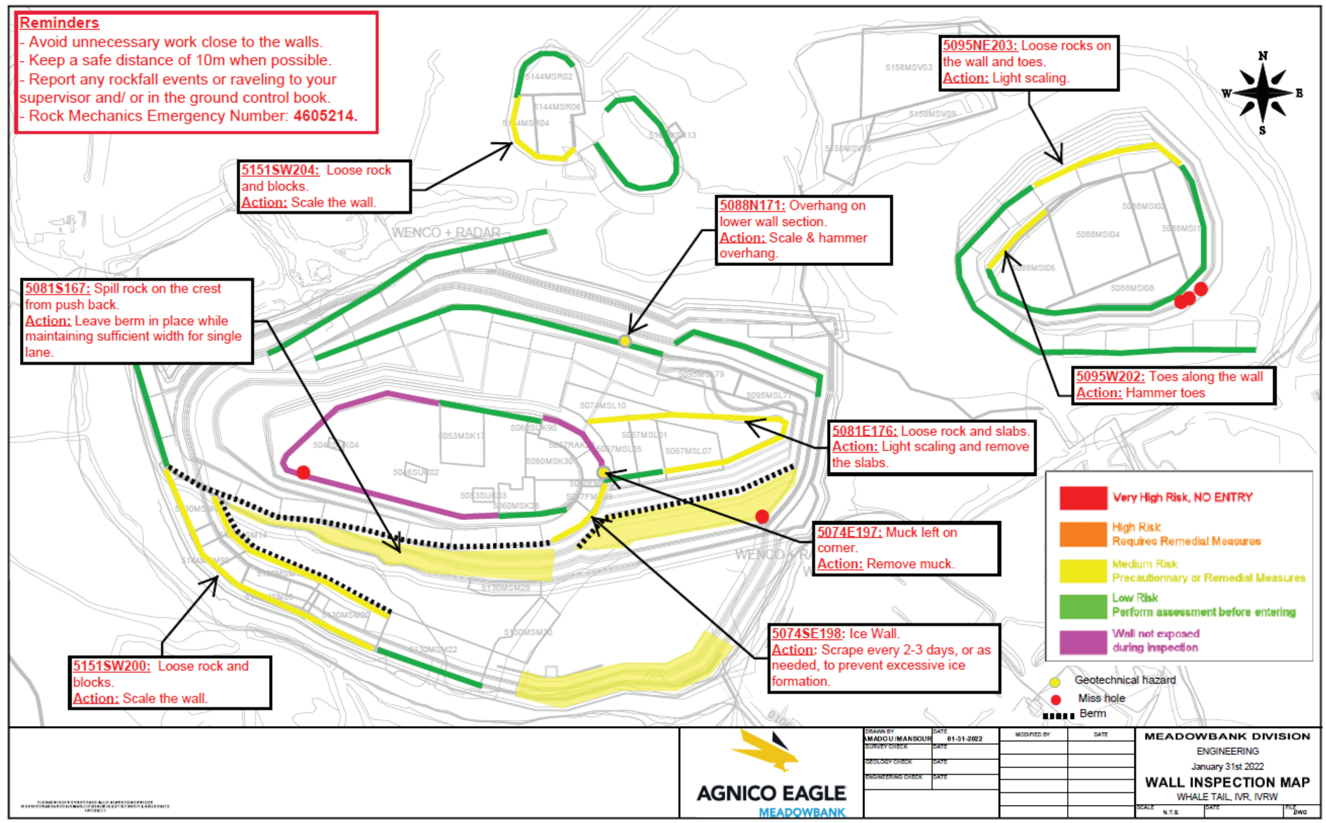
- A selection of the inspection reports were reviewed and the following discussed:
  - The wall inspection reports rightfully focus on the identified hazards. Recommend also compiling a series of overview photos (e.g., of each major wall) and comments to generate a record of wall performance over time. This can be invaluable for back-analysis.
  - While there are frequent visual inspections, there should be a formal mechanism (e.g., TARP) in place to increase the frequency of inspections in the event that an instability is observed or, for example, particular deformation limits are observed.
  - Recommend incorporating a periodic inspection of the open pit crest for evidence of instability (e.g., above D4K). As a starting point, this could be completed monthly.

- The drone inspection commitment in the GCMP should be reviewed and aligned with current needs and capabilities. For example:
  - Biannual (e.g., at start and end of summer) or quarterly review of catch bench condition / performance.
  - Targeted monthly inspections of specific hazards, with the frequency to be adjusted based on a TARP.

Monitoring and Inspections

Hazard / Risk Assessment

- Identified hazards and the required mitigation work are tracked on a Hazard Map available to the workforce. The map is an effective tool.
- The maps also form the basis for the risk-based wall approach procedure, which is a key process used at the mine to manage geotechnical risk.
- Inconsistency in the assigning of risk ratings has been noted between different staff. There is currently limited guidance on how to select the risk ratings. Recommend providing detailed guidance, including examples, on how to determine these ratings.



Monitoring and Inspections

Hazard and Action Item Tracking

- Hazards, the associated risk rating, and any required corrective actions are tracked in a database. An example from the database is shown below.
- A due date to complete the corrective actions is specified. However, overdue items are not flagged. Recommend setting up a mechanism within the database to flag overdue hazards so that they aren't overlooked.
- The date the corrective action is completed and the person who verified completion is tracked. These are good practices.

Date	ID	Pit/Quarry	Bench	Mine Northing (center)	Mine Easting (center)	Lateral Extent of zone (m)	Final Wall	Scale
02/08/2020	5123NW64	Whale Tail	5123	7357	14438	120	Yes	7m
02/08/2020	5123NW65	Whale Tail	5130	7430	14565	5	Yes	7m
02/08/2020	5123NE66	Whale Tail	5137	7355	15183	20	Yes	7-14m
02/08/2020	5144EE67	Whale Tail	5144	7150	15281	5	Yes	5m

GEOTECHNICAL HAZARD MAP FOR AMARUQ WHALE TAIL DEPOSIT

Geotechnical Hazard	Corrective Measure	Due date	Completed (Yes/No)	ate complete	pproved b	Status
Loose rocks on the face	Scale the wall and clean material left at the toe	Before drilling 5116MSW11	Yes	8/1/2020	VD	4
Thermal capping and material on the edge of the crest	Install a small berm to catch any debris	8/20/2020	Yes	9/4/2020	VD	4
Sand and loose rock on the face and upper corner	Sacle the wall and remove loose material	8/31/2020	Yes	8/18/2020	LC	4
Protruding block	Blast the blcok and scale the wall after	8/20/2020	Yes	8/27/2020	VD	4

Monitoring and Inspections

Bench Approval Process

- The rock mechanics group has implemented an approval process for the benches on the final walls (both ultimate pit and interim stages).
- The condition of the bench and whether or not the face has been adequately scaled is assessed. The process is intended to be completed after each 7 m bench is established and before work resumes in the area. A standard two-page report is issued each time.
- This process is a key control for managing potential rockfalls and bench-scale instabilities. While it appears to be well established, it is largely informal; a procedure has not been developed and a formal commitment to the process has not been made. Recommend formalizing the commitment to complete the process for all final walls.
- Recommend developing a checklist and/or procedure for the bench approvals to ensure consistency.
- It is understood that benches are occasionally missed and not approved. Recommend developing a simple tracking method (e.g. coloured lines on a plan) for the approvals to reduce the likelihood of this occurring.

AGNICO EAGLE
AMARUQ

PIT WALL APPROVAL

Prior to the stake out and drilling process

DRILL PATTERN: 5151MSV01 (IVR 2)

SUBMITTED BY: Daniel Serrano DATE: 2022-02-13

WALL CORRECTIVE MEASURE

ID	DESCRIPTION	DATE	INITIALS
1	West wall of 5151MSV01 pattern needs to be scaled.	2022-02-12	DS
2			

PIT SUPERVISOR/AUXILIARY SUPERVISOR/DRILL AND BLAST SUPERVISOR

ID	COMMENT	DATE	INITIALS
1			
2			

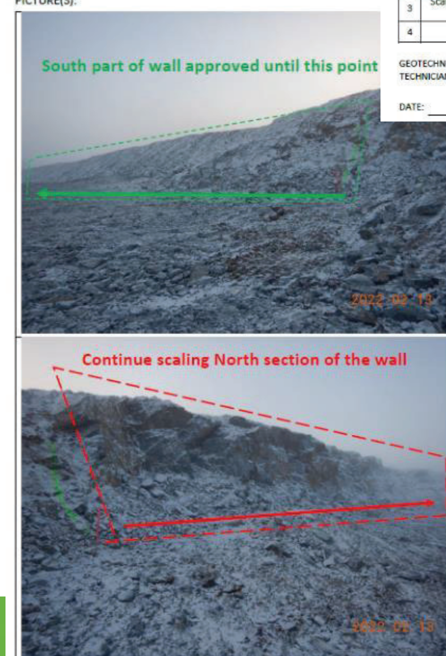
GEOTECHICAL ENGINEER/TECHNICIAN

ID	COMMENT	DATE	INITIALS
1	South part of the West wall of pattern 5151MSV01 has been scaled.	2022-02-13	DS
2	South part of the West wall of pattern 5151MSV01 is approved until purple stake/ green mark on wall.	2022-02-13	DS
3	Scaling of the North part of the West wall of pattern 5151MSV01 is to be completed for full wall approval.	2022-02-13	DS
4			

GEOTECHNIAL ENGINEER / TECHNICIAN APPROVAL: Daniel Serrano

DATE: 2022-02-13

PICTURE(S):



Monitoring and Inspections

SSR - General

- The mine has two GroundProbe SSR-XT real aperture radars. One radar covers the north wall while the other radar covers the south wall (see image at right).
- There is a procedure setting out responsibilities and how the SSR data are communicated. The radar data are reviewed at least twice a day and whenever alarms are triggered. The process followed when an alarm is triggered is defined in a TARP, shown at lower right.
- The TARP describes Orange (contact rock mechanics) and Red (evacuate) alarms, but in practice only Orange alarms are used in order to provide the rock mechanics group greater flexibility in determining a response.
- Someone from Rock Mechanics is designated as being on-call and has a pager in the event that they cannot be immediately reached or it is night shift.

RADAR ALARM

EXAMPLE	SIGNIFICATION	DISPATCHER'S ACTIONS
GREY	System or equipment problem	-> Do NOT stop operation -> Contact Geotech on the appropriate number display on the message
ORANGE	Wall movement or noise LOW risk	-> Do NOT stop operation -> Contact Geotech on the appropriate number display on the message
RED	Wall movement or noise HIGH risk	-> STOP operation in the area -> EVACUATE area -> Contact Geotech on the appropriate number display on the message

Monitoring and Inspections

SSR Monitoring - Alarms

- The current Orange alarm thresholds are as follows:
  - Velocity exceeding 1.3 mm/hr with a calculation period of 180 minutes
  - 4 contiguous pixels over 2 consecutive scans
- The alarms are adjusted on an informal basis in response to observed conditions. For example, a lower deformation threshold may be used for an area of concern at a low angle of incidence. Additional parameters (e.g., coherence, inverse velocity) are used to interpret the observed movement on a case-by-case basis but are not incorporated into the alarms.
- The SSR was involved in the forecasting of approximately 50% of the slope failures that have occurred to date. As expected, the system was more likely to identify larger events representing approximately 85% of the total tonnes. However, whether or not an alarm was triggered is not consistently tracked.
- The alarm parameters were reviewed internally in September to evaluate whether different alarms would have triggered for the slope failures that had occurred in 2021. The alarm triggers were revised after the review. This is an excellent practice.
- It is important to note that the ability of the SSR to reliably detect brittle bench-scale failures with sufficient time to respond (and without producing an excessive number of false alarms) is limited. This is consistent with the results of the review, which suggest that the revised alarm parameters would likely not have triggered or would have provided less than a one hour warning for 10 of the 14 failures. However, the SSR can still provide valuable insight on the behaviour of the slopes.

Monitoring and Inspections

SSR Monitoring - Comments

- SSR is best suited to larger-scale failures and is less effective at identifying the brittle bench-scale failures that have been the primary type of instability to date in the Whale Tail Pit. Care must be taken to avoid over-reliance on the radar and a resulting sense of complacency. The Rock Mechanics group is aware of this limitation.
- One possibility for potentially improving the ability of the SSR to predict the bench scale failures is to use one of the radar units tactically and position it closer to the working area to reduce the pixel size and scan times. Alternatively an additional mobile radar unit could be procured. There may also be an opportunity to use thermal monitoring or rockfall radars as a supplement or alternative. A risk-based review of the management of rockfall is recommend to help with the selection of the appropriate tool.
- The current strategy of using Orange Alarms and adjusting the alarm parameters on a case-by-case basis relies on an experienced operator who is familiar with the historical slope performance and is comfortable interpreting the data. With the recent addition of new staff, recommend developing guidance for this process. It is understood that a draft memo is in progress. As part of this process, recommend revisiting the current “default” alarm parameters in light of the results of the back analysis.
- As the open pit gets deeper and the potential for multi-bench failures increases, it is expected that Red Alarms will need to be developed for some areas in order to manage the associated risk.
- Given the expected need to relocate the south radar repeatedly over the next year, recommend reviewing the mine plan from the perspective of radar coverage and placement.
- The radar is the sole quantitative method for measuring surface displacement at the mine and the measured displacements are only along a vector between the radar and the pit wall. An additional surface monitoring system is recommended and is discussed on the next slide.

Monitoring and Inspections

Instrumentation

- There are currently no geotechnical or hydrogeological instruments being actively monitored in or around the open pit. It is understood that the mine has started to plan for additional instrumentation in the open pit.
- An additional surface monitoring system is recommended, such as prisms or GPS beacons, to complement the SSR and to also allow the true displacement vector to be measured. It is acknowledged that the mine has had challenges with prisms in the past but it may be possible to benefit from the knowledge gained at other operations (e.g., Diavik).
- The current monitoring system only captures surface deformation and any sub-surface movement is inferred. Instruments such as TDRs or Inclinometers provide sub-surface data that can be used to better define deeper-seated instabilities. The installation of these instruments is recommended in the sectors with a greater potential for larger-scale slope instabilities (e.g., design sector D4K).
- Vibrating Wire Piezometers (VWPs) and thermistors are planned for the South Wall talik to allow the effectiveness of the water management system to be measured. This is endorsed.
- VWPs and thermistors have been discussed for the talik in the approx. four upper benches of the Northeast Wall to better understand the potential impact of surface water infiltration on the bench performance. This is endorsed. A similar approach could be used on the Northwest Wall, but the slope has performed well to date and the observed seepage has been largely limited to contacts.
- Note that the GCMP includes discussion of several instruments not used at Amaruq. Recommend removing them from the GCMP.

Ground Control Program

Ground Control Program

General

Comments on the following aspects of the ground control program for the open pit are provided on the following slides:

- Mine Design Input and Review
- Data Collection and Design Verification
- Resources and Training
- Ground Control Management Plan (GCMP)

Ground Control Program

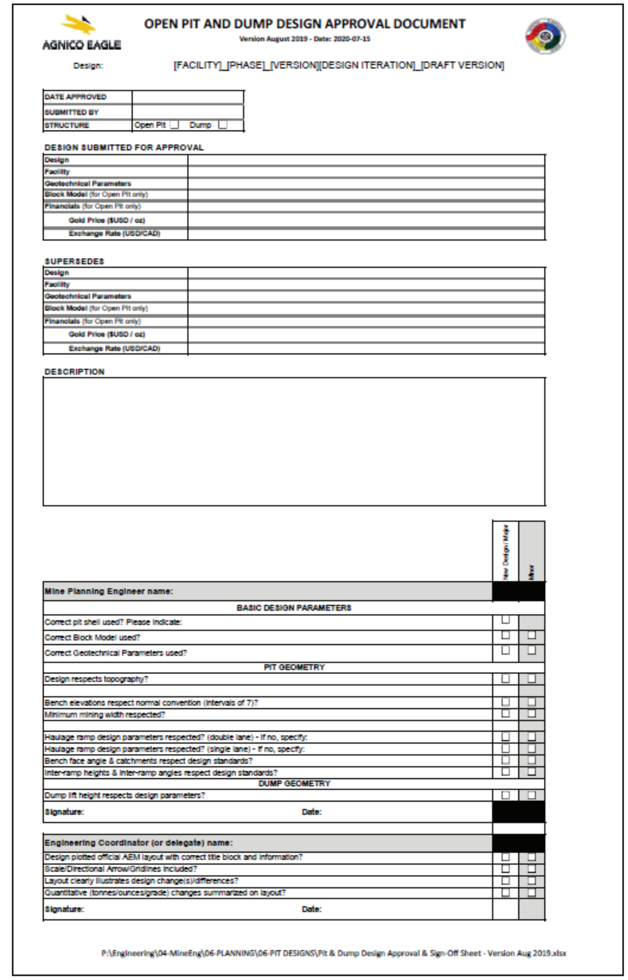
Mine Design Input and Review

- Regular review of, and feedback on, interim designs by the rock mechanics team is important as it allows early recognition and possible mitigation of potential slope instabilities or geomechanical hazards. Ground control factors requiring consideration include:
  - The structural domain(s) involved, including the presence of adverse structure and whether the conditions deviate from expectations.
  - The rock mass quality domains involved, including the presence of weak units (Komatiite and overburden) and whether the conditions deviate from expectations.
  - Whether the proposed design is consistent with the slope geometry recommendations (bench scale and inter-ramp scale).
  - Whether the slope geometry recommendations are applicable (e.g., is the orientation of the dominant structure relative to the orientation of the wall consistent with the analyses underlying the slope geometry recommendations). Is a specific analysis required (by the mine or a consultant)?
  - Possible interactions with faults and brittle structures (e.g. will a fault intersect or lie directly behind the slope).
  - Possible interactions with existing or predicted slope instabilities.
  - Possible interactions with talik or surface water (e.g. the formation of an ice wall or potential for significant inflows)
  - The creation of adverse slope geometry (e.g. a nose).
  - Potential impacts on nearby infrastructure (e.g. ramp, roads at pit crest, attenuation pond, etc.).
  - Is instrumentation or a specific monitoring plan required?

Ground Control Program

Mine Design Input and Review

- The rock mechanics team provides input to mine design and planning process as follows:
  - **Bench Layouts and Bench Master -** Drill polygons / layouts are reviewed by the rock mechanics team as part of the sign-off process.
  - **Weekly Mine Planning Meeting -** Attended by a member of the rock mechanics team. The mine plan for the next two weeks is discussed and any geomechanical considerations identified.
  - **Four Month Rolling Mine Plan (4MR) -** The rock mechanics team provides input to the 4MR as part of the mine planning meetings. Comments are understood to be documented in meeting minutes, though a recent example was not available at the time of the review. Recommend formalizing input to the 4MR – for example in the discussion of geomechanical risks and opportunities.
  - **Budget Mine Plan -** The rock mechanics team reviews the mine plan and key geomechanical considerations are summarized on a slide. However, the review itself is not formally documented. Recommend documenting the review in greater detail, even if the document remains internal to the team.
- The “Open Pit and Dump Design Approval Document” is used to track sign-off, including from the rock mechanics team, on major changes to the open pit design. This is a good practice.
- The rock mechanics team has a good working relationship with the planners and geologists.


AGNICO EAGLE
OPEN PIT AND DUMP DESIGN APPROVAL DOCUMENT
Version August 2019 - Date: 2020-07-15
Design: [FACILITY]_[PHASE]_[VERSION][DESIGN ITERATION]_[DRAFT VERSION]

DATE APPROVED
SUBMITTED BY
STRUCTURE: Open Pit ☐ Dump ☐

DESIGN SUBMITTED FOR APPROVAL
Design
Facility
Geotechnical Parameters
Block Model (for Open Pit only)
Financials (for Open Pit only)
Gold Price ($USD / oz)
Exchange Rate (USD/CAD)

SUPERSEDES
Design
Facility
Geotechnical Parameters
Block Model (for Open Pit only)
Financials (for Open Pit only)
Gold Price ($USD / oz)
Exchange Rate (USD/CAD)

DESCRIPTION

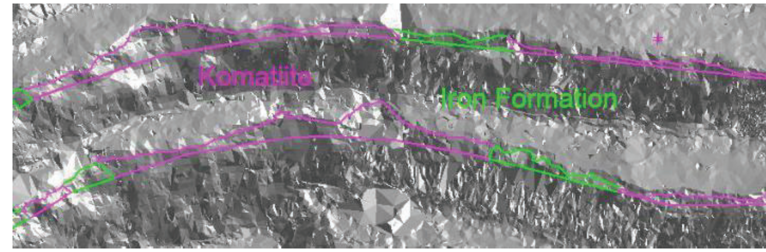
Mine Planning Engineer name:
BASIC DESIGN PARAMETERS
Correct pit shell used? Please indicate:
Correct Block Model used?
Correct Geotechnical Parameters used?
PIT GEOMETRY
Design respects topography?
Bench elevations respect normal convention (intervals of 7)?
Minimum mining width respected?
Haulage ramp design parameters respected? (double lane) - If no, specify:
Haulage ramp design parameters respected? (single lane) - If no, specify:
Bench face angle & catchments respect design standards?
Inter-ramp heights & inter-ramp angles respect design standards?
DUMP GEOMETRY
Dump lift height respects design parameters?
Signature: Date:

Engineering Coordinator (or delegate) name:
Design plotted official AEM layout with correct title block and information?
Scale/Directional Arrow/Gridlines included?
Layout clearly illustrates design change(s)/differences?
Quantitative (tonnes/ounces/grade) changes summarized on layout?
Signature: Date:

P:\Engineering\04-MineEng\06-PLANNING\06-PIT DESIGNS\Pit & Dump Design Approval & Sign-Off Sheet - Version Aug 2019.xlsx

Ground Control Program

Data Collection and Design Verification



The mine collects information to support design verification and reconciliation. These efforts can be broadly grouped into two categories.

- Rock Mass Characterization
  - Structural and rock mass quality mapping are to be completed for at least one location every 150 m of the final walls.
  - Maptek LiDAR scans are to be completed for all benches on the final walls.
- Slope Performance
  - Bench backbreak is measured using Maptek scans on a periodic basis.
  - Rockfalls are tracked in a database as they occur.

Comments on the these activities are provided below.

- The mine puts considerable effort into data collection and the data have been valuable for design studies.
- The collected data are valuable but without periodic compilation their utility is limited. The mine has committed to producing a report every four months that summarizes the slope performance, the monitoring, instrumentation, and rock mass characterization data collected over the reporting period. The intent is to allow for a periodic review of the slope performance and to identify deviations (or opportunities) that need to be addressed and may not be apparent in day-to-day observations. These reports have not been completed to date and should be completed as planned.
- It is difficult to assess compliance with the commitments in the GCMP. For example, 39 locations were mapped in 2021 but it is not clear whether this meets the required frequency. Recommend tracking activities relative to the various commitments to ensure compliance.
- The rockfall database was reviewed in detail as part of the WHL open pit design verification review. As an outcome of that review, it is recommended that the mine consistently record all parameters where possible (e.g., whether a rockfall triggered a radar alarm).

Ground Control Program

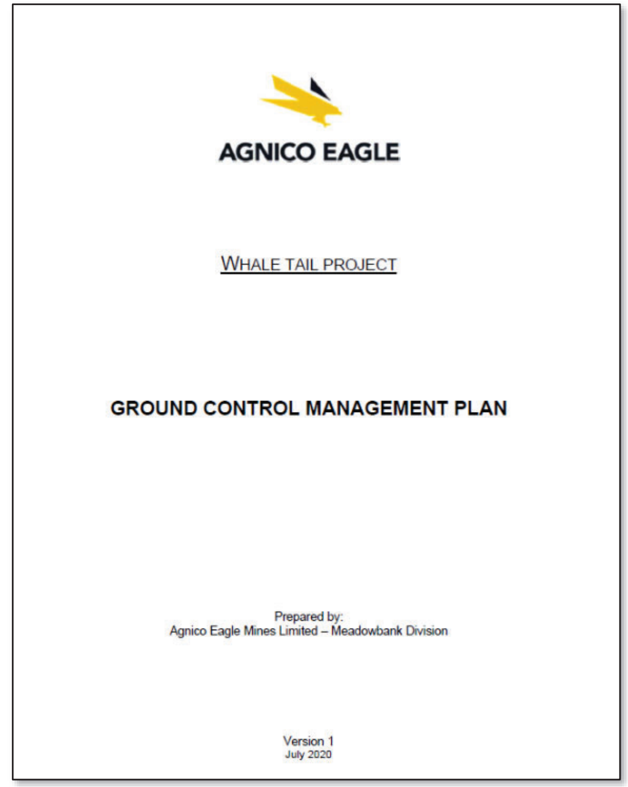
Resources and Training

- The rock mechanics team typically has three engineers or technicians on site at any given time. These staff are responsible for both of the open pits as well as the exploration decline. The planned start of underground mining will impose additional demands on the team. This will require careful coordination of the available rock mechanics resources.
- The team has many competing claims on its time and resources. There is a tendency for staff to focus on their personal areas of strength as a consequence. Recommend clearly defining roles and responsibilities both so that commitments are not missed and so that staff can focus on the areas where they provide greatest benefit. For example, the engineers need to be freed up from routine inspections so that they can take on a greater design and review role. Consider tracking the time staff spend on individual tasks.
- The team has added three new members over the last year. This will require an emphasis on training while staff become familiar with the site. Consider developing a skills matrix to help identify training needs.
- Consider developing a monthly dashboard report summarizing key statistics (e.g., inspections performed vs commitment) and providing a brief overview of key hazards. The intent is to demonstrate the work completed by the team and to demonstrate compliance with the commitments in the GCMP. This will also help demonstrate whether additional resources are required to meet the commitments.
- The mine has a full suite of Rocscience software (DIPS, RocPlane, Swedge, RocFall, Slide, RS2). The rock mechanics team also has access to Leapfrog, Maptek, and Pix4D. In particular, the team makes effective use of Leapfrog and Maptek to track and visualize observations and geomechanical data. This is endorsed.

Ground Control Program

GCMP

- The GCMP is a clear concise document. The following observations and recommendations are provided:
  - Consider adding a one-page overview of the deposit geology and mine plan, including key information such as the ultimate pit dimensions, approximate mine life, major lithologies, etc.
  - (5.2.1.3) - Review and revise the commitments for drone monitoring so that they are focussed and achievable.
  - (5.3.2) Clarify that the collected data should be compared to the design basis for the open pit in addition to looking for trends.
  - (5.4.1) Note that crack meters and extensometers have not been installed and clarify that vibrating wire piezometers and thermistors are not currently being monitored. A plan with the location of the instrumentation should be included or referenced.
  - (5.5) Reference a register that tracks who has received what geomechanical training.
  - (8) Provide greater clarity and detail on the input the team provides to the mine planning and approval process. For example, the input to the Bench Master and 4MR.
  - Describe and include a commitment to the bench approval process.
- The GCMP was last updated in July 2020. The GCMP should be reviewed and updated annually.


AGNICO EAGLE

WHALE TAIL PROJECT

GROUND CONTROL MANAGEMENT PLAN

Prepared by:
Agnico Eagle Mines Limited – Meadowbank Division

Version 1
July 2020


THANK
YOU