Appendix 9

Whale Tail 2023 Annual Open Pit Geomechanical Inspection

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Management System Certified By: bsi ISO 9001 Quality Management Systems CERTIFIED FS 64925 ISO 14001 Environmental Management CERTIFIED EMS 550121 ISO 45001 Occupational Health and Safety Management CERTIFIED OHS 550122

February 27, 2024

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Dear Christian,

RE: Meadowbank Complex - Amaruq Site - 2023 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 several open pits at the Whale Tail and IVR deposits, and an underground mine at the Whale Tail deposit. Knight Piésold Ltd. (KP) has been providing geomechanical support for the Amaruq Site since 2015 and has completed the annual third-party inspections for the open pits and underground mine since 2018.

Mr. Ben Peacock, P.Eng., completed the 2023 annual inspection of the open pits at the Amaruq Site between July 7 and 13, 2023 with Mr. Christian Tremblay (Rock Mechanics Coordinator) and Mr. Arron Haselhorst (Rock Mechanics Technician) of AEM. The results of the inspection are summarized in this letter and detailed in Appendix A. Key observations were reviewed with AEM in August 2023 and the recommendations were issued for AEM's review and comments in December, 2023.

2.0 2023 INSPECTION RESULTS

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 safety issues. Also includes recommendations for pro-active measures and design validation.
- **Priority 4 (P4) -** Opportunity for improvement, for example to meet industry best practices. Also includes recommendations relating to proper documentation.

The observations and associated recommendations were reviewed with AEM during the site visit. New findings as well as the status of findings from previous annual inspections are summarized in Table 1. Additional detail and context are provided in Appendix A.

3.0 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
2024-02-27
NT/NU

PERMIT TO PRACTICE
KNIGHT PIESOLD LTD.
Signature
Date 2024-02-27
PERMIT NUMBER: P 547
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

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

Attachments:

Table 1	Open Pit Geomechanical Inspection Recommendations Summary
Appendix A	Meadowbank Complex - Amaruq Site - 2023 Annual Open Pit Geomechanical Inspection

/bdp

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TABLE 1

AGNICO EAGLE MINES LIMITED
MEADOWBANK COMPLEX - AMARUQ SITE

2023 ANNUAL OPEN PIT GEOMECHANICAL INSPECTION
OPEN PIT GEOMECHANICAL INSPECTION RECOMMENDATIONS SUMMARY

Print Feb-27-24 11:08:57

Observations, Comment and Recommendations					
Category	**Topic**	**2022 Recommendations**	**2023 Status and Comments**	**2023 Recommendations**	**Priority**
Design	**Rock Mass Characterization**	Undertake structural mapping to: a) Define the northwest dipping joint set in the lower Phase 2 Southeast Wall of the Whale Tail open pit b) Better define the extents of Structural Domain 5 in the Whale Tail open pit c) Validate the Brittle Structure model	This work has not yet been completed. The original recommendations remain relevant. Key decisions are being made based on the Brittle / High Strain Structure model (e.g., Whale Tail open pit lower Northeast Wall redesign, tactical measures for the Whale Tail open pit Northwest Wall, design of the IVR V2 open pit North Wall etc.), increasing the importance of validating the model through mapping in the open pits and underground mine. While it is unrealistic to assume that all structures will agree with the model, it is expected that many of the major structures will be able to be identified consistently across the open pit slopes.	Complete the original recommendation, with a particular focus on validating the Brittle / High Strain Structure model. Key areas include Design Sector A1K, E4, D4K, and IVR V2A. If there are significant changes to the interpretation of the structures, the potential impact on the open pit slope performance and design should be assessed. Priority increased to P2.	**P2**
		Complete geomechanical mapping on a regular basis, consistent with the commitments in the GCMP. Mapping is particularly important in Q2 and Q3 when the bench faces are clear of snow. The mapping should focus on critical areas of the open pit, including Design Sectors D4K and F6 of the Whale Tail pit and V0A, V2A and V2E of the IVR pits.	The Rock Mechanics team commits to undertaking spot mapping every 150 m along each of the final benches. The mapping is not reliably completed; 18 locations were mapped in the first quarter of 2023 but none were mapped in the second quarter. The mapping to date has been focussed on critical areas in Design Sector D4 of the Whale Tail pit and Design Sector V0A of the IVR V1 pit, which is endorsed. The mapping should also include Design Sectors A1K, F6 at the Whale Tail pit and Design Sectors V2A and V2E of the IVR V2 pit.	Complete the original recommendation. The mapping should include Design Sectors A1K, D4, D4K, F6 and IVR V2A and V2E.	**P3**
	Open Pit Design	Complete the on-going review and re-design of the Northeast Wall of the Whale Tail open pit. Possible measures under consideration include managing surface water, seasonal mining and double-benching in the lower wall.	The lower Northeast Wall of the Whale Tail open pit has been re-designed based on the results of kinematic analyses and numerical modelling.	None. A separate recommendation has been made relating to the need to use the observed slope performance to validate the results of the stability analyses and the revised slope design.	Complete
		Review the risks associated with future access below the failure in the Phase 1 North Wall of the Whale Tail open pit for water management purposes. Implement mitigation measures as appropriate.	This will be done when access is needed to Phase 1.	Complete original recommendation prior to re-accessing Phase 1 of the Whale Tail open pit.	**P3**
		(New Recommendation in 2023)	The Whale Tail Extension is planned to be used for water management purposes in the future. This will require periodic access along the ramp. The ramp is located within poor quality Komatiite and ravelling and small-scale rockfall is likely to occur over time.	Review the risks associated with future access along the ramp in the Whale Tail Extension for water management purposes. Implement mitigation measures as appropriate.	**P3**
		(New Recommendation in 2023)	The IVR V1 open pit is currently inactive and barricaded but is planned to be used for water management purposes in the future. This will require periodic access along the ramp and rockfall hazards are present above and below the ramp. An existing multi-bench failure on the North Wall could break back further into the ramp.	Review the risks associated with future access along the ramp in the IVR V1 open pit for water management purposes. Implement mitigation measures as appropriate.	**P3**
		Review the rockfall risk associated with spillover from blasting and the potential creation of noses at the breakthrough between the IVR West 2 and IVR V2 Extension pits.	The IVR West 2 and IVR V2 Extension (referred to as the IVR West West Pit) have not been, and are not planned to be, linked. As a result, this recommendation is no longer relevant.	None	N/A
		Revert to a 55° pre-shear angle for the IVR V1 Northwest Wall (Design Sector V0A).	The bench design reverted to a 55° pre-shear in Q4 of 2022. Mining of the IVR V1 open pit is now complete.	None	Complete
	Review of 5-Year Mine Plan and LOM	Document the review of the Budget Mine Plan in greater detail, even if the document remains internal to the team, in order to better capture risks and opportunities.	The review of the IVR V2 007 mine plan by the Rock Mechanics team was well documented.	None	Complete
		(New Recommendation in 2023)	The review of the IVR V2 007 mine plan considered the potential influence of the high-strain/brittle structures on bench scale failures. However, the potential for inter-ramp scale failures on the footwall was not considered. The influence of changing wall orientation on the potential for kinematic failures was also not considered.	Consider the potential for inter-ramp scale failures in addition to bench and overall slope scale failures during reviews of the mine plan.	**P3**
	Design Verification and Optimization	Review the failure in the Phase 1 North Wall of the Whale Tail open pit in greater detail to better understand the failure mechanism, likely contributing factors, and the potential for the failure to continue below the ramp. A Maptek scan is recommended to better define the failure geometry.	A detailed review and back-analysis of the failure had not been completed at the time of the audit. A Maptek scan has been completed for the failure.	Complete the original recommendation.	**P3**
		Document the lithology, rock mass structure, and bench performance at regular intervals along the Northeast Wall of the IVR V2 pit in order to better understand the controls on the wall performance. While few benches remain in the pit, the results are relevant to the footwall of the IVR V1 pit.	This recommendation has been grouped with the one below.	None	N/A
		Document the bench performance and key rock mass characteristics in the IVR V2 open pit and compare them to the design. In particular, it is important to verify that the north wall is being established in the Mafic Volcanics and below the Brittle Structure expected along the contact between the Mafic Volcanics and the Komatiite as the slope geometry recommendations for the V2A and V2E design sectors are based on this premise.	The bench performance of the IVR V2 open pit was reviewed as part of the Open Pit Ground Control Quarterly Reports in Q3 2022 and Q1 2021. The lithologies and high-strain/brittle structures exposed in the open pit slopes have not been reviewed relative to the design. The rock mass quality and structure encountered in the pit had not been quantitatively documented at the time of the audit.	Document the lithology, rock mass quality, and rock mass structure at regular intervals in the IVR V2 pit and compare them to the design. Continue to document and review the bench performance. KP is in the process of completing a detailed review of the design of the IVR V2 open pit , including the bench performance and rock mass characteristics.	**P3**
		(New Recommendation in 2023)	The redesign of the Northeast wall of the Whale Tail open pit is based in part on the results of a numerical model that have not yet been validated. There is a need to validate the numerical model results and thus the slope design.	Use the numerical model to define criteria for comparing the model results to the observed/measured performance of the Northeast Wall. Use these criteria to verify the slope design.	**P3**
Implementation: Excavation	**Thermal Capping**	Remediate the thermal cap in the IVR V2 "Turtlehead".	The thermal cap was not remediated. Mining of the "Turtlehead" is now complete and access to the area has been limited with a berm. As a result, there is no exposure of personnel to the rockfall hazard caused by the gaps in the thermal cap.	Whether or not remediation of the thermal cap is required given the lack of exposure should be confirmed with the WSCC. Priority reduced from P2 as mining is no longer occurring in the area and personnel are not exposed to the rockfall hazard. Recommendation can be removed if WSCC confirms the regulatory requirement is not applicable.	**P3**
	Bench Performance	Monitor the implementation and performance of the double-benching trial in the Donite at the Whale Tail pit. In particular, there will need to be an emphasis on scaling and the Bench Approval process to ensure that hazards are managed.	The performance of the double-benches is summarized in the Open Pit Ground Control Quarterly Reports. The benches have experienced between 2.2 m and 2.8 m of backbreak on average, which is greater than the expected 2 m. The difference is attributed to extensive scaling. The benches are otherwise performing well and no rockfalls have been reported.	None	Complete
		Monitor the implementation and performance of the benches in the Whale Tail Phase 3 Southeast Wall (Design Sector F6). Once the next bench is complete, a review should be completed to assess if the current bench design is achievable or if it needs to be adjusted (i.e., to a BFA of 50°).	The review is summarized in the Open Pit Ground Control Quarterly Report for 2023 Q1. The benches performed better than expected, with backbreak averaging approximately 4.5 m compared to the allowance of 8 m. As a result, the catch bench width was reduced by 3 m from 16 to 13 m.	None	Complete
	Drill and Blast	Complete the recommended blasting trials. In particular, the development of a blasting pattern for the Komatiite is likely to be beneficial to bench performance.	Initial trials were completed but further work stopped due to the departure of several Drill and Blast personnel. To date, the trials have not resulted in significant changes to drilling and blasting practices. The mine intends to revisit the trials in the future.	Complete the original recommendation.	**P3**
		Implement a year-round blasting quality control program, at a minimum measuring blasthole depth.	A blasting quality control program has not been implemented.	Complete the original recommendation.	**P3**
	Water Management	(New Recommendation in 2023)	The sump on the 5081 bench of the South Wall of the Whale Tail open pit is unlined. Water from the sump is seeping through the face of the bench below and will create an ice wall during winter. The ramp will eventually be located below this location.	Evaluate options for lining the sump to limit the re-infiltration of water.	**P4**
Implementation: Inspections and Monitoring	**Inspections**	Several areas were identified during the visit that should be a focus of on-going monitoring and inspections: a) The failure in the Phase 1 North Wall of the Whale Tail open pit b) The failed slab in the northwest corner of the Phase 1 North Wall of the Whale Tail open pit c) The potentially unstable blocks in the Whale Tail East Wall d) The accumulation of rockfall on the catch benches of the Whale Tail Phase 2 Southeast wall e) The potentially unstable wedge below the Whale Tail Phase 2 ramp, particularly during blasting below the wedge f) The Brittle Structure with seepage in the southwest corner of the IVR V1 open pit g) The nose on the north wall of the IVR V2 open pit h) The potentially unstable block in the IVR V2 open pit North wall "Turtlehead" i) The nose between the IVR V1 and IVR V2 open pits	Many of these hazards have been removed as mining progressed. The remaining hazards include a), c), g) and i). These hazards continue to be monitored as part of the Ground Control Program at the mine.	Continue to monitor as part of the Ground Control Program.	Complete
		(New Recommendation in 2023)	A potential wedge has been identified in the Northwest wall of the Whale Tail Open pit, above the Phase 2 ramp. If the wedge were to fail, it is likely that material would reach the ramp. The wedge is currently being monitored using visual inspections, drone surveys, and the slope stability radar.	Continue to monitor the wedge. If further deterioration of the wedge is observed, review and implement mitigation measures (e.g., knocking down the wedge).	**P3**
		Take a series of overview photos (e.g., of each major wall) as part of the visual inspections to generate a record of wall performance over time.	The visual inspections now include a series of overview photos.	None	Complete
		Implement a formal mechanism (e.g., TARP) to increase the frequency of inspections in the event that an instability is observed or, for example, particular deformation limits are exceeded.	A TARP has not been developed. However, the GCMP now defines cases where additional inspections are to be completed (Table 5-5).	None	Complete

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Category	**Topic**	**2022 Recommendations**	**2023 Status and Comments**	**2023 Recommendations**	**Priority**
Implementation: Inspections and Monitoring	**Inspections**	(New Recommendation in 2023)	IVR West 2 was barricaded upon completion of mining. This was an effective method of managing the risk associated with the identified rockfall hazards in the pit. It was identified during the 2022 annual review that access would eventually be required for dewatering purposes and that the construction of a rockfall berm along the inside of the ramp was recommended prior to re-entry. However, in late June or early July, dewatering personnel were allowed access to install a pump at the base of the ramp. The rockfall berm had not been constructed. A rock mechanics inspection was not completed prior to personnel accessing the pit. The pump was installed below a rockfall hazard and adjacent several large blocks that had fallen onto the ramp. These rockfall hazards were either not identified by the dewatering personnel or were identified and no action was taken. The hazard was identified during the 2023 annual inspection and the pump was removed and the pit barricaded the following day.	Ensure that a rock mechanics inspection is completed before work activities resume in barricaded areas. The intent is to re-assess existing hazards and to assess whether new hazards have developed over time. All hazards should be mitigated before access is allowed. A rockfall berm should be constructed along the inside of the ramp if the IVR West 2 pit is used for water management in the future. Prior to the removal of the pump and the re-establishment of the barricade, this was a P1 priority.	**P2**
		Review the use of the Hazard Maps: a) Refine the legend on the Hazard Map to clearly note the restrictions associated with the risk ratings (e.g., Yellow – Spotter Required). b) Provide more detailed guidance, including examples, on how to determine the risk ratings. c) Consider the use of physical markers (e.g., pylons) in the open pit to remind personnel of hazards that are not bermed off (e.g., Yellow Zones). d) Consider a separate method for communicating the corrective actions to Operations so that it is clear that the Hazard Map is focussed on existing hazards rather than whether or not work has been completed. This could be captured within the Bench Approval process. e) Two of the hazards noted as requiring ongoing monitoring in the Hazard Tracking Database have been removed from the hazard map. All current hazards requiring mitigation should be shown on the Hazard Map.	The use of the Hazard Maps has been reviewed. a) The legend has been revised to clearly indicate the need for a spotter in Medium Risk (Yellow) areas b) There continues to be limited guidance on how to determine the risk ratings. The mine relies on practical training by the Rock Mechanics Coordinator. While the training is important, the ratings are a critical aspect of hazard management at the mine and more detailed formal guidance on their selection should be developed. c) The mine has considered the use of physical markers in the open pit to demarcate the Yellow hazard areas that are not bermed off but has concluded that it would be impractical to implement d) The Hazard Map is focussed on rock mechanics hazards. While corrective actions related to the identified hazards are noted on the map, the corrective actions are primarily communicated and tracked through the Pit Wall Approval procedure and the Hazard Tracking Database. e) Not all existing hazards are shown on the map. This is discussed separately as a new recommendation under Hazard Tracking, below	Provide more detailed guidance, including examples, on how to determine the risk ratings. Priority has been revised to P3.	**P3**
		Evaluate methods for communicating updates to the Hazard Map outside of the regular two-week period if there are notable changes to the identified hazards. As an alternative to issuing an updated map, a brief addendum describing the change could be issued.	The Hazard Map continues to be issued every two weeks. The mine believes that there has not been a need to update the map more frequently. Slope instabilities have been largely restricted to the existing Red Zones and those that are not have been bermed or barricaded off as they are identified. The hazards associated with newly developed benches are managed using the Wall Approval Procedure.	The existing system appears to be adequately communicating the hazards to the workforce and this recommendation has been closed. However, there are plausible scenarios where interim updates to the Hazard Map could be a valuable part of managing ground control risk given the important role it plays in the Work Close to Pit Wall procedure. Interim updates could be required in the future.	N/A
		Review the Pit Wall Approval process: a) Review the communication of bench approvals with Engineering and Operations to ensure that the process is reliably followed b) Incorporate a checklist to improve consistency between staff and avoid hazards being missed c) Limit approvals in key sectors (e.g. WHL F6) to experienced staff	The list of upcoming patterns is reviewed each morning during the daily production meeting. This includes whether or not the walls adjacent the pattern have been approved. The mine is in the process of updating the Pit Wall Approval procedure so that patterns are only released to Survey once the required wall approvals are completed. This is endorsed. A checklist has not yet been implemented. The Rock Mechanics team currently relies on practical training in the field for new staff. Approvals in key sectors are now only completed by experienced staff.	Update the Pit Wall Approval procedure as planned. Continue to recommend the development of a checklist to improve consistency between staff and avoid hazards being missed. Priority has been revised to P3.	**P3**
		Inspect the crest of the open pit for evidence of instability (e.g., above D4K) periodically. As a starting point, this could be completed in the spring and fall.	The open pit crest is now inspected for evidence of instability on a monthly basis during the summer as part of the drone surveys.	None. Continue the inspections as planned.	Complete
		Conduct periodic drone inspections of the open pit slopes. Review the inspection frequency in the GCMP and align it with current needs/capabilities.	Drone inspections are now completed on a monthly basis during the summer (May to September). This commitment is reflected in the GCMP.	None. Continue the inspections as planned.	Complete
	Instrumentation and Monitoring	Formally identify sectors of the open pit where SSR is a critical control for achieving an acceptable level of residual risk. Develop a process to stop or modify mining activities in these areas when SSR coverage is not available. This could be captured within the SSR TARP.	Sectors of the open pit where SSR is a critical control are now identified in the Ground Control Monitoring Using Radar System Procedure (Northeast and Northwest Walls of the Whale Tail open pit). When the SSR is offline, a Grey Alarm is triggered. On day shift, the Rock Mechanics team would be aware of the alarm and could stop or modify mining activities in these sectors. However, on night shift Dispatch does not contact the Rock Mechanics team if a Grey Alarm is triggered. As a result, no action would be taken until the start of the next day shift.	Empower Dispatch to pull personnel out of sectors where SSR is a critical control in the event that the SSR is offline (e.g., a Grey Alarm triggers). Update the procedure to reflect this change.	**P2**
		Review the effectiveness of the SSR alarm parameters in 2022 and establish a commitment to review the parameters annually.	The SSR alarm parameters had not been reviewed at the time of the audit. It is understood that the mine intends to implement an annual review.	Complete the original recommendation.	**P3**
		Define a red trigger for the SSR TARP to provide a backstop for unprecedented or unexpected conditions.	A global Red Alarm trigger has not been defined. The intent is to define these on a case by case basis for high risk activities requiring constant monitoring.	Continue to recommend the development of a Red Alarm for at least the areas of the open pit where SSR is a critical control. The intent is to capture unprecedented or unexpected conditions.	**P3**
		Adjust the SSR TARP so that the response to Grey and Orange SSR alarms does not explicitly state that mining operations are not to be stopped.	The TARP has been updated. Rock Mechanics personnel are to be contacted in the event that a Grey or Orange alarm triggers.	None	Complete
		(New Recommendation in 2023)	The TARP indicates that Rock Mechanics personnel are to be contacted if a Grey Alarm is triggered. However, the alarm notification itself says not to contact Rock Mechanics.	Revise the notification for the Grey Alarm so that it is consistent with the TARP.	**P2**
		Explain in the GCMP or radar monitoring procedure why the SSR alarms have been set at their current values and provide guidance on how they can be adjusted based on different circumstances.	The Ground Control Monitoring Using Radar System Procedure sets out the current alarm triggers and when they can be adjusted. However, no guidance is provided on how to adjust them based on different circumstances.	Complete the original recommendation. While it is recognized that it is not practical to cover all eventualities, recommend providing additional guidance on how to define alarm criteria.	**P4**
		Implement an additional surface monitoring system, such as prisms or GPS beacons, to complement the SSR, provide a long-term deformation baseline, and to allow the true displacement vector to be measured.	The Rock Mechanics team has researched the use of GPS beacons but the purchase of these beacons had not been budgeted or planned at the time of the audit. The mine is trialling the use of corner reflectors as history / reference points for the SSR. This is endorsed.	Complete the original recommendation. The GPS beacons are promising. Recommend budgeting for the installation of several beacons.	**P2**
		(New Recommendation in 2023)	The design of the IVR V2 open pit North Wall is sensitive to the position and orientation of the High Strain / Brittle Structures, as well as the presence of Komatiite. This is one of very few design sectors at Amaruq where the potential for inter-ramp scale failures limited the slope design. As a result, increased monitoring is recommended.	Plan for full-time SSR coverage of the North Wall of the IVR V2 open pit once mining extends further to depth in 2024.	**P3**
		Install instrumentation (e.g., wireline extensometer) in the potentially unstable wedge below the Whale Tail Phase 1 ramp to supplement radar monitoring.	The wedge has been mined out by the Phase 3 pushback. Instrumentation was not installed in the wedge prior to it being mined out.	None	N/A
		(New Recommendation in 2023)	The mine has planned and budgeted the installation of Shape Array Accelerometers (SAAs) and Vibrating Wire Piezometers (VWPs) in the Northeast wall of the Whale Tail open pit. This is endorsed. The original plan was for three instrumented drillholes but this has since been reduced to two.	Recommend implementing the original plan for three instrumented drillholes. This will improve the coverage of the Northeast wall above the future ramp position and will provide additional redundancy in the event that an instrument is damaged.	**P4**
	Hazard Tracking	Implement a mechanism within the Hazard Tracking Database to flag overdue corrective actions. If an action has been superseded or the hazard mitigated through other means the action should be closed out.	Hazards with overdue corrective actions or that have been unmitigated for extended durations are not flagged. In some cases, corrective actions that have been superseded are noted as such and the action closed out, but this is not consistently done. This aspect of this recommendation is discussed as part of the new recommendation below.	Complete the original recommendation.	**P2**
		(New Recommendation in 2023)	Not all identified hazards are documented in the Hazard Tracking Database. For example, the rockfall hazard above the ramp in the IVR West 2 Pit identified during the 2022 annual inspection was not documented and had not been mitigated prior to the 2023 annual inspection. No hazards were recorded in the database in July or August 2023.	Review the use of the Hazard Tracking Database with the Rock Mechanics team. Ensure all identified hazards are documented. Consider tracking the number of entries each month to monitor both wall performance and how well the database is being used.	**P2**
		(New Recommendation in 2023)	There are multiple hazards documented in the Hazard Tracking Database that have not been closed out but are noted as being removed from the Hazard Maps as mining is not currently occurring in the area. There is no mechanism to ensure these hazards are revisited or mitigated before mining in the area resumes.	Develop a process to track hazards that have not been eliminated but are being managed through exclusion zones (or other means of limiting exposure). The intent is to ensure they are identified, communicated to personnel and mitigated prior to resuming work in the area. For example, this could be accomplished using a new status in the database and/or with a separate layer on the Hazard Maps.	**P2**
		(New Recommendation in 2023)	Not all rockfalls have been documented in the Rockfall Database. This is a key tool for understanding failures and for refining/validating the slope design and other control measures.	Document all rockfalls (at least to the extent practical) in the rockfall database. Define criteria for what type of events are recorded in the rockfall database. Events that resulted in injury or damage to equipment, or could plausibly have done so under different circumstances, should always be recorded in the database.	**P3**

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TABLE 1

AGNICO EAGLE MINES LIMITED
MEADOWBANK COMPLEX - AMARUQ SITE

2023 ANNUAL OPEN PIT GEOMECHANICAL INSPECTION
OPEN PIT GEOMECHANICAL INSPECTION RECOMMENDATIONS SUMMARY

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Observations, Comment and Recommendations					
Category	**Topic**	**2022 Recommendations**	**2023 Status and Comments**	**2023 Recommendations**	**Priority**
Implementation: Other Controls		Review the Work Close to Pit Wall procedure, how it is communicated and whether it is being consistently used, including: a) Provide refresher training on the procedure to ensure it is understood and implemented consistently b) Review the use of spotters in Yellow Zones, as it is unclear if they are being reliably used c) Review the annual training material and assess its appropriateness	The Work Close to Pit Wall procedure was reviewed and updated in June 2023. The primary change is that the legend on the Hazard Map has been revised to note the requirement for a spotter when working within a Medium Risk area (Yellow Zone). Annual refresher training on the Work Close to Pit Wall procedure was provided to the workforce. The Rock Mechanics team believes that spotters are being consistently used by personnel working in Yellow Zones. It was not possible to verify this during the audit.	None	Complete
	Managing Exposure / Barricades	Construct, remediate or maintain rockfall or safety berms in the following locations: a) Along the inside of the Whale Tail Phase 2 ramp. The ramp needs to be extended along the upper ramp and built up to a consistent 2 m height b) Along the inside of the ramp on the Northwest Wall of the IVR V1 open pit c) At the end of the crest road on the east side of the IVR V2 "Turtlehead" d) Along the inside of the ramp of the IVR West 2 open pit prior to the pit being used for water management	The Whale Tail Phase 2 ramp has been mined out and mining in the IVR V1 open pit and IVR V2 "Turtlehead" is complete. A rockfall berm had not been constructed along the inside of the IVR West 2 open pit when it was accessed for water management in June or July of 2023. The circumstances of this incident and the associated recommendations are covered under "Inspections" in this table.	None. Outstanding recommendations covered under an earlier recommendation.	N/A
		Prevent access above the potentially unstable block in the Whale Tail Phase 2 Southeast Wall. Consider leaving some muck against the block to buttress it during drilling and blasting. The area should be monitored when crews are working in the area.	This block has been mined out by the Phase 3 pushback.	None	Complete
	Scaling	Several areas were identified during the visit that should be scaled or rockfall hazards mitigated: a) Whale Tail Phase 2 South Wall b) Whale Tail Phase 3 South Wall at the Ramp Fault c) Loose slabs and debris from scaling on the Whale Tail Phase 3 Southeast Wall d) Loose slabs and overhangs on the lower northwest wall of the IVR V1 open pit e) Nose between IVR V1 and IVR V2 f) Loose on the North and East walls of the IVR West 2 open pit	Most of these hazards have been removed as mining progressed. The remaining hazards include f). These hazards continue to be monitored as part of the Ground Control Program at the mine.	Continue to monitor as part of the Ground Control Program.	Complete
Ground Control Program	**Training**	Develop a skills matrix to help identify training needs.	A skills matrix has not been developed. The Rock Mechanics team has experienced significant turnover, with only three staff remaining from a year ago. This puts an increased demand on training and knowledge sharing.	Complete the original recommendation.	**P4**
	Documentation	Add the following to the Quarterly Summary Reports to improve the communication of the completed rock mechanics activities and their effectiveness: a) The reports include a dashboard summary of the activities complete, but there is no reference to the commitments in the GCMP. Recommend including a column in the dashboard indicating the target frequency for the tracked items. b) Consider including a slide commenting on the effectiveness of the mine's controls (e.g. radar alarms, prior identification of rockfalls, etc.)	The recommended changes have not been implemented. While the reviews of the bench performance summarized in the reports are well done, the results are not consistently compared to expectations / the design basis.	Complete the original recommendation. Directly compare the results of the bench performance reviews to the bench design. For example, does the backbreak exceed the amount that was designed for?	**P4**
		(New Recommendation in 2023)	The commitment to issue the Quarterly Summary Reports is not being met. Reports were issued in Q1 and Q3 2023 but not in Q2.	Issue the Quarterly Summary Reports each quarter.	**P3**
		Update the GCMP and subsequently review and update it annually. The GCMP has not been updated since July 2020 and annual updates are a regulatory requirement under the Nunavut Mine Health and Safety Regulations.	The GCMP was updated in April 2023.	None. Continue to review and update the GCMP annually.	Complete
		The following comments are provided for the GCMP: a) 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. b) (5.2.1.3) - Review and revise the commitments for drone monitoring so that they are focussed and achievable c) (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 d) (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. e) (5.5) Reference a register that tracks who has received what geomechanical training f) (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 3MR g) Describe and include a commitment to the bench approval process	The updates to the GCMP incorporated changes b), c), d), f) and g). While the GCMP now includes a plan showing the location of the instrumentation, the plan is out of date.	a) 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. Focus on the major lithologies/domains and how they perform in the open pits. b) Reference a register that tracks who has received what geomechanical training. c) Update the plan showing the position of the instrumentation.	**P4**

I:\1\01\00622\46\A\Correspondence\NB24-00208 - Amaruq Annual Open Pit Inspection\[Amaruq - OP Status of Recommendations February 23 2024).xlsx]Findings

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	27FEB24	ISSUED WITH LETTER NB24-00208	BDP	RAM

APPENDIX A

Meadowbank Complex - Amaruq Site - 2023 Annual Open Pit Geomechanical Inspection

(Pages A-1 to A-69)

Meadowbank Complex - Amaruq Site

2023 Annual Open Pit Geomechanical Inspection

July 7 to 13, 2023

Outline

Introduction

Whale Tail Open Pit

IVR V1 & V2 Open Pits

IVR West Open Pits

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. Underground mining at the Whale Tail deposit is also underway.
- Knight Piésold (KP) has been providing geomechanical support for the Amaruq Site since 2015, 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. A detailed review of the Whale Tail Open Pit slope performance was completed in 2021 and 2022.
- KP has completed the annual inspections for the open pits at the Amaruq Site since 2019. The 2023 annual inspection was completed by Ben Peacock, P.Eng., during a site visit from July 7 to 13, 2023. The inspection is summarized in this presentation, along with a summary of other related discussion topics.

Introduction

Inspection

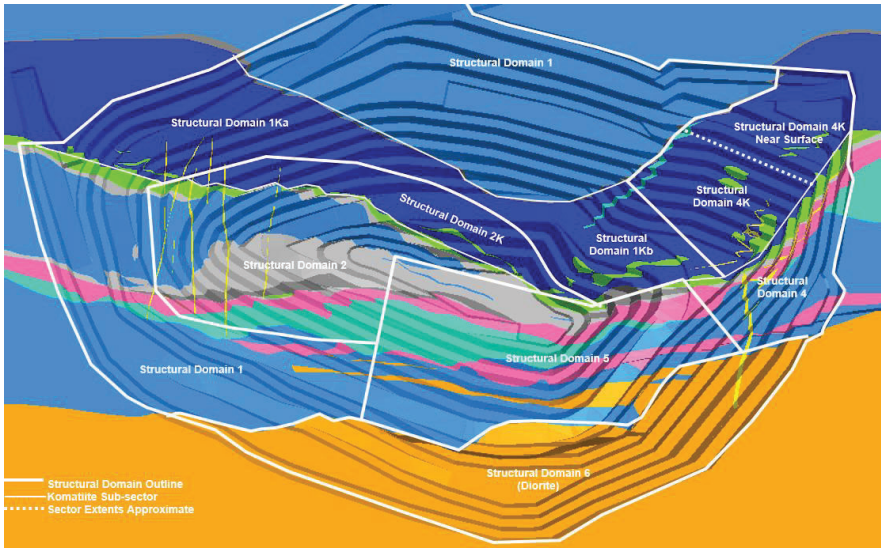
- The following open pits and surface excavations at the Amaruq Site were reviewed on July 7 and 8, 2023 (shown at right):
  - Whale Tail (WHL) Open Pit
  - IVR V1 Open Pit
  - IVR V2 Open Pit
  - IVR West 1 Open Pit
  - IVR West 2 Open Pit
  - AP5
- Christian Tremblay (Rock Mechanics Coordinator) and Arron Haselhorst (Rock Mechanics Technician) of AEM participated in the inspections.

Whale Tail Open Pit

Whale Tail Open Pit

Design

- The WHL-13D open pit is the current design for the Whale Tail deposit.
- The current 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 slope geometry recommendations are shown at lower right.
- The design of the portion of Design Sector 1Kb below the ramp (marked with an "*" at lower right) has been the focus of recent studies and was under review at the time of the visit. The benches striking 110° will be mined with a height of 21 m, a catch bench width of 10.5 m, and a BFA of 55°. To achieve this, the benches will be mined in the winter and buttressed before freshet. The remaining benches will have a BFA of 65°.



LITHOLOGY LEGEND:

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

Base Bench Geometry

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

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

Bench Geometry Controlled by Bench-Scale Failures

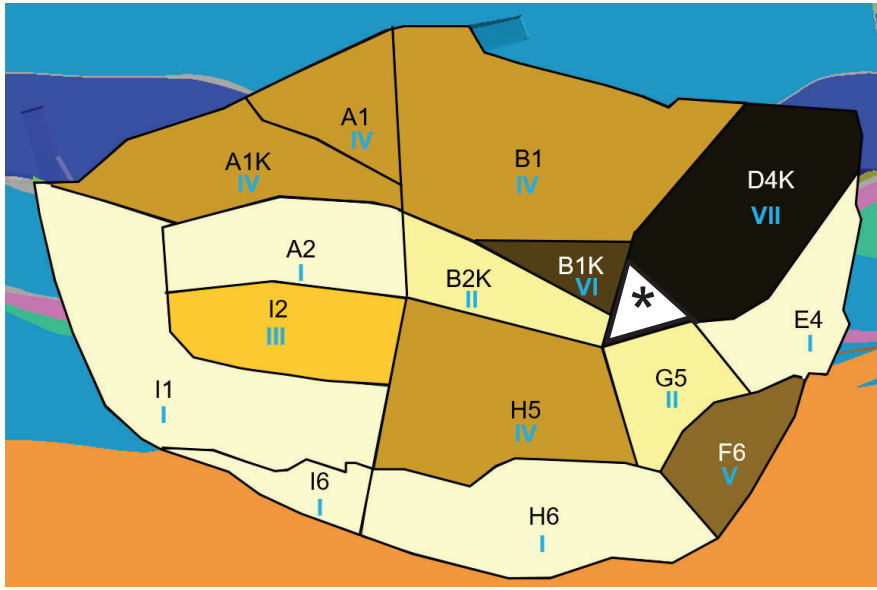
III — BFA: 65°
Bench Width: 10 m
Bench Height: 21 m
IRA: 47°

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

V — BFA: 75°
Bench Width: 16 m
Bench Height: 21 m
IRA: 44°

VI — BFA: 55°
Bench Width: 10.5 m
Bench Height: 21 m
IRA: 40°

VII — BFA: 55°
Bench Width: 11 m
Bench Height: 14 m
IRA: 34°



Knight Piésold CONSULTING

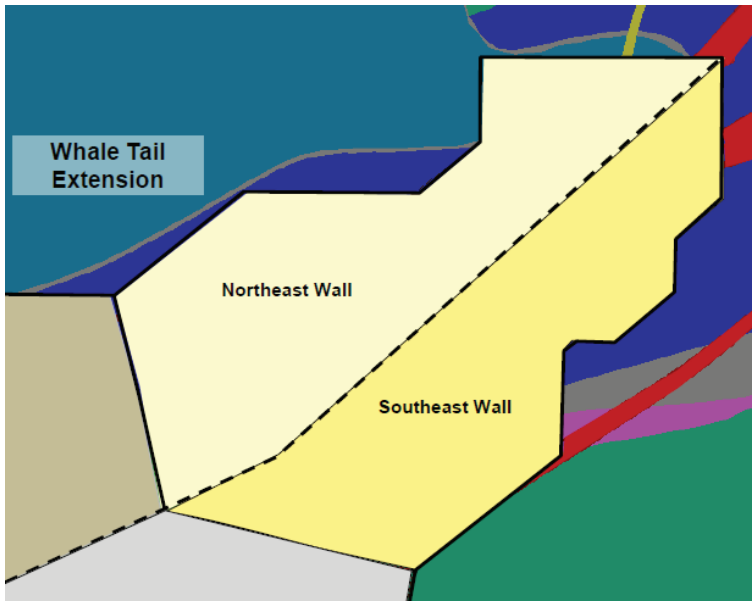
Whale Tail Open Pit
Design (Cont'd)

- The WHL-EXT-V02G design is the current design for the WHL Extension at the northeastern end of the open pit, above Design Sector D4K.
- The slope geometry recommendations are summarized below and in letter NB21-00159 issued September 2021.

Base Bench Geometry

Base Case
BFA: 75°
Bench Width: 10 m
Bench Height: 21 m
IRA: 53°

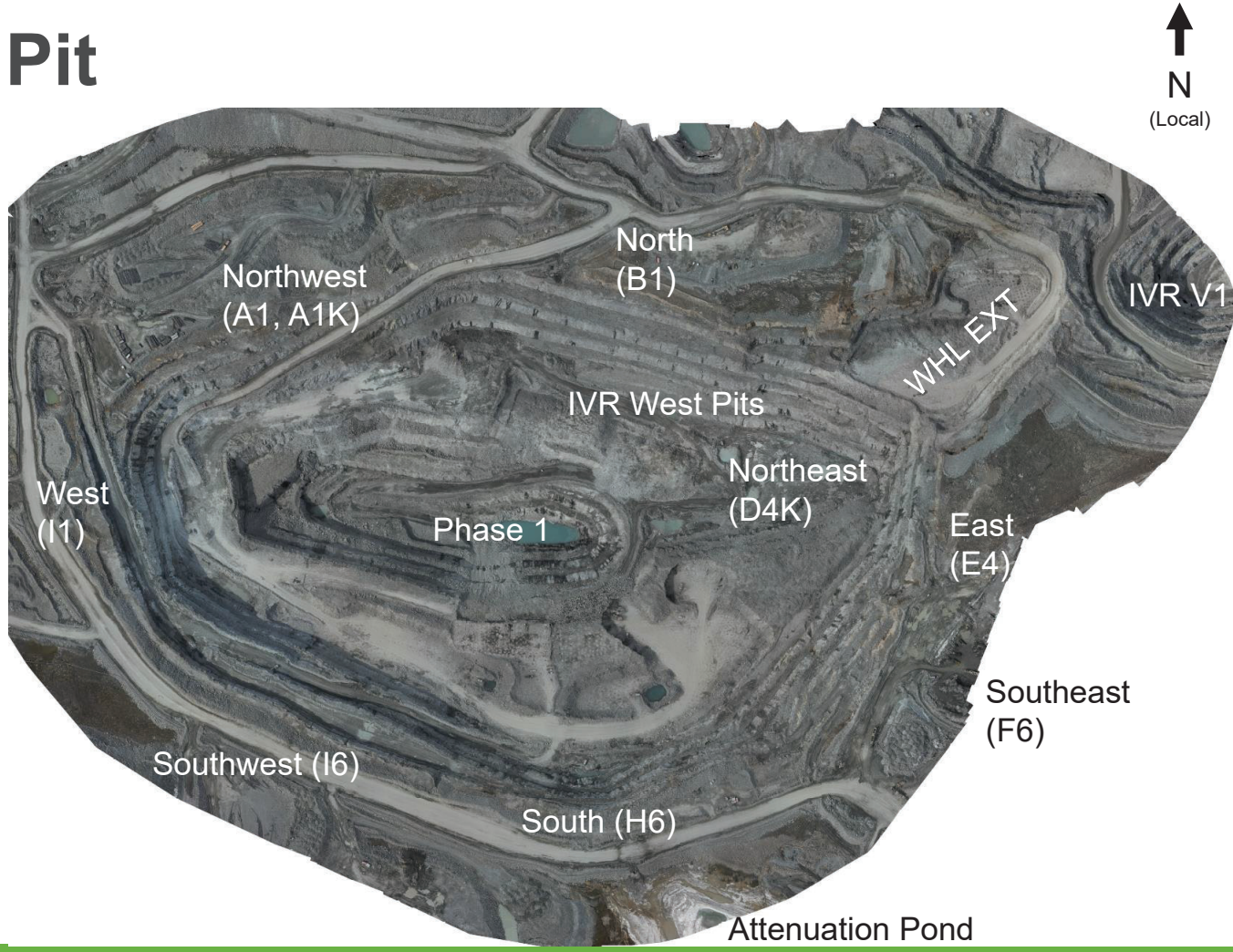
Base Case (Komatiite)
BFA: 75°
Bench Width: 10.5 m
Bench Height: 21 m
IRA: 52°



Whale Tail Open Pit

Inspection

- The Whale Tail open pit was inspected on July 8, 2023. 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 walls inspected are labelled relative to mine north. The labels in brackets refer to the related design sector.



Whale Tail Open Pit

Observations - Northwest Wall

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

- Final wall in Design Sector A1/A1K.
- Mining in this area resumed in 2023.
- The benches established prior to 2023 are generally performing well. The benches established in the Komatiite below the ramp in 2023 have experienced significant backbreak (outlined below in black). These benches are discussed further on the next slide.
- A potential wedge is present above the ramp (outlined below in white). The wedge is discussed further on a subsequent slide.
- The Oxidized Greywacke has performed well and no rockfalls have been reported since the last annual inspection. Observations made during this visit suggest that the western boundary of the zone could be partially defined by a large-scale structure.

Whale Tail Open Pit

Observations - Northwest Wall - Backbreak

- Overbreak of the bench directly below the Phase 2 ramp (red outline) resulted in adjustments to open pit design in order to maintain two-way traffic.
- The 5109 bench on the inside of the ramp was slashed out to increase the available space and a small step-in was implemented below the ramp to accommodate a buttress on the inside of the ramp. Line drilling was implemented along the remainder of the ramp to reduce blast-induced damage.
- The overbreak occurred within the Komatiite. The structural model indicates that several Brittle/ High Strain Structures intersect the area.
- The performance of the benches in the Komatiite varies significantly along this wall, with poor performance observed in the area outlined in yellow and generally good performance observed elsewhere. The wall performance was a focus of the inspection and is discussed further on the next slides.

Whale Tail Open Pit

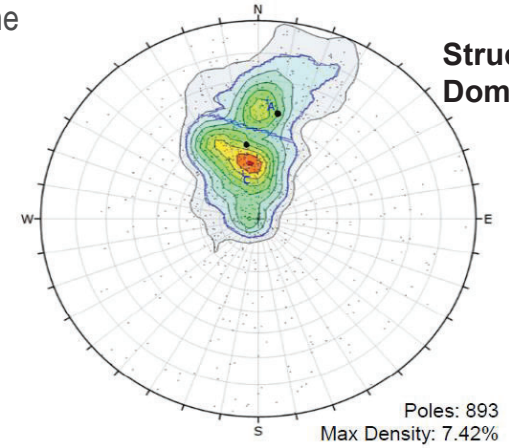
Observations - Northwest Wall - Backbreak (Cont'd)

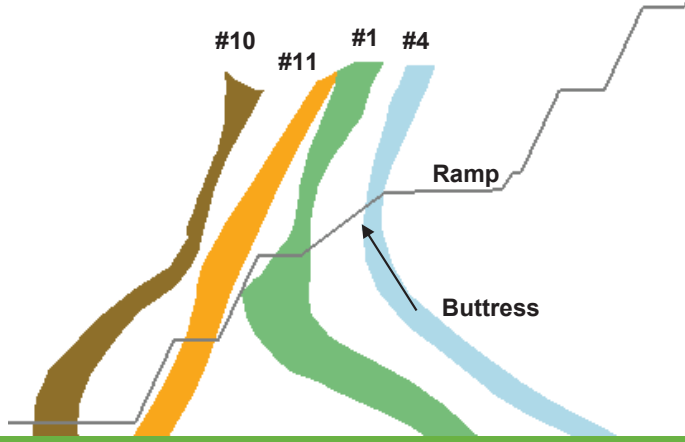
- The majority of the wall is performing well, particularly given that it is entirely established within the Komatiite. Half barrels are often visible and the design geometry appears to have been achieved (though this has not been verified).
- There are intervals with poor bench performance (example at far right in the image below). These areas appear to be associated with Brittle / High Strain Structures, persistent discontinuities dipping at a shallow angle to the south (S3 foliation?), and wedges formed by these structures and Joint Set D.
- The western end of the wall, near the ramp, is of notably lower rock mass quality. A prominent structure defines the eastern limit of this zone (yellow dashed line below). The reduction in rock mass quality is believed to be due to the presence of multiple Brittle / High Strain Structures (see next slide). The foliation in this area is distorted and at least locally has a much shallower dip (white dashed lines below, possibly the S3 foliation).

Whale Tail Open Pit

Observations - Northwest Wall - Backbreak (Cont'd)

- Brittle / High Strain Structures 1, 4, 10 and 11 are all predicted to intersect the wall in the area where the excessive overbreak occurred below the ramp. Structures 1 and 4 are categorized as "Major Zones" by AEM, with greater confidence in their interpretation.
- Structure 4 agrees well with survey measurements of the structure that defines the northern limit of the zone of sheared Komatiite noted on the previous slide (yellow dashed line). This zone also includes Structures 1 and 11 and lies on the contact between the Iron Formation and Komatiite.
- The Brittle / High Strain Structures are often associated with a significant reduction in rock mass quality within the Komatiite. This is likely a key driver for the overbreak that occurred adjacent the ramp.
- The orientation of the foliation was mapped in several places along the wall and compared to Structural Domain 1K. The measurements taken further to the east generally agree with Joint Set A (S1/2 Foliation) while the failure planes below the ramp (white dashed lines on previous slide) are much closer to the S3 foliation. It is not clear if this is the S3 foliation or a local rotation in Joint Set A.
- The Brittle / High Strain Structures should be mapped to validate/refine the structural model.
- Structural mapping should be completed to better understand the variation in the foliation.
- If there are significant changes in the understanding of the rock mass structure, the potential impact on the slope performance and design should be reviewed.





Whale Tail Open Pit

Observations - Northwest Wall - Wedge

- A wedge is present above the Phase 2 ramp (lower photo).
- The potential for a wedge was originally identified in 2020 (upper photo). Ravelling of material from the bottom / left hand side of the wedge over time has resulted in the wedge becoming more prominent. The northern (right) side of the wedge is either also having material ravel / wash out over time or is dilating.
- The loss of material was not observed in Sept 2022. A review of photos suggest that most of the loss occurred when the Phase 2 Ramp was established below this area between December 2022 and January 2023. it is not clear whether this was a result of scaling or if it came down during blasting.
- These observations suggest that the potential for a failure of the wedge may be increasing over time. There is a partial bench between the wedge and the Phase 2 ramp. However, it is likely that material would reach the ramp if the wedge failed.
- No tension cracks were observed above the wedge in the June 2023 drone photo of the area.
- The wedge is a focus of the regular visual inspections and the drone surveys. The mine has also defined a specific radar alarm for this area. While this is a good idea, the failure of the wedge could be rapid and might not trigger the radar.
- Continue to monitor this area closely, both from the ramp and the overlook above. If further deterioration is observed, further mitigation will be required (e.g., knocking down the wedge).

Whale Tail Open Pit

Observations - North Wall

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

- Final wall in Design Sector B1.
- Limited mining has occurred in this area and there have been no slope failures since the last annual inspection.
- The benches are performing better than expected, with the bench face often standing steeper than the foliation.

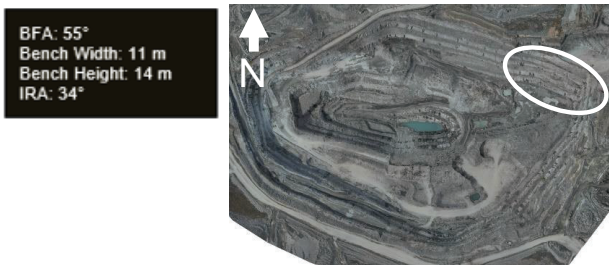
Whale Tail Open Pit

Observations - Phase 1

- Mining of Phase 1 was completed in the first half of 2023. The ramp to Phase 1 is currently bermed off.
- The North Wall wall was established in the Komatiite, parallel to the foliation and experienced a series of bench-scale planar failures. Mining along the North Wall was successfully prioritized during winter to minimize the rockfall risk to personnel. A berm was installed at the toe of the slope prior to freshet to retain the expected rockfall. This approach was successful.
- A multi-bench instability occurred on the North Wall on May 14, 2022. As the first multi-bench failure to occur at Amaruq, it is important that this failure be back-analyzed to understand the failure mechanism. This has not yet been done.
- It is understood that access may be re-established to Phase 1 for dewatering purposes. The risks associated with on-going access below the failure, as well as the rockfall hazard associated with on-going mining of Phase 3 should be reviewed and mitigation measures implemented as appropriate.

Whale Tail Open Pit

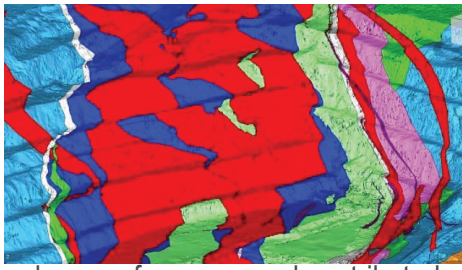
Observations - Northeast Wall



- Final wall in Design Sector D4K.
- This sector is within the Komatiite and has been characterized by a series of bench scale failures. The failures are currently understood to be a hybrid of failure on the foliation and failure of the weak rock mass, influenced by water (i.e., a combination of seepage within the talik and surface runoff), and the High-Strain / Brittle Structures.
- The performance of the benches has improved since the slope design was revised in December 2021. While, bench-scale failures have and will continue to occur, no failures have occurred in this sector since the last annual inspection.
- The wall continues to be a focus for the Rock Mechanics team.
- The rock mass characteristics of the Komatiite vary significantly along the wall, at least in part due to the High-Strain / Brittle Structures. This is discussed further on the next slide.
- The design of the lower wall northeast wall, below the future ramp positions, was revised in 2023 based on the results of kinematic and numerical analyses.

Whale Tail Open Pit

Observations - Northeast Wall (Cont'd)



- Two "Major" High-Strain / Brittle Structures intersect this wall (BS1 and BS5). These structures have strongly influenced the slope performance and contributed to many of the bench-scale failures to date. Jonathan Servais (3D Modelling Geologist) of AEM has high confidence in the interpretation of both structures.
- BS5 has had a greater adverse effect on the slope performance than BS1. BS5 is associated with a small Iron Formation lens linked to the Mineralized Zone # 92. The mechanical contrast between the Komatiite and the Iron Formation could explain why BS5 is more prominent.
- The position of BS5 on the wall is expected to move closer to the NE corner of the pit as mining progresses to depth. This is generally favourable. Outside of BS1 / BS5, the Komatiite is more competent and half-barrels are sometimes visible. Minor shears and the foliation often locally define the bench face.
- A notable exception is the Komatiite along the western contact with the Greywacke. The Komatiite in this area is quartz-rich and numerous veins and veinlets are present. The bench faces locally stand steeper than the foliation after thawing. Matt Dewar (Geologist) of AEM noted that this quartz-rich zone is the IC Zone (Mineralized Zones #51 and 52). This zone pinches out towards the west and is not expected to be present in the Northwest Wall of the open pit.
- Assessments of the overall stability of this wall have assumed a weak structure along the western contact. The presence of the IC Zone suggests that this assumption is conservative.

Whale Tail Open Pit

Observations - East Wall

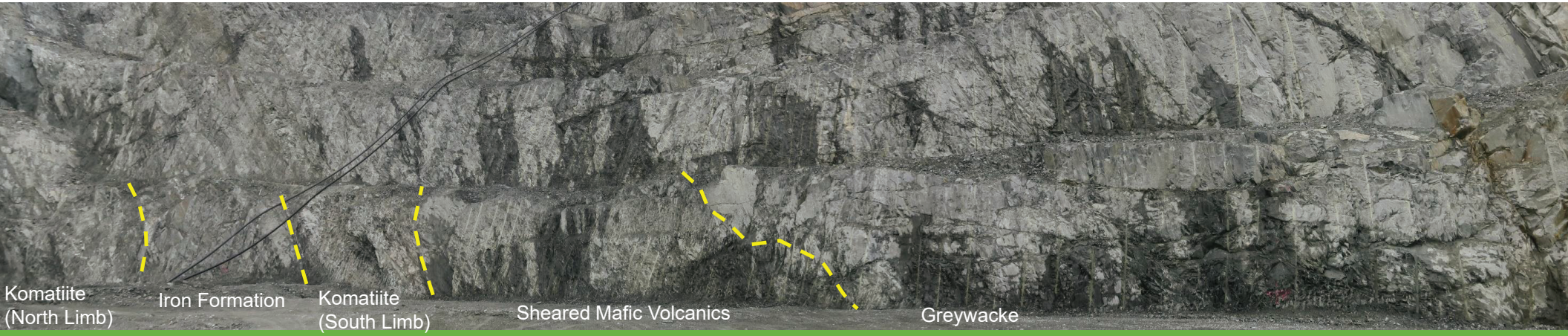
BASE CASE
BFA: 75°
Bench Width: 10 m
Bench Height: 21 m
IRA: 53°

- Final wall in Design Sector E4.
- Mining of the Phase 3 pushback allowed limited scaling of an area that has been identified as a rockfall hazard for several years (outlined in black).
- Significant variation was observed in the rock mass quality exposed in the lowermost bench of the wall. This is discussed further on the next slide.
- The benches have generally performed well. Increased crest loss was observed where either a north dipping structure (Joint Set B?) or a sub-horizontal structure (Joint Set C) is present.
- The foliation strikes roughly perpendicular to the wall, which is favourable for bench stability. Half barrels are observed in some instances in the Komatiite.

Whale Tail Open Pit

Observations - East Wall (Cont'd)

- During the inspection, an operator was scaling the wall with an excavator. The operator reported that the rock mass characteristics varied significantly along the bench face. This prompted a review of the wall with Matt Dewar of AEM Geology.
- The Greywacke is generally competent, though localized shear zones attributed to the Brittle / High Strain Structures were observed within it.
- However, there is an interval that is much more intensely foliated/sheared and has lower intact strength. The excavator was able to leave teeth marks in the face within this interval. Based on XRF analysis of a few samples, this interval of shearing is within the Mafic Volcanics.
- The sheared Mafic Volcanics have not significantly impacted bench performance to date, primarily because the foliation is roughly perpendicular to the slope. However, the extents of this unit should be reviewed and the potential impact on subsequent benches assessed. It may be associated with Brittle / High Strain Structure #3.



Whale Tail Open Pit

Observations - Southeast Wall

BFA: 75°
Bench Width: 16 m
Bench Height: 21 m
IRA: 44°

- Final wall in Design Sector F6.
- The slope geometry recommendations for this sector were adjusted in late 2021. Analyses demonstrated that the slope performance was sensitive to the persistence of Joint Set C. With careful blasting and scaling, a BFA of 75°, catch bench width of 16 m, and IRA of 44° was thought to be achievable. Backbreak in the order of 8 m was expected.
- The benches have performed better than expected. While backbreak has approached 8 m in some areas, the average ranges from approximately 2.75 to 4.25 m.
- Based on a statistical assessment of the observed backbreak, AEM reduced the catch bench width to 13 m in March 2023. This is reasonable.
- The tie-in between Phase 3 and Phase 2 on this wall was well executed, with only a very limited nose left.

Whale Tail Open Pit

Observations - Southeast Wall (Cont'd)

- The bench performance is generally consistent with the revised design. Joint Set C strongly influences the bench geometry and extensive scaling of the crest is required.
- Localized rockfall has occurred since the start of freshet. It is understood that it has been retained on the benches. Where possible, this should be documented as it can be used to validate/refine the design of the catch benches.
- The toe of the bench face often breaks to Joint Set C, forming a hard toe that requires hammering. The practice of hammering or trim blasting to remove the hard toes is important for maintaining the catch bench width / capacity and eliminating "ski jumps".

Whale Tail Open Pit

Observations - South Wall

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

- Final wall in Design Sectors H6 (Diorite) and potentially H5.
- In 2022, the mine switched to double-benching using 10.5 m flitches in the waste (Diorite) instead of triple-benching using 7 m flitches. This does not appear to have adversely impacted wall performance and has reduced the exposure of personnel.
- The Phase 3 pushback has extended below the water management infrastructure (position of excavator in image below). A soft ramp is currently in place to allow the Phase 3 ramp to be used for pit operations but this will eventually be discontinued.
- Phase 3 is reaching an elevation where Structural Domain 5 is expected to be exposed in the South Wall. North dipping structures within this domain are expected to control the achievable bench face angle and the slope geometry recommendations reflect this. Periodic mapping is recommended to confirm the extents of this domain (and thus where the H5 slope geometry recommendations should be implemented).

Whale Tail Open Pit

Observations - South Wall (Cont'd)

- A sump and horizontal drains were established on the 5081 bench in the South Wall. The goal was to intercept seepage from the base of the talik below the former Whale Tail Lake and prevent the formation of an ice wall directly above the ramp.
- The drains (right photo) were installed in the location of the most prominent seep as a trial. There is sufficient flow from the horizontal drains that they do not freeze in the winter. Other seeps are present along the wall.
- Significant seepage was observed on the bench below the sump (left photo), which will form an ice wall below the 5081 bench. AEM has completed a dye test which suggests that at least some of the seepage is coming from the sump, which is unlined (center photo). However, it is also believed that the talik/cryopeg extends deeper than originally thought and some of the seepage is from groundwater flow. Note that the sump had been purposely drained at the time of the visit.
- AEM is currently reviewing options for improving the water management strategy in this area, including drilling additional drains to intercept and divert more of the seepage to the sump. This is endorsed. Recommend evaluating options for lining the sump to limit re-infiltration of the diverted water.

Whale Tail Open Pit

Observations - Southwest Wall

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

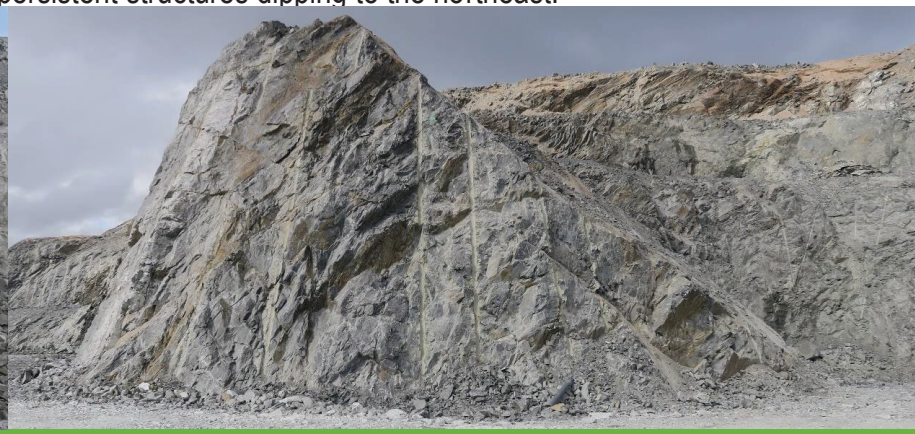
- Final wall in Design Sectors I6 (Diorite) and I1 (predominantly Greywacke).
- The wall is generally performing well. Two main items were discussed:
  - There continue to be challenges with drill and blasting practices resulting in crest loss or hard toes on the benches. Some of the blastholes directly above the future catch benches were sub-drilled, resulting in increased crest loss. It is understood that this has been corrected. However, there is a continued need to review and improve drill and blast practices.
  - Limited evidence of block toppling was observed at the crest of several benches. It is understood that this has not resulted in rockfall to date and that these areas continue to be monitored. The potential for toppling was identified during the original design studies but was not expected to control slope performance.

Whale Tail Open Pit

Observations - Whale Tail EXT (North Wall)

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

- The southwestern end of the WHL EXT has reached its final elevation and no further mining of the northeast wall of the Whale Tail Pit is planned. The central portion of the EXT is planned to be mined a further 14 m down.
- The northwest wall is primarily within Greywacke. The foliation dips to the southeast and the wall performance is sensitive to the relative orientation of the wall and the foliation.
- A few small exposures of Komatiite may be present. A key assumption of the design of this wall was that it would be established within Greywacke. Significant exposures of Komatiite increase the potential for planar failures and would potentially require changes to the slope geometry. This should be carefully monitored.
- A small planar failure occurred where the bench face was established a few degrees steeper than the foliation (left photo). The area was bermed off.
- A prominent nose is present on the northwest wall (right photo), partially defined by persistent structures dipping to the northeast.



Whale Tail Open Pit

Observations - Whale Tail EXT (South Wall)

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

- The south wall is within the Komatiite. The wall was mined in single 7 m high benches without pre-shear.
- The Komatiite is of poor quality and ravelling and small-scale rockfalls are likely. The ramp is located along this wall, increasing exposure. However, it is expected that the risk can be adequately managed through inspections and scaling.
- On-going dewatering activities are planned in this area once mining of the EXT is complete. A rockfall berm should be installed along the inside of the ramp once mining of the EXT is complete to mitigate the risks associated with the rockfall hazard in the Komatiite.

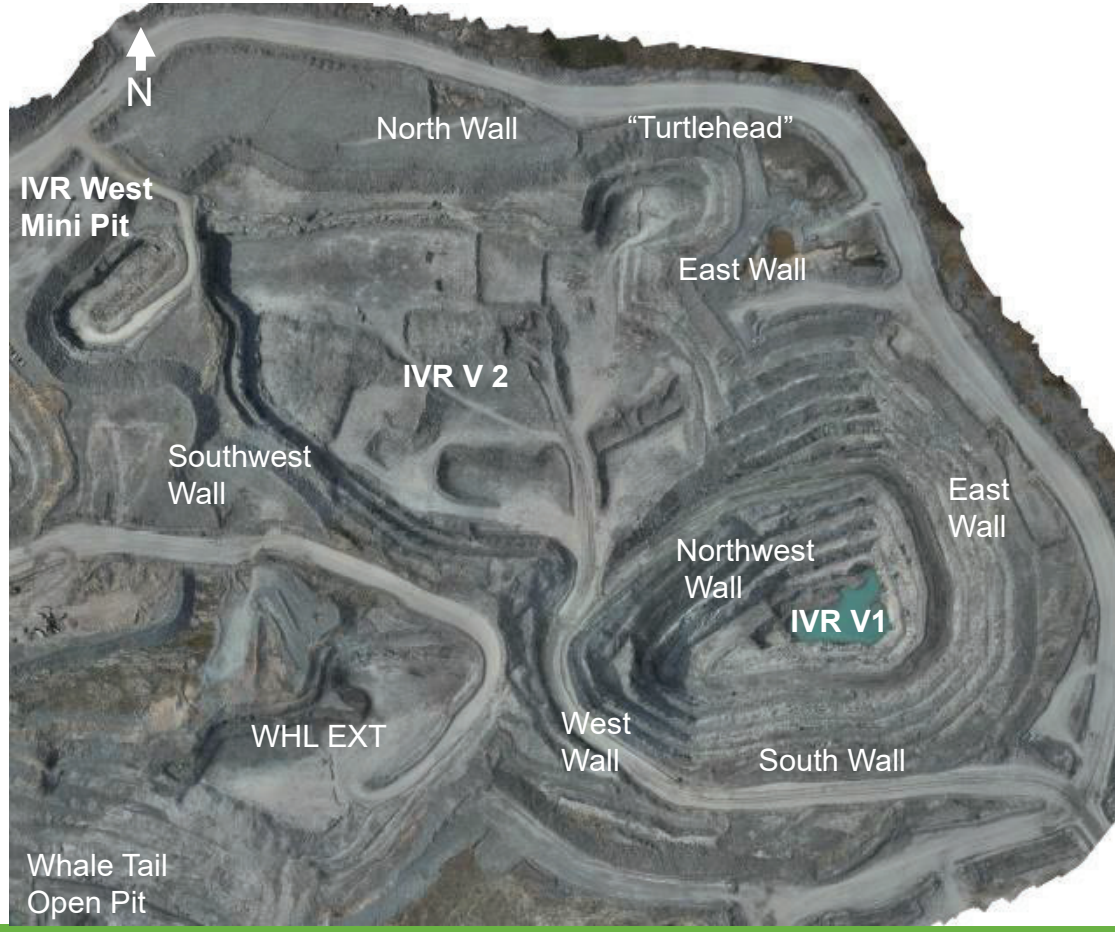
IVR V1 & V2 OPEN PITS

IVR V1 & V2 Open Pits

General

- The IVR V1 and IVR V2 open pits were inspected on July 7, 2023 . 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.

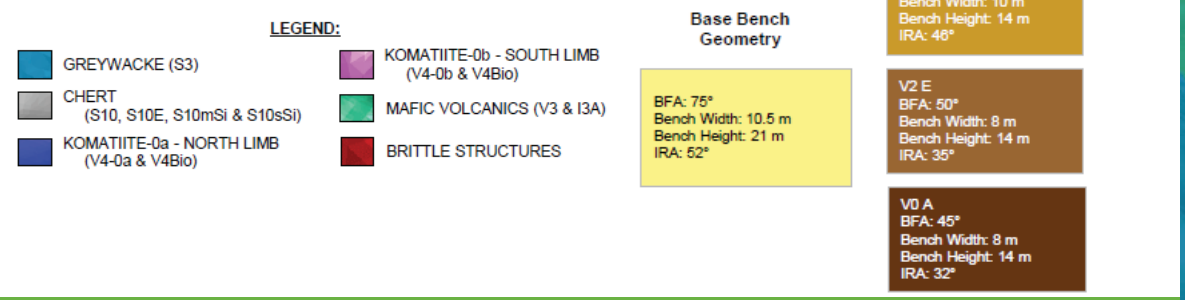
- Note that mining of the IVR V1 open pit is now complete, and access is prevented by a berm. It is understood that it may be used for water management in the future.

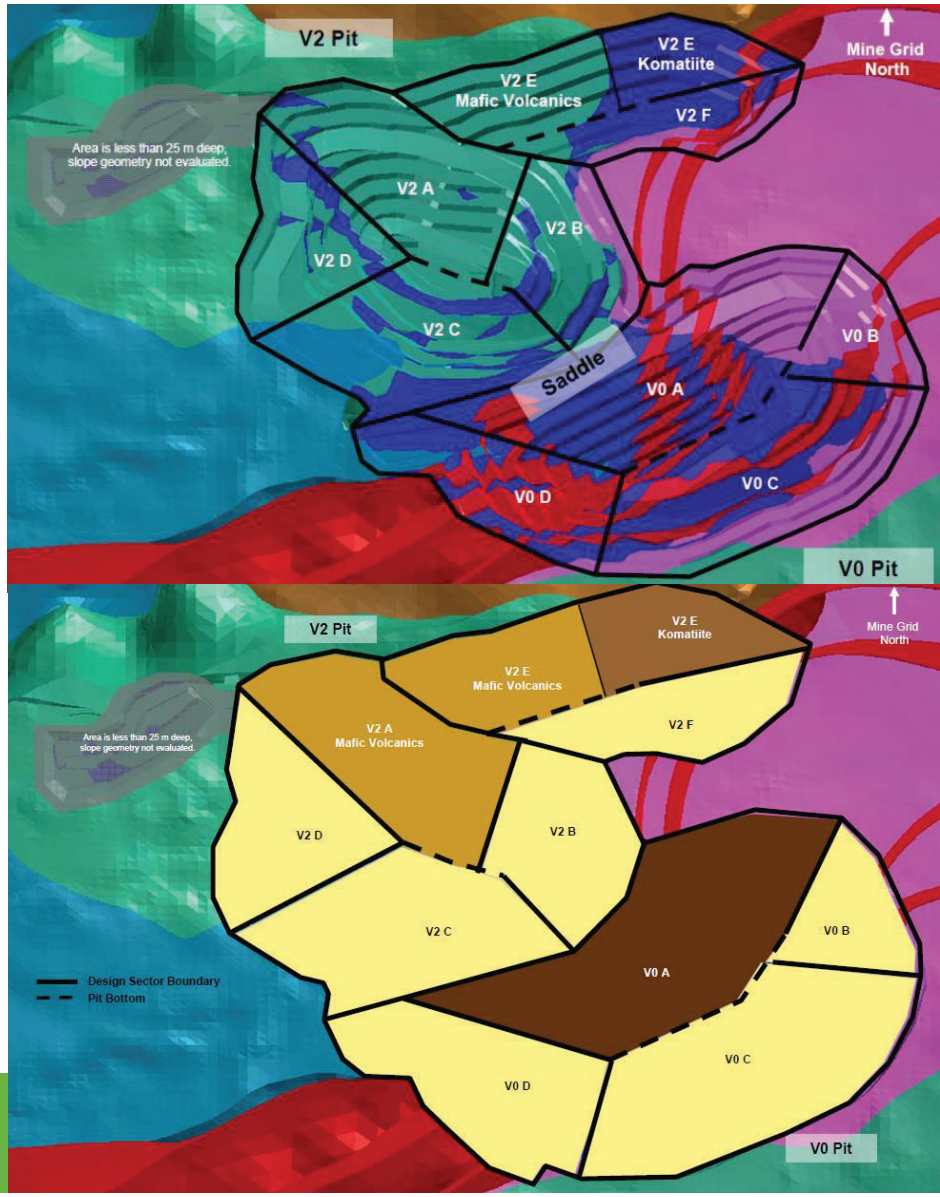


IVR V1 & V2 Open Pits

Design

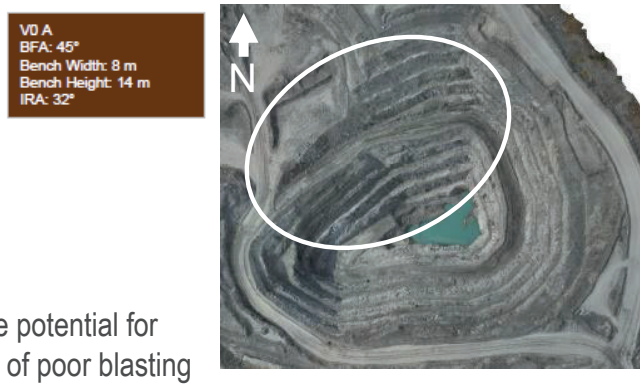
- The design recommendations for the IVR V1 and V2 open pits are shown at right for reference.
- The design sectors are shown at upper right along with the lithologies expected in the final open pit walls. The slope geometry recommendations are shown at lower right.
- Note that the V1 open pit was previously referred to as the V0 open pit and most design documents issued by KP refer to it as such.
- The design recommendations were developed based on the IVR-001-004C design. The current design for the V2 open pit is IVR-V07A. Comments on the revised design are provided at the end of this section.





IVR V1 Open Pit

Observations - Northwest Wall

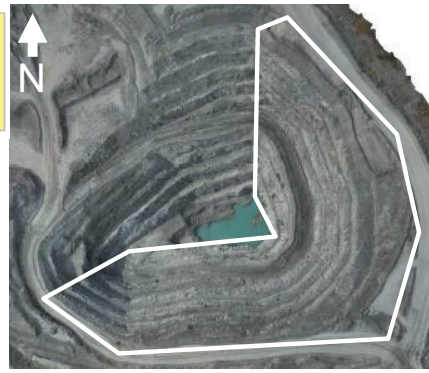


- This is the footwall of the deposit and is primarily within the Komatiite.
- The original design called for the use of staggered blastholes to establish the BFA at 45° in order to limit the potential for bench and inter-ramp scale failures on the foliation. This approach was unsuccessful due to a combination of poor blasting quality control and variability in the orientation of the foliation.
- As a result, the mine trialled a 55° pre-shear and then a 65° pre-shear to define the bench face. The 55° pre-shear trial was successful, but a series of bench scale planar and wedge failures have occurred in areas where the 65° pre-shear was trialled, including four in September 2022. The areas are outlined below.
- The failures outlined in yellow occurred on September 3 and 8, 2022 and were not anticipated. They were investigated as near misses. As a result of these failures, the mine implemented radar monitoring of this wall, reverted to a 55° pre-shear, and prioritized the completion of the V1 pit before the 2023 freshet.
- It is understood that overspill from the V2 open pit was successfully managed, and that very little material reached the ramp during blasts.

IVR V1 Open Pit

Observations - East and South Walls

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



- These walls performed well, with half-barrels visible. The foliation is oriented perpendicular to the Northeast wall and dips into the South Wall.
- Cross-cutting structures resulted in numerous small wedges in the upper benches of the East Wall, and significant scaling was required when the benches were established. There was a concern that the benches would ravel over time. However, to date, very little material has accumulated on the catch benches.
- No particular geomechanical concerns.

IVR V2 Open Pit

Observations - General

- The IVR V2 open pit is in the early stages of mining; approximately two benches have been established.
- These initial benches represent an important opportunity to validate the rock mass characterisation and slope geometry recommendations that underpin the open pit design. Recommend documenting the bench performance and key rock mass characteristics and comparing them to expectations.
- Comments on specific locations within the pit are provided on the following slides.

IVR V2 Open Pit

Observations - North Wall

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

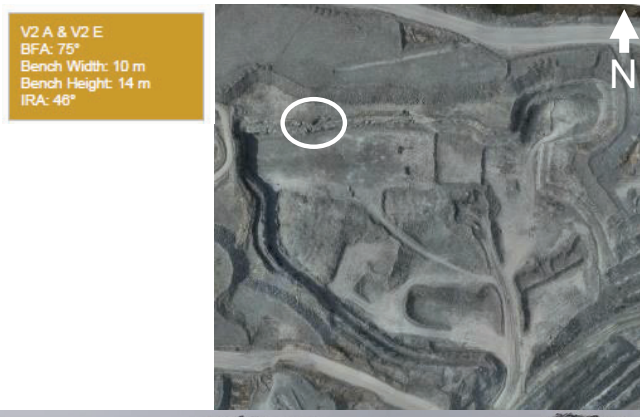
- Final wall established in the footwall of the deposit, primarily within the Mafic Volcanics.
- The initial two benches have generally performed well. Crest loss along the foliation has occurred, as expected. The bench faces in the Mafic Volcanics have often been held at a steeper angle than the dip of the foliation.
- A prominent structure with graphite infill has resulted in a local loss of the catch benches across multiple benches (outlined below). No tension cracks were observed on the crest above the failure. This may be High-Strain/Brittle Structure 18. The rock mass immediately to the east of the failure may be Komatiite, as it is of lower quality and more variable structure. This is not reflected in the lithology model.

IVR V2 Open Pit

Observations - North Wall (Cont'd)

- A possible wedge formed by an undulation in the foliation was identified near the western end of the wall, within the Mafic Volcanics.
- It is understood that a significant effort was made to scale the wedge and that it has not shown evidence of movement or deterioration.
- The wedge should continue to be a focus of the visual monitoring program.

- This is an example of the folding in the foliation that results in considerable local variation in both the dip and strike of these discontinuities.



IVR V2 Open Pit

Observations - “Turtlehead”

- Mining of this area is now complete, and access is prevented with a berm.
- Rockfall hazards were observed in several areas. If access is ever required in the future a visual inspection should be completed and scaling undertaken as required.
- The gaps in the thermal cap and exposed overburden identified in 2022 (example outlined below in white) continue to be present along the crest of the upper bench. Section 1.135 of the Nunavut Mine Health and Safety Act requires unconsolidated material to be excavated back a minimum of 2 m from the crest. Given the lack of exposure, the requirement for remediation should be confirmed with the WSCC.

IVR V2 Open Pit

Observations - East Wall

- The East Wall is performing well.
- The lowermost bench was recently established and still needs to be scaled.
- The noses formed with the Turtlehead and with the IVR V1 open pit represent potential rockfall hazards and should continue to be a focus of the visual inspections.

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

IVR V2 Open Pit

Observations - West Wall

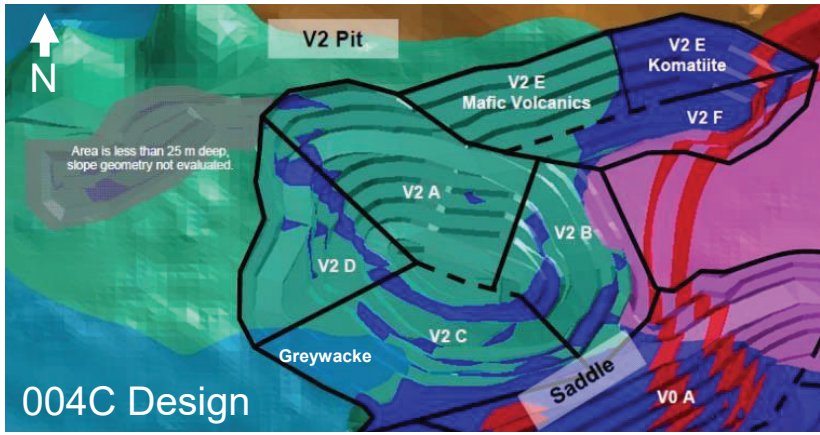
BFA: 75°
Bench Width: 10.5 m
Bench Height: 21 m
IRA: 52°

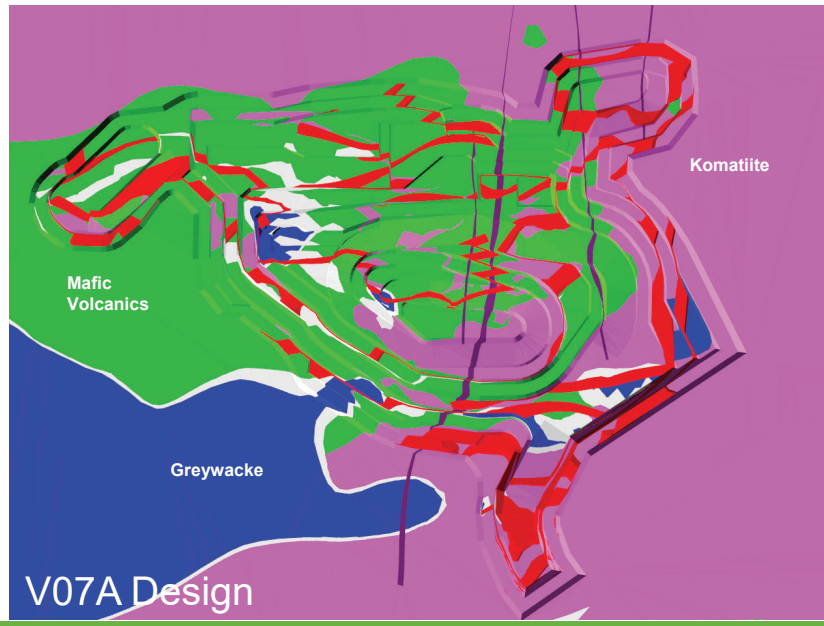
- The rock mass structure and quality is favourable is this sector and have not limited the achievable bench geometry.
- However, Drilling and Blasting practices are having a strong influence on bench performance, with hard toes, crest loss, and frozen rock on the face observed regularly along this wall. Irregularly spaced half-barrels were observed in some areas. It is likely that the design catch bench width is not being consistently achieved. These practices are discussed in greater detail later in this presentation (Slide 60).
- A series of discontinuities dipping to the east have locally resulted in crest loss of one of the benches (outlined in white below). These discontinuities approximately correspond to Joint Set E observed in the underground development.
- The northern end of the wall (not shown in image below) was established below the former Lake A49 and the uppermost bench is characterized by a oxidized and blocky rock mass.
- The nose between the V1 and V2 open pits represents a potential rockfall hazard and should continue to a focus of the visual inspections.

IVR

Review of IVR V2 Open Pit Design

- The current V07A design of the IVR V2 open pit is substantially different from the 004C design that formed the basis for the 2020 feasibility study for the IVR open pits:
  - The West Wall (V2D design sector) has been rotated counter-clockwise.
  - The ramp has been reconfigured and crosses the North Wall (footwall) in a lower position. A substantial step-in has been incorporated into the upper North Wall.
  - The lobes at the eastern and western ends of the North Wall have been modified. The western lobe is now the IVR West Mini Pit and the eastern lobe is the Turtlehead.
- Many of the changes generally result in increased flexibility from a rock mechanics perspective (e.g., the step-in on the footwall).
- These changes are of sufficient magnitude to justify a review of the design basis for the open pits.
- The changes were discussed with the site team and comments are provided on the following slide.



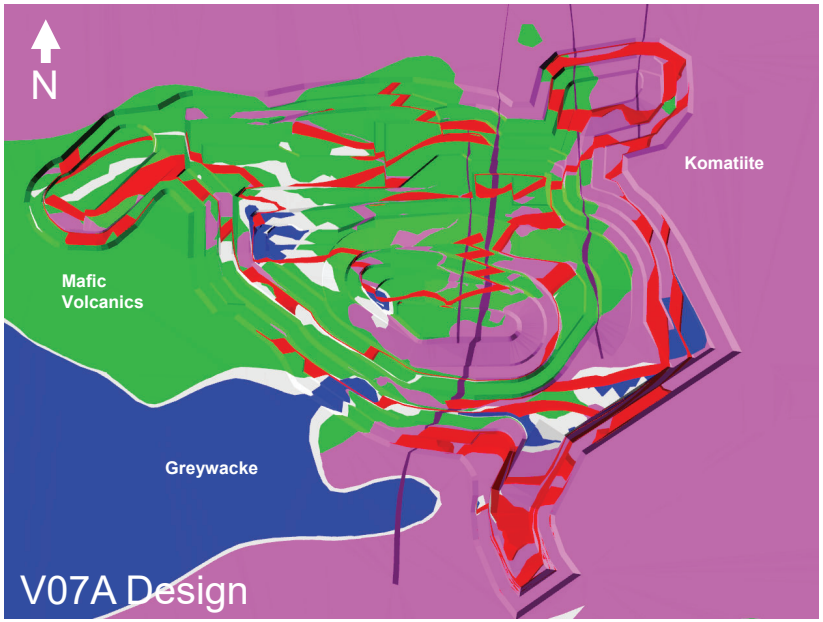


IVR

Review of IVR V2 Open Pit Design (Cont'd)

- The North Wall of the V2 open pit was designed to be within the Mafic Volcanics rather than the Komatiite in order to reduce the potential for bench- and inter-ramp scale planar failures on the foliation. If the wall is established in the Komatiite, a shallower slope would be required.

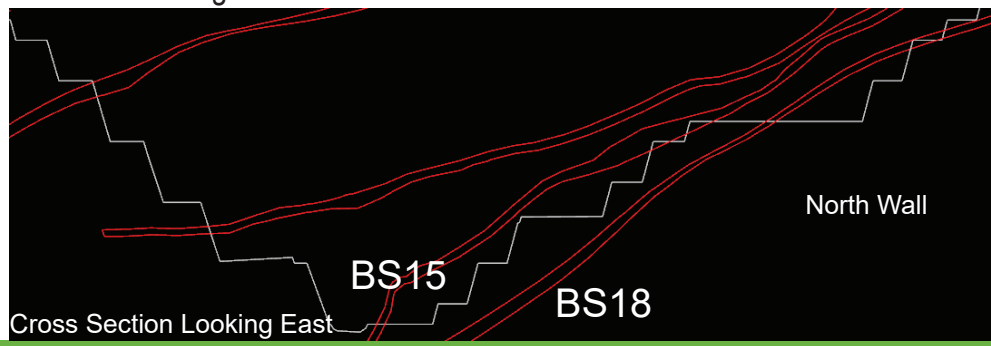
- The North Wall of the V07A design is still predicted to be within the Mafic Volcanics. However, Geology has noted that the lithological interpretation for IVR is complex and that the modelled lithologies do not necessarily agree with the drillhole data. The broad trends are still thought to be generally reliable. On-going geological mapping to verify that the North Wall is in fact being established in the Mafic Volcanics is recommended.



IVR

Review of IVR V2 Open Pit Design (Cont'd)

- The High-Strain / Brittle Structure model did not cover the North Wall of the V2 open pit at the time the open pit slope geometry recommendations were developed. The model has since been expanded and refined. Brittle Structure 18 is modelled immediately behind the wall and Brittle Structure 15 is modelled along/immediately inside the wall (see image below).
- As modelled, the orientation of the high-strain / brittle structures is much more consistent than that of the modelled lithology contacts. Jonathan Servais (AEM 3D Modelling Geologist) indicated that he has the least confidence in the structures modelled in the IVR V2 open pit. It is possible that thrust faults are present in IVR V2 and that the modelled folds are actually displacements/offsets in the structures along these thrust faults.
- Brittle Structure 18 is currently classified as a Minor Structure and the RQD data suggests it is more prominent / consistent in the upper half of the pit and reduces in prominence / confidence with depth.
- The performance of the North Wall will be sensitive to the position, orientation and persistence of these structures. If the current structural model is correct, there is significant potential for an inter-ramp scale failure. If the modelled structures represents a series of structures, they are more likely to result in bench-scale failures. The uncertainty in the geological interpretation increases the geomechanical risk in this area.
- KP is reviewing the slope geometry recommendations for this wall as part of an on-going study. Guidance is expected in late February 2024.
- Limited structural mapping is being completed in the open pits. It is recommended that mapping be completed regularly, focussing on large-scale structures such as the high-strain / brittle structures. The goal is to validate and refine the structural model and assess the potential for multi-bench or inter-ramp scale failures.



IVR WEST OPEN PITS

IVR West Open Pits

General

- The IVR West 1, IVR West 2 and IVR West Mini Pit open pits were inspected on July 7 and 8, 2023. Observations made during the inspection are summarized on the following slides.
- The approximate current pit geometry is shown at right.
- Mining of all three open pits is now complete.

- IVR West 1 has been partially backfilled with waste rock and access is no longer possible.
- IVR West 2 was being used for water management. It is understood that this is no longer required and the open pit will be closed.
- The IVR West Mini Pit was referred to as the IVR V2 Extension during the 2022 annual inspection.

IVR West Open Pits

Observations - IVR West 1

- Mining of the IVR West 1 pit is complete and the open pit is being backfilled with waste rock placed by end-dumping from the crest.
- A berm has been constructed on the ramp to prevent access to the open pit.
- The controls in place appear to be adequate to manage the expected hazards.

Looking Southwest

IVR West Open Pits

Observations - IVR West 2

- Mining of the IVR West 2 pit is complete. The pit was being used for water management at the time of the inspection. Over the last winter, it was allowed to partially flood and access was prevented by a berm. Prior to freshet, a pump was installed and the water level lowered.
- Several rockfall hazards were identified during the 2022 annual inspection and it was recommended that a berm be installed along the inside of the ramp before the pit was used for water management. This was not done. Loose rock was observed above the pump (circled in black).
- During development of a pad above the north wall, large rocks were pushed over the crest, accumulating on the ramp and the catch bench (circled in white). The pump was then installed adjacent this area. The rockfall hazards were not reported by the crew installing the pump nor identified in any of the Rock Mechanics inspection reports. It is understood that a rock mechanics inspection was not completed before crews re-entered the inactive pit to install the pump. This represents a breakdown of multiple processes at the site.
- The pump was removed during the inspection and access to the open pit was prevented with a berm.

Looking Northeast

IVR West Open Pits

Observations - IVR West Mini Pit

- Mining of the open pit is complete.
- Most of the open pit was established in the Mafic Volcanics, with limited intervals of Komatiite. The performance of the benches along the footwall have been influenced by the foliation dipping into the pit, with the crests breaking back to the foliation.
- Prominent quartz veining is observed.
- A berm has been constructed on the ramp to prevent access to the open pit.
- The controls in place appear to be adequate to manage the expected hazards.

Looking Southwest

AP5

AP5

Observations

- Attenuation Pond 5 is a former quarry located to the east of the WHL open pit that is now used for water management. The pond was inspected on July 8, 2023.
- 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.
- Pumps were present at the time of the inspection.

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
    - Drone inspections
    - Official wall inspections
    - Bench approvals
  - Slope Stability Radar (SSR) monitoring
  - Instrumentation, consisting of piezometers, thermistors, and a TDR. Additional instruments are planned in the future.
- Maptek LiDAR scans are used to document the achieved slope geometry but are not used for monitoring.

Monitoring and Inspections

Visual Inspections

- The frequency of each inspection, the person responsible and the communication of the observations are defined in the GCMP (at right).
- The routine and special visual inspections are documented with photos and summarized in emails. The documentation focuses 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.
- Comments:
  - The inspections now include a series of overview photos to generate a record of wall performance over time.
  - The GCMP now defines cases where additional inspections are to be completed.
  - The drone inspection commitment in the GCMP has been revised. Drone inspections are now completed on a monthly basis during the summer.
  - The open pit crest is now inspected for evidence of instability on a monthly basis as part of the drone surveys.

Table 5-5: Summary of Inspection Program

Structure	Responsible	Type	Frequency	Reporting	Distribution List
Whale Tail and IVR pit	Rock Mechanics Engineer or Technician	Routine visual inspection	1 x 2 days	Email highlighting the main observation and conclusions	Meadowbank Mine Operation Supervisors
		Pit wall approval inspection	Every drill and blast pattern adjacent to a pit wall	Pit wall approval sheet	Meadowbank Mine Operation Supervisors, D&B Engineering and Surveyors
		Official wall inspection	Biweekly	Wall inspection map and report	Surveyors, Grade control, Mine Ops, E&I, Environment, Mine inspector, Geology team
		Drone inspection	Monthly from May to September	Email highlighting the main observation and conclusions. Quarterly ground control report.	Meadowbank Mine Operation Supervisors
		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
	Rock Mechanics Engineer and third-party reviewer	Annual pit slope performance	Once per year	Annual pit slope performance review	Mine inspector, Regulators

Monitoring and Inspections

Hazard and Action Item Tracking

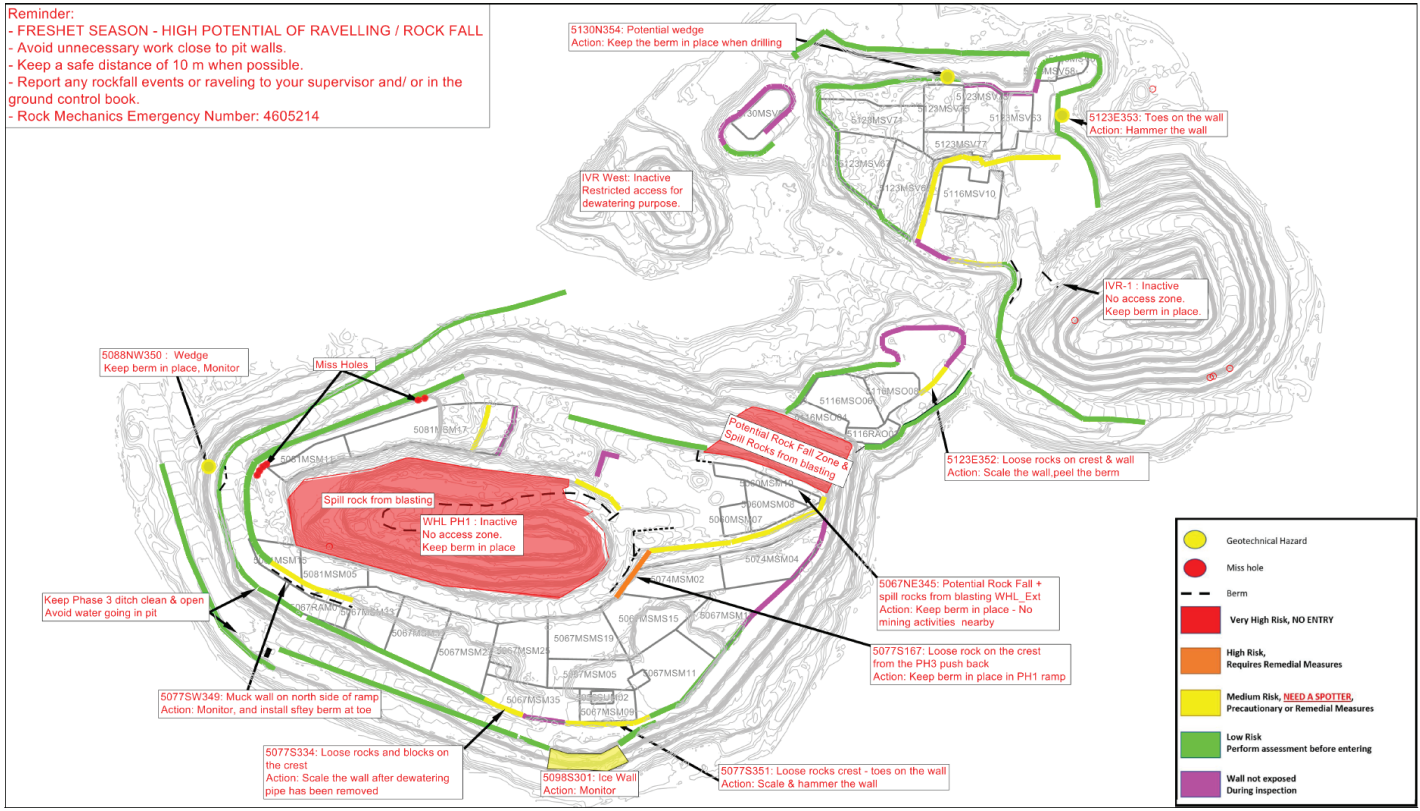
- Hazards, the associated risk rating, and any required corrective actions are tracked in a database. An example from the database is shown below.
- A total of 84 hazards were identified between July 2022 and July 2023. The most common hazards (70) are associated with rockfall hazards or loose. The remainder are typically associated with hard toes or icefall hazards.
- A due date to complete the corrective actions is specified. Often it is linked to an action rather than a date (e.g., “before drilling adjacent pattern”). Overdue items are not flagged. Recommend setting up a mechanism within the database to flag overdue corrective actions so that they aren’t overlooked.
- Not all identified hazards are documented in the Hazard Tracking Database. For example, the rockfall hazard identified above the ramp in the IVR West 2 Pit during the 2022 annual inspection was not documented and had not been mitigated prior to the 2023 annual inspection. No hazards were recorded in the database in July or August 2023. All identified hazards should be documented. Consider tracking the number of entries each month to monitor both wall performance and how well the database is being used.

Date	ID	Pit/Quarry	Bench	Geotechnical Hazard	Corrective Measure	Due date	Completed (Yes/No)	ate complete	pproved b	Status
04-09-2023	5130S335	IVR-2	5137	Loose rocks and some toes on the mid to lower section of the wall.	Scale and hammer the wall up to preshear barrels. Remove debris.		YES	NA	CT	4
04-09-2023	5025S336	IVR-1	5032	Overhang and blocky materials on the crest.	Wedge partially scaled, the remianing looks solid. Monitor the wedge during drilling activities.	Before freshet	NO	NA	AH	4
04-09-2023	5123NE337	WHL-EXT	5130	Cracked wall on the NE forming a wedge.	Scale the wall and remove the wedge as soon the wall is exposed.		YES	NA	CT	4
04-09-2023	5123SE338	WHL-EXT	5130	Loose rocks on exposed wall.	Scale as BB taken.		YES	2023-04-19	CT	4
04-09-2023	5081NE339	WHL-PH3	5088	Muck pad install for drilling.	After mining out the POP, scale the wall and hammer toes.	After the blast 5081MSM13	YES	NA	CT	4
04-09-2023	5088NW340	WHL-PH3	5088	Loose rocks and some toes.	Scale the wall and ahmmer toes. Remove debris.		YES	2023-04-23	CT	4
04-09-2023	5081NW341	WHL-PH3	5081	Loose rocks, scrabs and boulders on the crest.	Scale the wall and the whole crest.	Before 5081MSM09 & 5081MSM11 pattern	YES	2023-05-23	AH	4

Monitoring and Inspections

Hazard / Risk Assessment

- Identified hazards and the required mitigation work are tracked on a Hazard Map available to the workforce that is updated every two weeks.
- Comments on the maps and their integration with work near the pit walls is provided on the next slide.
- There continues to be limited guidance on how to select the risk ratings. Recommend providing detailed guidance, including examples, on how to determine these ratings. The goal is to ensure that each member of the Rock Mechanics team can perform the assessment in a consistent and reliable manner.
- Note that, strictly speaking, these are hazard ratings and not risk ratings.

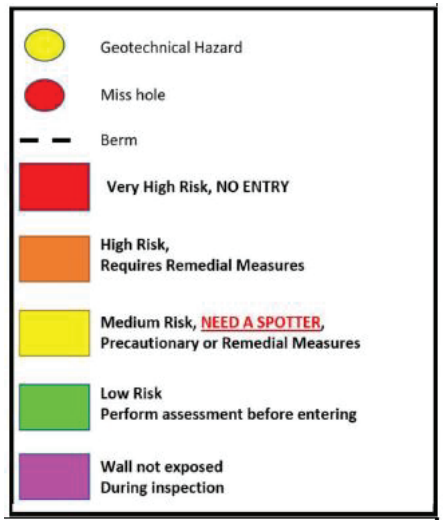


Monitoring and Inspections

Hazard / Risk Assessment (Cont'd)

- The hazard maps form the basis for the risk-based Work Close to Pit Wall procedure, which is a key process for managing geotechnical risk (excerpt shown at right).
- The procedure was reviewed and updated in June 2023. The primary change is that the legend on the hazard map has been refined to note the requirement for a spotter when working within a Medium Risk area (Yellow Rating).
- Concerns were raised during the 2022 inspection about awareness of the procedure and how reliably spotters were used when working in Medium Risk areas. Annual refresher training was provided on the procedure. It is understood that personnel working close to the walls (e.g., surveyors, blaster, geologists) commonly work in pairs and that the Pit Supervisor is available to act as a spotter if someone is working alone.
- The hazard maps now focuses on rock mechanics hazards. While corrective actions related to the identified hazards are noted on the map, the corrective actions are primarily communicated and tracked through the Pit Wall Approval procedure and the Hazard Tracking Database.
- There are multiple hazards documented in the Hazard Tracking Database that have been removed from the Hazard Maps as they are located in inactive areas. This addresses the short-term risk but there is currently no mechanism to ensure these hazards are revisited or mitigated before mining resumes or other access is required for other activities (e.g., dewatering).

- Red Zone: An area defined as very high risk.
- Orange Zone: An area defined as high risk. It is a section of the Pit Walls requiring remedial work.
- Yellow Zone: An area defined on the Wall Inspection Map as medium risk. It is a section of the Pit Walls requiring remedial work or precautionary measures, as well as a spotter.
- Green Zone: An area defined on the Wall Inspection Map as low risk. It's a section of Pit Wall where no special work is planned, but an initial assessment is always performed before approaching wall.
- Purple Zone: An area defined on the Wall Inspection Map as an area where the wall was not exposed at the time of previous inspection.



Monitoring and Inspections

Bench Approval Process

- Rock Mechanics completes a Pit Wall Approval for all benches on the final walls (both ultimate pit and interim stages). This process is a key control for managing potential rockfalls and bench-scale instabilities and is formalized within the Pit Wall Approval procedure.
- 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 flitch is established and before work resumes in the area. A standard two-page report is issued each time.
- The communication of wall approvals has been improved since the 2022 audit. The status of the approval process is now reviewed for each of the upcoming patterns during the daily production meetings.
- The mine is in the process of updating the Pit Wall Approval procedure so that patterns are only released to Survey once the required wall approvals are completed. This is endorsed.
- Approvals in key sectors (e.g. WHL F6) are now to be completed by experienced staff (i.e., not a student).
- The use of a checklist to improve consistency between staff and avoid hazards being missed continues to be recommended.

Monitoring and Inspections

SSR - General

- The mine has two GroundProbe SSR-XT real aperture radars. Typically, one radar covers the north wall of the Whale Tail Pit while the other radar covers the south wall (see image at right). However, one radar was moved to cover the IVR V1 open pit footwall at the end of mining in that pit.
- The Ground Control Monitoring Using Radar System procedure sets out responsibilities and how the SSR data are to be communicated. The procedure was last revised in February 2023.
- 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 Grey, Orange and Red alarms. In practice Red alarms are not used and the current monitoring strategy relies on an experienced operator who is familiar with the historical slope performance and is comfortable interpreting the data and adjusting the triggers for the Orange alarms on a case-by-case basis.
- Neither the procedure nor the GCMP explain why the alarms have been set at their current values or provide actionable guidance on how they can be adjusted based on different circumstances. While it is recognized that it is not practical to cover all eventualities, recommend providing additional guidance on how to define alarm criteria.
- The alarm parameters were last reviewed in 2021. The parameters should be reviewed annually.
- Someone from Rock Mechanics is designated as being on-call and has a pager if they cannot be immediately reached or it is night shift.

Example	Signification	Dispatcher's response
GREY 	No to low risk system or equipment issues	➢ Contact Rock Mechanics personnel. The appropriate number will display on Alarm message ➢ Sepura # - 4605214 ➢ Ext: 4606920
ORANGE 	Low Risk Wall Movement or noise	➢ Contact Rock Mechanics personnel. The appropriate number will display on Alarm message ➢ Sepura # - 4605214 ➢ Ext: 4606920
RED 	HIGH Risk Wall Movement or noise	➢ STOP operations in area ➢ Evacuate area ➢ IMMEDIATELY CALL ROCK MECHANICS PERSONNEL ➢ Sepura # - 4605214 ➢ Ext: 4606920

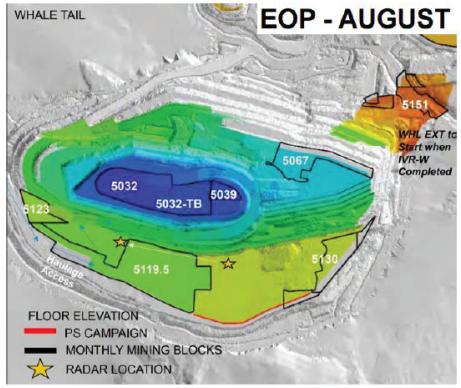
Monitoring and Inspections

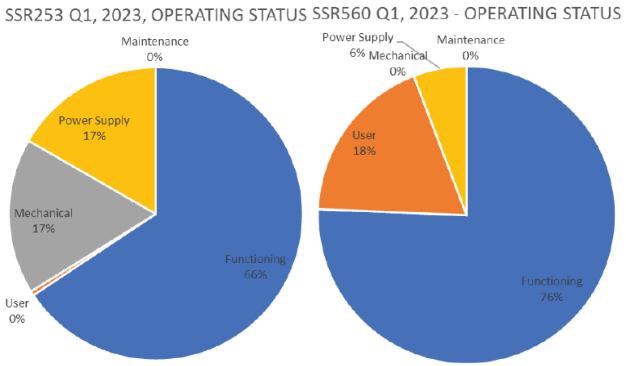
SSR Monitoring - Coverage

- The mine reviews the expected radar coverage relative to the planned mining as part of the quarterly reports (example at right). This is endorsed.
- Radar availability has improved since 2022. However, there continue to be challenges in radar availability:
  - Radar SSR253 was operating 66% of the time in Q1 due to power supply and mechanical issues, increasing to 95% in Q3. Data are not available for Q2.
  - Radar SSR560 was operating 76% of the time in Q1 due to an issue with the external power supply, increasing to 81% in Q3. The periods of non-availability in Q3 are associated with frequent moves (10) over the period due to extensive mining in Phase. Data are not available for Q2.
- The radar is the sole quantitative monitoring system for the open pit slopes, and periods of downtime significantly impact the mine's ability to manage geotechnical risk.
- The mine has now formally identified sectors of the open pit where the SSR is critical for achieving an acceptable level of residual risk (e.g., D4K, Phase 1 North Wall). These are documented in the Monitoring Procedure but have not been communicated outside of the Rock Mechanics team.
- If a radar goes down, a Grey Alarm is triggered. On Day Shift, the Rock Mechanics team would respond and pull people out of these sectors. On Night Shift, Dispatch would receive the alarm but their procedure is not to contact the Rock Mechanics on-call person for Grey Alarms. As a result, most of a night shift could go by without radar coverage. Recommend empowering Dispatch to pull people out of the formally defined critical areas, at least on NS.

MONITORING OF NORTH WALL

Exact location for the radar to be determined. It will be critical to monitor the NE wall once activities resume in Phase 2, however it may interfere with mining of 5130 bench in Phase 3. Blasts are typically directed to the west. Moving the radar out for each blast may be required.





Monitoring and Inspections

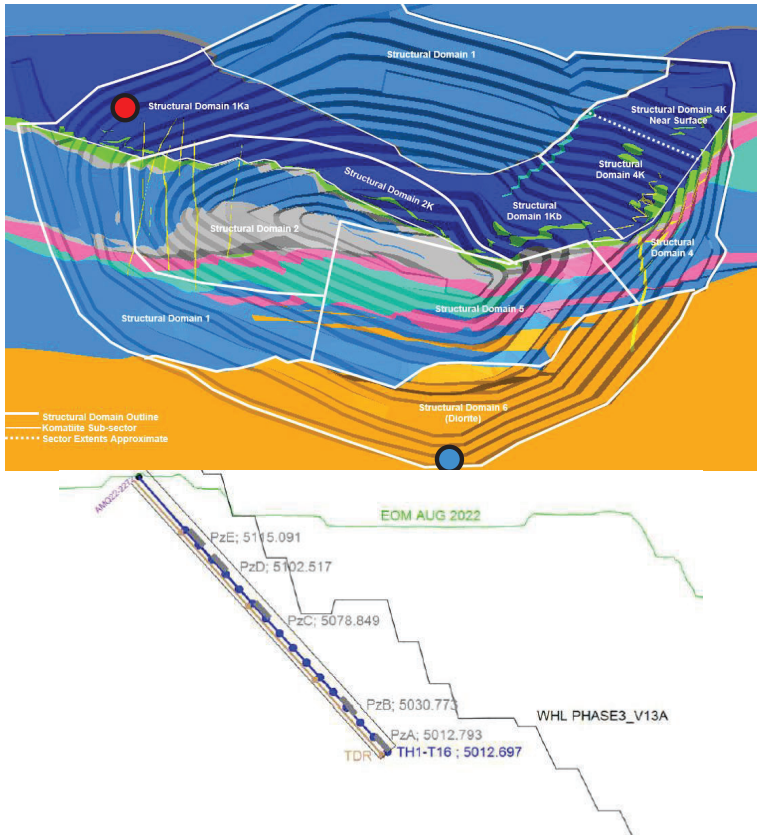
SSR and Surface Monitoring

- At the time of the site visit, the SSR was involved in the forecasting of 1 of the 5 reported slope failures that had occurred since the previous annual inspection in August 2022. All of these failures occurred in the IVR V1 open pit and the radar was not being used to monitor the pit when the other 4 failures occurred.
- The design of the IVR V2 open pit North Wall is sensitive to the position and orientation of the High Strain / Brittle Structures, as well as the presence of Komatiite. This is one of very few design sectors at Amaruq where the potential for inter-ramp scale failures limited the slope design and no instrumentation is currently installed in this slope. As a result, it is recommended that the mine plan for full-time SSR coverage of the North Wall of the IVR V2 open pit once mining extends further to depth in 2024.
- 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. The mine is trialing the use of corner reflectors as history / reference points for the SSR. This initiative is endorsed.
- An additional surface monitoring system, such as prisms or GPS beacons, has been recommended in previous annual inspections to complement the SSR, provide a long-term deformation baseline, and to allow the true displacement vector to be measured. The Rock Mechanics team has researched the use of GPS beacons, but the purchase of these beacons had not been budgeted or planned at the time of the audit. GPS beacons should be budgeted and installed (e.g., on the Northeast Wall of the Whale Tail pit).

Monitoring and Inspections

Sub-Surface Monitoring

- The sole geotechnical instrument being actively monitored in or around the open pits is a TDR installed in the South Wall of the Whale Tail pit (blue dot at right). The TDR is not showing any evidence of slope movement.
- Vibrating wire piezometers and a thermistor string were installed in the same hole as the TDR in order to monitor the hydrogeological conditions within the talik exposed in the south wall. The mine has done a nice job summarizing and reviewing the data. The data show a clear response to mining and are consistent with a gradual drawdown of the piezometric surface as mining extends to depth.
- An additional thermistor was installed in March 2023 in the Northwest Wall of the Whale Tail pit (red dot at right) to a depth of 14 m behind the wall. The intent was to better understand the active layer within the slope. The thermistor is not currently being actively monitored.
- The mine has budgeted an instrumentation program for the Northeast Wall of the Whale Tail pit in 2024. The plan includes a combination of Shape Accelerometer Arrays (SAA) and vibrating wire piezometers (including integral thermistors) in two drillholes to provide sub-surface data that can be used to better define potential deeper-seated instabilities. The proposed instrumentation plan is considered reasonable. However, the original plan was for three instrumented drillholes which provides greater coverage of the slope and increased redundancy. Recommend reverting to the original plan.
- The instrumentation should be expanded as mining progresses (e.g., Design Sector A1K).



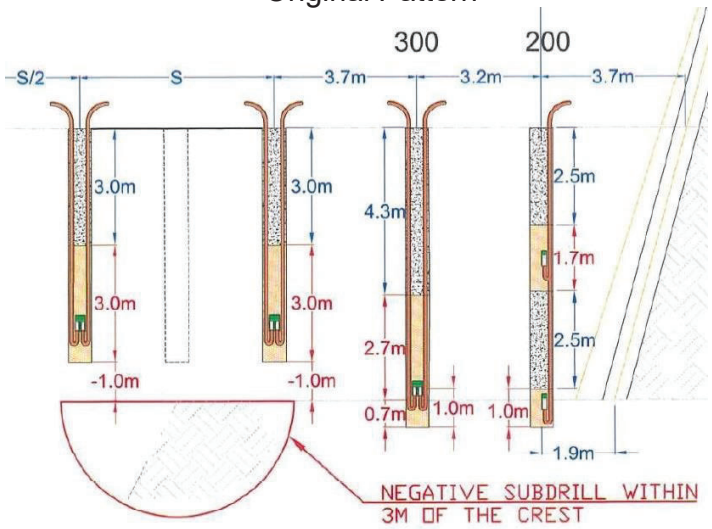
Cross Section of TDR/VWP/Thermistor String in South Wall

Monitoring and Inspections

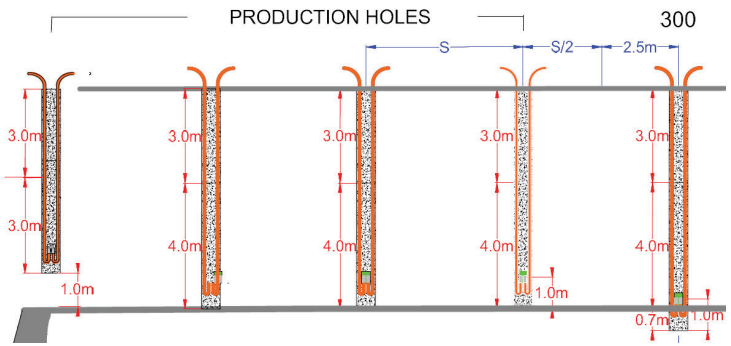
Blasting

- The Third-Party review identified limitations in drilling and blasting practices as having a significant effect on wall performance and whether or not the design bench geometry was achieved. Two key limitations were the lack of quality control for the drilling and the use of a limited number of blast patterns for a wide range of conditions.
- The mine commissioned DynoNobel to review the blasting practices in 2022. Dyno recommended the use of stemming, air decking and larger diameter holes, and provided several trial patterns.
- The mine completed initial trials in 2022 but has not advanced this further, primarily due to changeover in key drill and blast personnel. Blasting practices continue to have a strong influence on bench performance and it is recommended that work on the trial patterns resume.
- The mine has chosen not to implement a quality control program for drilling and blasting. As the issues identified during the Third-Party review continue to impact bench performance, a quality control program continues to be recommended.

Original Pattern



Updated Pattern



Ground Control Program

Ground Control Program

General

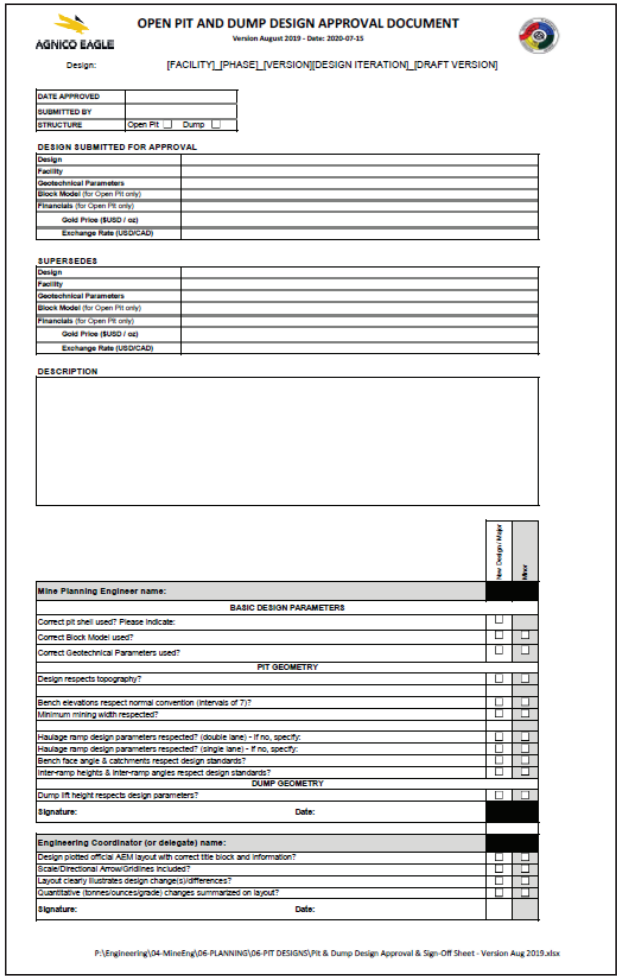
Comments on the following aspects of the ground control program for the open pits are provided on the following slides:

- Mine Design Input and Review
- Quarterly Summary Reports
- Data Collection and Design Verification
- Rockfall Database
- Resources and Training
- Ground Control Management Plan (GCMP)

Ground Control Program

Mine Design Input and Review

- The rock mechanics team provides input to mine design and planning process as follows:
  - **Bench Master -** The Bench Master is reviewed by the rock mechanics team as part of the sign-off process (example at right).
  - **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 rock mechanics considerations identified. Key decisions are documented in meeting minutes.
  - **Three Month Rolling Mine Plan (3MR) -** The rock mechanics team provides input to the 3MR as part of the mine planning meetings. High-level comments are documented in an overall summary presentation.
  - **Budget Mine Plan -** The rock mechanics team reviews the mine plan and key geomechanical considerations are summarized in a series of slides.



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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

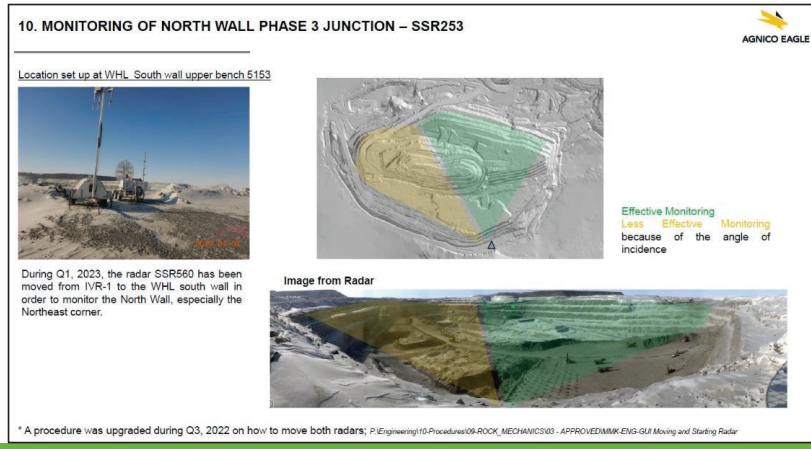
	New Design Major	Minor
Mine Planning Engineer name:		
BASIC DESIGN PARAMETERS		
Correct pit shell used? Please indicate:	☐	
Correct Block Model used?	☐	☐
Correct Geotechnical Parameters used?	☐	☐
PIT GEOMETRY		
Design respects topography?	☐	☐
Bench elevations respect normal convention (intervals of 7)?	☐	☐
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

Quarterly Summary Reports

- The mine has committed to producing a report every quarter that summarizes the slope performance, monitoring and instrumentation activities, and rock mass characterization data collected over the reporting period. Progress updates are also provided on any projects.
- At the time of the inspection, the Q1 and Q3 reports had been completed in 2023 but not the Q2 report. These reports are an important verification activity and should be completed as planned.
- The reports are a clear and effective summary of Rock Mechanics activities in the open pits. The following comments from previous annual inspections remain applicable:
  - The reports include a dashboard summary of the activities complete, but there is no reference to the commitments in the GCMP. Recommend including a column in the dashboard indicating the target frequency for the tracked items.
  - Consider including a slide commenting on the effectiveness of the mine's controls (e.g., radar alarms, prior identification of rockfalls, etc.).
- In addition, while the reviews of the bench performance summarized in the reports are well done, the results are not consistently compared to expectations / the design basis. Recommend directly comparing the results of the bench performance reviews to the bench design (e.g., does the backbreak exceed the amount that was designed for?).



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 each 150 m along the length of the benches in the final walls.
  - Maptek LiDAR scans are completed for all benches on the final walls.
- Slope Performance
  - Bench backbreak is measured for the final walls using Maptek scans on a periodic basis and reviewed as part of the quarterly reports.

Comments on these activities are provided below.

- The geomechanical mapping is not reliably completed (i.e., 5 locations were mapped in Q1 of 2023 and none were mapped in Q3). Additional mapping should be completed, particularly during the summer months when the bench faces are clear of snow.
- The mapping since the last annual inspection has been focussed on Sector F6 of the Whale Tail pit. It should also include Sector A1K, D4/D4K of the Whale Tail pit and Sectors V2A and V2E of the IVR V2 pit.
- See comments on previous slide about the reconciliation of bench performance.

Table 5-6: Wall performance trend and actions

Trend	Actions
Wall performed as expected	- No action required
Wall performed less than expected	- Identify potential cause - Notify designer - Develop mitigation plan and implement specific action plan with the different stakeholders (Rock Mech., Designer, Mine planner, Production, Mine Operations).
Wall performed better than expected	- Identify possible cause - Notify designer - Evaluate the possibility of using more aggressive slope parameters with the different stakeholders (Rock Mech., Designer, Mine planner, Production, Mine Operations)

Table 5-7: Summary of Data Collection and Analysis Program

Structure	Responsible	Type	Frequency	Reporting	Distribution list
Whale Tail pit and IVR pit	Rock Mechanics Engineer or Technician	Wall mapping	One spot mapping at every section of 150m of final wall (21m high)	-	-
	Survey team	LiDAR or Drone wall scanning	Monthly	-	-
	Rock Mechanics Engineer or Technician	Quarterly ground control report	Quarterly	Quarterly ground control report	Engineering team, EoR & Mine Ops if required

Ground Control Program

Rockfall Database

- Rockfalls are to be recorded in the Rockfall Database.
- Six rockfalls have been recorded since the previous annual inspection in July 2022. Of these, five occurred in the IVR V1 open pit and one occurred in Phase 1 of the Whale Tail open pit. These represent bench-scale instabilities.
- On April 15, 2023 a rockfall occurred when Dewatering personnel were moving a water line carrying water out of the WHL pit via the pit crest. The rockfall fell onto a pattern where the blasters were working. An investigation was completed, and it concluded that the primary cause was a lack of communication between the Dewatering and Drill & Blast teams, the absence of a procedure for moving a pipe hanging on the wall (there is a procedure for dropping one down the wall), and a poor risk assessment. As a result of the investigation, Dewatering personnel now take part in the overall daily planning meetings. However, this event was not recorded in the rockfall database.
- There is a need to define criteria for what type of events are recorded in the rockfall database. Events that resulted in injury or damage, or could plausibly have done so under different circumstances, should always be recorded in the database.

Ground Control Program

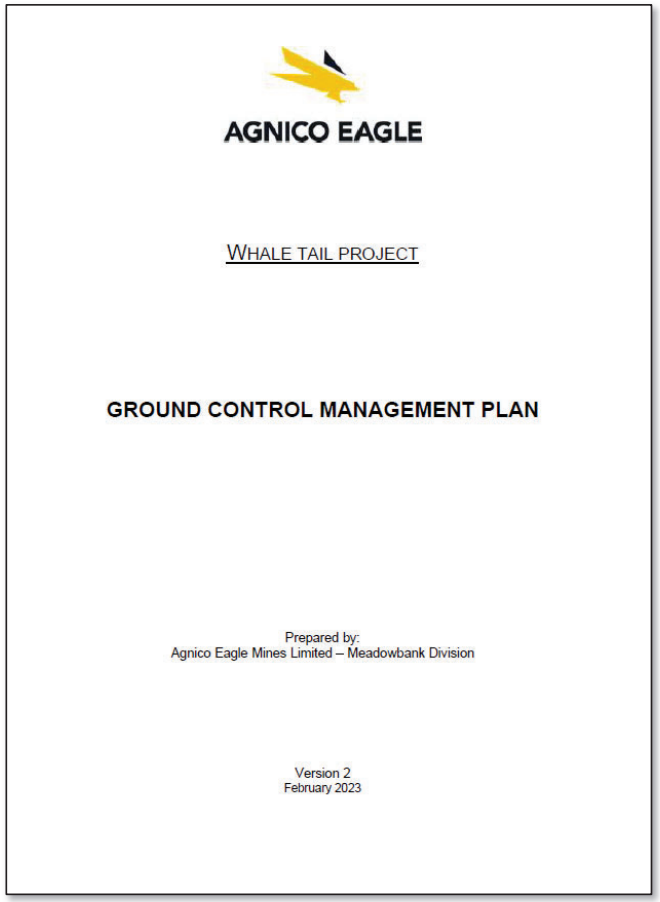
Resources and Training

- The rock mechanics team consists of:
  - Christian Tremblay, Rock Mechanics Coordinator
  - Amadou Traore, Rock Mechanics Engineer
  - Katie Hawley, Rock Mechanics Engineer
  - Sophie Papineau, Rock Mechanics Engineer
  - Vincent Duranleau, Rock Mechanics Technician
  - Arron Haselhorst, Rock Mechanics Technician
- The team is at full strength and, as a result, there are typically three rock mechanics staff on site at any given time. These staff are responsible for both of the open pits as well as the underground mine. The team are currently meeting most of their commitments for the open pits.
- The team has experienced significant turnover, with only three staff remaining from the team at the time of the 2022 review.
- The recent hires put an emphasis on training. The development of a skills matrix to help identify training needs continues to be recommended.
- The team has a full suite of Rocscience software and also has access to Leapfrog, Maptek, and Pix4D. The team primarily uses Deswik for visualization.

Ground Control Program

GCMP

- The GCMP is a clear concise document and was updated (including approvals) in April 2023.
- The following observations and recommendations are made for the next update:
  - Add brief overview of the deposit geology and mine plan, including key information such as the ultimate pit dimensions, approximate mine life, major lithologies, etc. Focus on the major lithologies/domains and how they perform in the open pits.
  - (5.4.3) Update the plan showing the location of the instrumentation to reflect the additional instrumentation installed.
  - (5.5) Reference a register that tracks who has received what geomechanical training.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WHALE TAIL PROJECT

GROUND CONTROL MANAGEMENT PLAN

Prepared by:
Agnico Eagle Mines Limited – Meadowbank Division

Version 2
February 2023


THANK
YOU