Appendix 14

Whale Tail MDRB Reports No.26-27-28A

August 29th, 2020

Mr. Alexandre Cauchon
General Manager
Agnico–Eagle Mines, Meadowbank Division
Baker Lake Office

Email: alexandre.cauchon@agnicoeagle.com

Dear Mr. Cauchon,

Report No 26
Meadowbank Mine Dike Review Board (MDRB)
Conference call June 26th, 2020

1.0 INTRODUCTION

A conference call was convened by Agnico Eagle Mines (AEM) on June 26th to update the MDRB on activities at the Meadowbank and Amaruq sites, and to present and discuss the design for the IVR Diversion Channel. At the time, the Board was comprised of two members, Mr. D. W. Hayley and Mr. D. A. Rattue. Both members participated in the conference call.

The subject matter is presented in this report in the same order as the conference call agenda. The recommendations are underlined in the text.

2.0 MEADOWBANK WATER MANAGEMENT

Data on the water levels at the Meadowbank Tailings Storage Facility were provided for information. Essentially, conditions similar to the previous year are being maintained. However, it is of interest to note the sensitivity on the water level control of the pump availability. Operational issues lasting about one week translated into water level fluctuations in the North Cell and the South Cell of around 1 m.
The Board is pleased to see that seepage at Central Dike is also consistent with values of around 40 m^3/h in winter and 100-150 m^3/h during freshet.

3.0 TAILINGS STORAGE FACILITY, NORTH CELL

A minor sloughing of the fine filter layer on the inner slope of the North Cell Internal Structure (NCIS) has been noted. Apparently, water ponds between the access road and this structure creating a hydraulic gradient from downstream to upstream. Periodically, the pond is emptied by pumping.
Freeze back of the structure and the foundation are expected as part of the closure plan. The Board would like to see, in due course, the water management details that will be part of this plan and to be informed of the short-term effects, if any, of ponding outside the cell.

4.0 AMARUQ WATER MANAGEMENT

The Mammoth Lake TARP level protocol was activated on a couple of occasions during freshet. The Board members were advised on both occasions. The issue relates to outflow capacity before the spring thaw opens the channel. Examination of the water management strategy for coming seasons is being examined.

5.0 SOUTH WHALE TAIL TRANSFER CHANNEL

The outlet channel from South Whale Tail Lake was completed in the winter of 2020 and is now operational. Performance is apparently satisfactory though no details were given. The Board looks forward to further presentations and receipt of the As-Built report.

6.0 WASTE ROCK STORAGE FACILITY DIKE

The remedial works at the Waste Rock Storage Facility (WRSF) dike, consisting of the construction of an upstream berm of low permeability material were completed as planned. There have been no issues with the control of the pond this year and, consequently, the efficiency of the berm has not been tested.

As Mammoth Lake controls the water level at the downstream toe of the WRSF dike, and as the Lake level was slightly above design level during freshet, it would be of interest to study the effect, if any, on the thermistors located in the foundation of this dike.

7.0 WHALE TAIL DIKE SEEPAGE

The Board was advised that the grouting campaign to reduce the seepage flow rates was put on hold in March 2020, as a result of manpower restrictions related to the COVID-19 pandemic. Nevertheless, the seepage is manageable and the capture and pump systems function as expected. A base flow rate of around 150 m^3/h was recorded during the winter.

8.0 IVR DIVERSION CHANNEL DESIGN

In advance of the conference call, the Board was provided with a copy of the design report for the IVR Diversion Channel. A presentation of the design was given by the personnel of SNC-Lavalin Inc. (SLI).

The objective of the IVR Diversion Channel is to capture the run-off from a 68.2 ha catchment situated to the north-east of the future pit and re-direct this non-contact water flow towards lake C-44 and ultimately to Nemo Lake, thus reducing the volumes of water for handling and treatment from the footprint area of the IVR Pit.

The works will consist of a trapezoidal channel cut through the divide between two catchments and a berm located along the western edge of the channel that serves to provide freeboard and increased capacity for the channel.

The hydraulic design allows for the passage of flood flows up to the 1:100 yr. return period with a freeboard of 0.3 m. The channel could therefore handle even greater flows but no information on the ultimate capacity was provided. A risk analysis would be a useful addition to the design to allow AEM to assess the potential impact of floods greater than the 1:100 design flood. Presumably, such an event would already have significant impact on the water management of the IVR pit and additional inflow from the catchment in question can be tolerated. A clear statement of the design intent and design criteria as accepted by AEM would be appropriate.

An investigation campaign including test pits (September 2019) and Tamrock percussion soundings (May 2020) was undertaken to provide information on the nature of the overburden, and the depth to bedrock. From the observations in the test pits, excavation of the channel, if carried out at the same time of year, would not encounter frozen ground at the depths envisaged along the profile. However, the site is in a region of perennial permafrost and the impact of and on the permafrost has to be part of the design. Indeed, large ice lenses and ice-rich soils were encountered within the depth of the investigations. Water inflow was also noted.

Grain size analyses of the material potentially usable for embankment construction show a sand and gravel with a trace to little fines (2 to 11 %). Freezing of this material is presumed to enhance the low permeability characteristics to reduce seepage.

Construction is envisaged for the period August-September 2020, though the possibility of winter work is also mentioned. The specifications were included in the design report as transmitted to the Board. It is noted that the specifications include instructions (Section 2.12) to the effect that the Contractor shall establish the methods to minimize ditch slope instability and lateral deformation in the event that large ice lenses or ice rich soil are encountered. The Board is of the opinion that greater direction from the designer is warranted. Section 4.2.1 indicates that the QC Representative may occasionally request additional stripping and removal of snow and ice. It may be more appropriate to assign this responsibility to the Owner's Representative or to the Designer. Furthermore, procedures and typical design details for dealing with ground ice should be established in advance of construction. Over-excavation may be required. Indeed, if the channel invert does not reach the base of the active layer, exploratory excavation may still be required and supervised by the Owner's Representative or the Designer to determine the presence of ground ice, the removal of the same, and the nature of the material required for compensatory backfill. Such details are not, as yet, provided by section 4.4.2.

Geotextile has been adopted for the separation between foundation/fill and the rip-rap. Ease of construction is probably the main reason. However, in the presence of ground ice or ice rich soils, settlement of the ground on thawing may create conditions whereby the geotextile bridges over voids and carries the entire weight of the rip-rap until tearing and collapse ensue. Erosion of the sub-soil could be an outcome. Granular or crushed rock transition material would better adapt to changes in the foundation support and provide better continuity to protect the foundation against erosion.

The Sand-Cone method is proposed for in-situ density measurements although an equivalent method could be accepted. This technique has largely been supplanted by nuclear densometers and it may be more appropriate to propose this method. If the material is coarse in nature, a large diameter sand cone may indeed be used. (Water replacement methods may not be appropriate for cold weather.). No standards are given in Section 2.2 for in-situ testing. In Section 5.0, it is not quite clear who in fact will carry out the tests. Will it be the QC Representative or the Contractor? In fact, according to Section 2.4.2, the role could be played by the Contractor or a sub-contractor of AEM. This point needs clarification.

Currently, no instrumentation is proposed for the IVR Diversion. The Board suggests that some instrumentation is desirable and would primarily be thermistors to monitor the evolution of freeze and/or subsequent thaw during operation of the diversion channel. There is likely to be a base flow during the summer and thaw of the foundation is a possibility to be considered particularly near the watershed divide where little or no flow would have existed in the natural state.

9.0 NEXT MEETINGS

The Board anticipates that the next conference call will be held on October 7th, 2020 and that any other participation will be through further ad-hoc conference calls. The Board awaits instruction from AEM in this regard.

10.0 ACKNOWLEDGMENTS

The Board wishes to thank the personnel of AEM, GOLDER and SLI for the preparation of material and their participation in the conference call.

Signed:

Don W. Hayley, P. Eng D. Anthony Rattue, P. Eng.

ATTACHMENT A

AGENDA FOR BOARD MEETING NO. 26

June 26th, 2020

- Site Update
  - •Meadowbank Water Management
  - •NCIS
  - •Amaruq Water Management
  - •SWTC
  - •WRSF Dike–Mitigation and performance
  - •WTD Seepage
- Presentation of IVR Diversion Design

ATTACHMENT B

ATTENDANCE AT JUNE 2020 CONFERENCE CALL MEETING

Attendance		
Fredérick L. Bolduc	AEM	Geotechnical Coordinator
Nicole Brisson	AEM	?
Alexandre Lavallée	AEM	Geotechnical Coordinator
Thomas Lepine	AEM	EoR – Technical Specialist, Env. Management
Yves Boulianne	GAL	Geotechnical Engineer
Anh-Long Nguyen	SLI	Project Manager
Nina Quan	SLI	?
Don Hayley		Dike Review Board
Anthony Rattue		Dike Review Board

AGNICO EAGLE

To: D. Anthony Rattue, Don W. Hayley, and K. Hawton

From: Agnico Eagle Mines, Meadowbank, Nunavut Division

Date: August 26, 2020

RESPONSE TO COMMENTS, MEADOWBANK DIKE REVIEW BOARD No.26 – MEADOWBANK REPORT

The twenty-sixth meeting between the Meadowbank Dike Review Board (the Board) and Agnico Eagle Mines Limited (AEM) was held on June 26th, 2020 through a conference call.

The objective of the meeting was to update the MDRB on activities at the Meadowbank and Amaruq sites, and to present and discuss the design for the IVR Diversion Channel.

On July 7th, 2020, the Board provided their report (MDRB Meeting No 26 Meadowbank Report) with their recommendations. This letter provides the response from AEM related to the Board recommendations for the report. All Board recommendations are contained in the following table along with their location, action plan, current status, and anticipated completion date. This table will be used to follow up on each recommendation throughout the upcoming year and to update the Board when the next MDRB Meeting is held.

Best Regards,

Frédérick L.Bolduc M.Sc.A, P.Eng.
Geotechnical Coordinator & Responsible Person
Meadowbank, Nunavut Division
Agnico Eagle Mine

MDRB26 Recommendations and Action Plan

Location/Structure	Report	MDRB Recommendation/Comments	AEM Answer	Status	Completion Date
MDBK - NCIS	MDRB#26	Freeze back of the structure and the foundation are expected as part of the closure plan. The Board would like to see, in due course, the water management details that will be part of this plan and to be informed of the short-term effects, if any, of ponding outside the cell.	AEM will be advancing the closure plans in the upcoming year to detailed engineering level. Determining the water management details of the North Cell will be of high priority to ensure freezeback.	Open	End of 2021
AMQ - WRSF Dike	MDRB#26	As Mammoth Lake controls the water level at the downstream toe of the WRSF dike, and as the Lake level was slightly above design level during freshet, it would be of interest to study the effect, if any, on the thermistors located in the foundation of this dike.	AEM will examine the effect on the WRSF dike thermistors of the high Mammoth Lake level at freshet. These will be reported in the 2020 annual MDRB meeting.	Open	Q3 2020
AMQ - IVR Diversion Channel	MDRB#26	A risk analysis would be a useful addition to the design to allow AEM to assess the potential impact of floods greater than the 1:100 design flood. Presumably, such an event would already have significant impact on the water management of the IVR pit and additional inflow from the catchment in question can be tolerated. A clear statement of the design intent and design criteria as accepted by AEM would be appropriate.	AEM will perform a risk analysis on the Phase 2 water management infrastructure prior to their construction (i.e IVR Diversion and IVR Dike). This will ensure that the risks of using a 1:100 design flood return period is well understood and accepted by AEM.	Open	Q3 2020
AMQ - IVR Diversion Channel	MDRB#26	From the observations in the test pits, excavation of the channel, if carried out at the same time of year, would not encounter frozen ground at the depaths envisaged along the profile. However, the site is in a region of perennial permafrost and the impact of and on the permafrost has to be part of the design.	AEM agrees with the Board and is of the opinion that permafrost has been considered in the design. The design includes a layer of fine filter and a geotextile to minimize potential impacts due to permafrost degradation. During construction if ice lenses and ice rich soil are encountered they will be removed from the excavation. During operation regular inspections will be performed and remediation action taken if unsatisfactory performance of the structure is observed.	Closed	-

MDRB26 Recommendations and Action Plan

Location/Structure	Report	MDRB Recommendation/Comments	AEM Answer	Status	Completion Date
AMQ - IVR Diversion Channel	MDRB#26	It is noted that the specifications include instructions (Section 2.12) to the effect that the Contractor shall establish the methods to minimize ditch slope instability and lateral deformation in the event that large ice lenses or ice rich soil are encountered. The Board is of the opinion that greater direction from the designer is warranted. Section 4.2.1 indicates that the QC Representative may occasionally request additional stripping and removal of snow and ice. It may be more appropriate to assign this responsibility to the Owner's Representative or to the Designer. Furthermore, procedures and typical design details for dealing with ground ice should be established in advance of construction. Over-excavation may be required. Indeed, if the channel invert does not reach the base of the active layer, exploratory excavation may still be required and supervised by the Owner's Representative or the Designer to determine the presence of ground ice, the removal of the same, and the nature of the material required for compensatory backfill. Such details are not, as yet, provided by section 4.4.2.	AEM agrees with the Board comments. During construction the QA will inspect the foundation and will be responsible to ensure that snow and ice is removed from the excavation. Foundation soil samples will be tested for ice content and exploratory excavation will be performed to ensure a proper foundation for the structure. The construction methodology will be adapted to field conditions.	Open	Q3 2020
AMQ - IVR Diversion Channel	MDRB#26	Geotextile has been adopted for the separation between foundation/fill and the rip-rap. Ease of construction is probably the main reason. However, in the presence of ground ice or ice rich soils, settlement of the ground on thawing may create conditions whereby the geotextile bridges over voids and carries the entire weight of the rip-rap until tearing and collapse ensue. Erosion of the sub-soil could be an outcome. Granular or crushed rock transition material would better adapt to changes in the foundation support and provide better continuity to protect the foundation against erosion.	A fine filter layer was added to the design of the channel (in addition to the geotextile and rip-rap). This layer will be installed over the natural soil and will help prevent tearing of the geotextile in case of ground settlement.	Open	Q3 2020

MDRB26 Recommendations and Action Plan

AGNICO EAGLE

Location/Structure	Report	MDRB Recommendation/Comments	AEM Answer	Status	Completion Date
AMQ - IVR Diversion Channel	MDRB#26	The Sand-Cone method is proposed for in-situ density measurements although an equivalent method could be accepted. This technique has largely been supplanted by nuclear densometers and it may be more appropriate to propose this method. If the material is coarse in nature, a large diameter sand cone may indeed be used. (Water replacement methods may not be appropriate for cold weather.). No standards are given in Section 2.2 for in-situ testing. In Section 5.0, it is not quite clear who in fact will carry out the tests. Will it be the QC Representative or the Contractor? In fact, according to Section 2.4.2, the role could be played by the Contractor or a sub-contractor of AEM. This point needs clarification.	The in-situ density testing will be performed by the QC using either the sand cone or the nucleodensometer technique. While the nucleodensometer is the prefered option, a sand cone might have to be used due to logistic constraints. The designer will add the apprpriate ASTM standard to the Specification.	Open	Q3 2020
AMQ - IVR Diversion Channel	MDRB#26	Currently, no instrumentation is proposed for the IVR Diversion. The Board suggests that some instrumentation is desirable and would primarily be thermistors to monitor the evolution of freeze and/or subsequent thaw during operation of the diversion channel. There is likely to be a base flow during the summer and thaw of the foundation is a possibility to be considered particularly near the watershed divide where little or no flow would have existed in the natural state.	Thermistors will be added to the IVR Diversion Channel design. The exact location of the thermistors is under review by the Designer but could include a location along the road berm and within the diversion cross section.	Open	Q3 2020

1 : Previous year recommendations are kept only if they are outstanding

September 21st, 2020

Mr. Alexandre Cauchon
General Manager
Agnico–Eagle Mines, Meadowbank Division
Baker Lake Office

Email: alexandre.cauchon@agnicoeagle.com

Dear Mr. Cauchon,

Report No 27
Meadowbank Mine Dike Review Board (MDRB)
Conference call August 7th, 2020

1.0 INTRODUCTION

A conference call was convened by Agnico Eagle Mines (AEM) on August 7th with the MDRB to present and discuss the current status of the design for the IVR Attenuation Pond Dikes. Responses to the report of the previous conference call (Report MDRB #26) were also covered during the conference call. The Board is currently comprised of three members, Mr. D. W. Hayley and Mr. D. A. Rattue who are now joined by Mr. Kevin Hawton. All three members participated in the conference call.

The subject matter is presented in this report in the same order as the conference call agenda. The recommendations are underlined in the text.

2.0 RESPONSES TO THE MDRB REPORT No. 26

Only the responses relating to the IVR diversion channel were presented and discussed. The Board provided additional explanations on the recommendations to ensure comprehension and expects that the various items will be adequately covered in the design and construction of this facility.

The Board anticipated that responses to other recommendations contained in report No. 26 would be discussed at a subsequent conference call. In fact, the responses were transmitted on August 26th which permitted the final version of that report to be transmitted.

3.0 IVR ATTENUATION POND DIKES

3.1 General

The design studies for the IVR attenuation pond and the retention dikes for this facility have reached a stage where it was appropriate to inform the MDRB of the current status and request

feedback to move forward. SNC-Lavalin Inc. (SLI) prepared and presented material to initiate discussion.

The IVR attenuation pond is intended to store mine contact water from the IVR mine extension facilities until such time as it can be passed through the water treatment plant prior to release. The pond is to be created by enlargement of the lake A53 by means of dikes D1 and D2. Note that a third dike designated as D3 is no longer required due to the freeboard being assured by existing fill. Dike D2 is also a freeboard dike. It would be useful to indicate on drawings the outline of the original lake and the future pond so as to better appreciate the area of permafrost affected ground that will be submerged.

Water reaching the attenuation pond will either be retained for treatment or, in the event of floods, may be released through the spillway towards the Whale Tail Attenuation Pond.

3.2 Flood routing analysis

The design criteria cover two scenarios, namely:

- An environmental design flood which would be fully contained within the pond, and;
- The Inflow Design Flood, which will be handled by the spillway.

It is understood that the return periods for snowmelt and rainfall contributions have been formulated and agreed upon with AEM. The Board suggests that the rationale behind these choices be explained in detail in a forthcoming Design Basis Memorandum and/or the Design Report. At that time, the consequence classification of the structures should also be covered. Release of extreme floods or failure of the dike D1 would lead to water inflow to the Whale Tail mine pit. The Board recognizes that flood inflows may give adequate advance warning to ensure the safety of employees but a clear statement of the design criteria is needed. Note that the inflow flood return periods for various consequence classifications as given in the Canadian Dam Safety Guidelines do not need to be followed to the letter, but the selected values and the rationale behind them should be well explained.

The Normal Maximum Operating Level (MOL) has been based on the annual water balance prepared by Golder and Associates (GAL). It has been suggested by GAL that this be validated to determine the effects of any change in the configuration of the mine facilities since this study was carried out. The Board concurs.

The flood routing analysis has been performed with the adjusted (reduced) sub-drainage areas as per the model produced by O'Kane. Apparently, this considers the absorption and run-off attenuation capacity provided by the waste rock storage piles.

The flood routing analysis was used to determine spillway and dike crest elevations. The spillway has been designed considering the IDF occurring with the pond at the maximum normal operating level, thus significant attenuation of the IDF is being relied upon prior to flows reaching the spillway invert. As operating levels are ultimately dependent on the accuracy of the water balance and the ability to treat and remove the water from the system, the Board recommends that the potential effect of the uncertainties be evaluated.

3.3 Design Basis of dike D1

A field investigation was carried out in September-October 2019. The stratigraphy for the Dike D1 foundation is understood to be essentially glacial till overlying bedrock. Due to the time of

year, permafrost was encountered at around 1.5 m depth in the test pits. The design is based on the concept recognizing the presence of permafrost and maintaining its integrity.

A 3 m deep cut-off trench is to be excavated beneath the upstream shell and thus taken down to below the estimated depth of the active layer. An LLDPE liner constitutes the low permeability element, both within the key trench and along the upstream slope of the rockfill embankment. Bentonite amended crushed stone is to be used for bedding and as a complement to the sealing system. An upstream berm of esker sourced sand and gravel provides additional thermal insulation to promote ground freezing.

It is noted that the facility is envisaged as having a relatively short lifespan, around four years. However, as other structures have been seen to have less than desirable performance in even less than four years, the Board cautions against underestimating the potential deleterious aspects of permafrost and to consider the probability that the mine operations and closure may require that the lifespan of water retention structures be extended beyond the initially anticipated period.

Construction will be carried out during the winter season. Excavation of the key trench will likely require blasting. Consequently, esker material is proposed as a reprofiling material to obtain a uniform base for the liner. Such material will likely be placed dry during the winter and, though at a temperature below zero, will not contain a moisture content sufficient to render the material of low permeability. The Board envisages that the ingress of ponded water during the first impoundment will probably initiate some degradation of the permafrost. Refreezing may occur during the following winter however experience with other structures such as Saddle Dam 1 at Meadowbank indicates that any inflow/outflow of water at freshet may delay this. The Board recommends an evaluation of the anticipated performance of the structure. This may be viewed as a type of Risk Analysis. It could also be described as a Failure Modes and Effects Analysis wherein all scenarios of potentially unsatisfactory performance and not just failure are evaluated.

This holistic systems-based approach is being advocated by the CDA even though, at the moment, it may not be spelt out in the guidelines. Adherence to the guidelines is often viewed as a matter of complying with, say, the Factors of Safety for slope stability and other prescriptive aspects of dam safety evaluation. However, the Board encourages the approach wherein each element of the design is evaluated by answering the following questions:

- How is this component intended to perform;
- What are the possibilities of and circumstances under which a less than desirable performance may ensue;
- What would be the effect on the integrity of the structure; and
- What mitigative measures can be incorporated.

Such an exercise takes on a particularly important role in engineering for permafrost regions. This topic can be further discussed at a subsequent meeting of the MDRB prior to finalizing the design and embarking on the construction in 2021.

As mentioned above, the uncertainties in the flood routing analysis also merit a review of the anticipated performance in a systems-based risk analysis framework.

3.4 Design basis of dike D2

As mentioned earlier, D2 is a freeboard dike that will only see water during the passage of floods. The dike will be founded on deep overburden, possibly greater than 20 m, which is assumed to be frozen. Construction is also planned for the winter period with the excavation of a central cut-

off trench backfilled with compacted till and covered with Esker sourced sand and gravel. Freezing of this embankment is also envisaged.

3.5 Next steps

The Boards looks forward to seeing the results of further site investigation planned for the coming summer. This will improve the database for the execution of the next phase of studies including, stability analyses and seepage analyses where required. It is understood that thermal modelling is also being considered. Prior to initiating this task, the Board would like to have an opportunity to assess the methodology and input parameters. In fact, it would be beneficial that the designer carry out an exercise to set out the objectives of the analyses, the means to achieve these objectives and the expected impact on the design of the facility. The Board also looks forward to receipt of the eventual design report and technical specifications for construction.

4.0 NEXT MEETINGS

The Board anticipates that the next meeting (conference call) covering, in general, the up-to-date performance of the Meadowbank structures will be held in early September 2020 and that any other participation will be through further ad-hoc conference calls. The Board awaits instruction from AEM in this regard.

5.0 ACKNOWLEDGMENTS

The Board wishes to thank the personnel of AEM and SLI for the preparation of material and the participation of AEM, SLI and GAL in the conference call.

Signed:



Don W. Hayley, P. Eng Kevin Hawton, P. Eng D. Anthony Rattue, P. Eng.

ATTACHMENT A

AGENDA FOR BOARD MEETING NO. 27

August 7th, 2020

- IVR Diversion MDRB Comment Review
- Introduction
- Background Information
- Flood Routing Analysis
- Design Basis for Dike Design
- Next Step

ATTACHMENT B

ATTENDANCE AT AUGUST 2020 CONFERENCE CALL MEETING

Attendance		
Fredérick L. Bolduc	AEM	Geotechnical Coordinator
Nicole Brisson	AEM	?
Alexandre Lavallée	AEM	Geotechnical Coordinator
Thomas Lepine	AEM	EoR – Technical Specialist, Env. Management
Yves Boulianne	GAL	Geotechnical Engineer
Anh-Long Nguyen	SLI	Project Manager
Nina Quan	SLI	Geotechnical Engineer
Philip Gomes	SLI	
Don Hayley		Dike Review Board
Kevin Hawton		Dike Review Board
Anthony Rattue		Dike Review Board

AGNICO EAGLE

To: D. Anthony Rattue, Don W. Hayley, and K. Hawton

From: Agnico Eagle Mines, Meadowbank, Nunavut Division

Date: September 16, 2020

RESPONSE TO COMMENTS, MEADOWBANK DIKE REVIEW BOARD No.27 – MEADOWBANK REPORT

The twenty-seventh meeting between the Meadowbank Dike Review Board (the Board) and Agnico Eagle Mines Limited (AEM) was held on August 7th, 2020 through a conference call.

The objective of the meeting was to present and discuss the current status of the design for the IVR Attenuation Pond Dikes.

On August 18th, 2020, the Board provided their report (MDRB Meeting No 27 Meadowbank Report) with their recommendations. This letter provides the response from AEM related to the Board recommendations for the report. All Board recommendations are contained in the following table along with their location, action plan, current status, and anticipated completion date. This table will be used to follow up on each recommendation throughout the upcoming year and to update the Board when the next MDRB Meeting is held.

Best Regards,

Frédérick L.Bolduc M.Sc.A, P.Eng.
Geotechnical Coordinator & Responsible Person
Meadowbank, Nunavut Division
Agnico Eagle Mines

MDRB27 Recommendations and Action Plan

Location/Structure	Report	MDRB Recommendation/Comments	AEM Answer	Status	Completion Date
AMQ - IVR Attenuation Pond	MDRB#27	It would be useful to indicate on drawings the outline of the original lake and the future pond so as to better appreciate the area of permafrost affected ground that will be submerged.	AEM will ensure that the outline of the original lake and the future pond will be added on the layout drawing for the IVR Attenuation Pond and Dikes. AEM agrees that this will be useful to show the area of submerged permafrost affected ground.	Open	Q3 2020
AMQ - IVR Dikes	MDRB#27	The design criteria cover two scenarios, namely: • An environmental design flood which would be fully contained within the pond, and; • The Inflow Design Flood, which will be handled by the spillway. It is understood that the return periods for snowmelt and rainfall contributions have been formulated and agreed upon with AEM.The Board suggests that the rationale behind these choices be explained in detail in a forthcoming Design Basis Memorandum and/or the Design Report. At that time, the consequence classification of the structures should also be covered. Release of extreme floods or failure of the dike D1 would lead to water inflow to the Whale Tail mine pit. The Board recognizes that flood inflows may give adequate advance warning to ensure the safety of employees but a clear statement of the design criteria is needed. Note that the inflow flood return periods for various consequence classifications as given in the Canadian Dam Safety Guidelines do not need to be followed to the letter, but the selected values and the rationale behind them should be well explained.	AEM agrees with the Board on their suggestion to provide more details about the choices made for the flood routing analysis. In the IVR Dike design report, there will be a specific section on the Dike Classification assessment and the water level assessed in the flood routing analysis. It will be ensured that the decisions for the selected inflow flood return periods are well explained and that a clear statement of the design criteria is made in the report.	Open	Q3 2020
AMQ - IVR Dikes	MDRB#27	The Normal Maximum Operating Level (MOL) has been based on the annual water balance prepared by Golder and Associates (GAL). It has been suggested by GAL that this be validated to determine the effects of any change in the configuration of the mine facilities since this study was carried out. The Board concurs.	The model used in assessing the MOL at 163.18 m is based on the 2019 water balance last revised in May 2019. The water balance developed by GAL will be updated in Q1 2021 as part of the Annual Report process that is a requirement of the site Water Licence. During that process a validation will be made and oeprational level could be adjsuted accordingly. According to the designer the flood routing model is conservative by adopting the initial water level assessed by GAL as the total drainage area for the IVR Pond in the water balance is higher than the effective drainage area used in the flood routing model.	Open	Q1 2021
AMQ - IVR Dikes	MDRB#27	The flood routing analysis was used to determine spillway and dike crest elevations. The spillway has been designed considering the IDF occurring with the pond at the maximum normal operating level, thus significant attenuation of the IDF is being relied upon prior to flows reaching the spillway invert. As operating levels are ultimately dependent on the accuracy of the water balance and the ability to treat and remove the water from the system, the Board recommends that the potential effect of the uncertainties be evaluated.	The designer will do a sensitivity analysis on the spillway design to evaluate if the spillway design can pass a more extreme event, such as assuming a starting elevation equal to the invert of the spillway and adding a PMF summer rain event.	Open	Q3 2020
AMQ - IVR Dike D1	MDRB#27	It is noted that Dike D1 is envisaged as having a relatively short lifespan, around four years. However, as other structures have been seen to have less than desirable performance in even less than four years, the Board cautions against underestimating the potential deleterious aspects of permafrost and to consider the probability that the mine operations and closure may require that the lifespan of water retention structures be extended beyond the initially anticipated period.	The design basis of the structure does not assume that the structure needs to perform for only 4 years. The design intent of the structure is to have the structure perform untill the conditions for decomissioning are met which could result in an increased lifespan. The design intent of the structure is also to maintain the permafrost condition. Sensitivity analysis will be performed to understand the impact of permafrost degradation on the performance of the structure. AEM will ensure that these design criteria are well captured in the design report of the structure.	Open	Q3 2020

MDRB27 Recommendations and Action Plan

Location/Structure	Report	MDRB Recommendation/Comments	AEM Answer	Status	Completion Date
AMQ - IVR Dike D1	MDRB#27	Construction will be carried out during the winter season. Excavation of the key trench will likely require blasting. Consequently, esker material is proposed as a reprofiling material to obtain a uniform base for the liner. Such material will likely be placed dry during the winter and, though at a temperature below zero, will not contain a moisture content sufficient to render the material of low permeability. The Board envisages that the ingress of ponded water during the first impoundment will probably initiate some degradation of the permafrost. Refreezing may occur during the following winter however experience with other structures such as Saddle Dam 1 at Meadowbank indicates that any inflow/outflow of water at freshet may delay this. The Board recommends an evaluation of the anticipated performance of the structure. This may be viewed as a type of Risk Analysis. It could also be described as a Failure Modes and Effects Analysis wherein all scenarios of potentially unsatisfactory performance and not just failure are evaluated. This holistic systems-based approach is being advocated by the CDA even though, at the moment, it may not be spelt out in the guidelines. Adherence to the guidelines is often viewed as a matter of complying with, say, the Factors of Safety for slope stability and other prescriptive aspects of dam safety evaluation. However, the Board encourages the approach wherein each element of the design is evaluated by answering the following questions: • How is this component intended to perform; • What are the possibilities of and circumstances under which a less than desirable performance may ensue; • What would be the effect on the integrity of the structure; and • What mitigative measures can be incorporated. Such an exercise takes on a particularly important role in engineering for permafrost regions. This topic can be further discussed at a subsequent meeting of the MDRB prior to finalizing the design and embarking on the construction in 2021. As mentioned above, the uncertainties in the flood routing analysis also merit a review of the anticipated performance in a systems-based risk analysis framework.	AEM appreciates the approach suggested by the Board. A Failure Mode and Effects Analysis will be undertaken before finalizing the design. The questions provided in the Board's report will be carefully examined during the analysis.	Open	Q4 2020
AMQ - IVR Dikes	MDRB#27	The Board looks forward to seeing the results of further site investigation planned for the coming summer. This will improve the database for the execution of the next phase of studies including, stability analyses and seepage analyses where required.	AEM will provide the Board with an update on the results of the upcoming site investigation and will ensure the results are integrated in the next design phase.	Open	Q4 2020
AMQ - IVR Dikes	MDRB#27	It is understood that thermal modelling is also being considered. Prior to initiating this task, the Board would like to have an opportunity to assess the methodology and input parameters. In fact, it would be beneficial that the designer carry out an exercise to set out the objectives of the analyses, the means to achieve these objectives and the expected impact on the design of the facility. The Board also looks forward to receipt of the eventual design report and technical specifications for construction.	AEM agrees that the thermal analysis will be a key input in the design of the structure and would appreciate to have the Board review the methodology and approach proposed by the Designer. The methodology and input parameters used in the thermal modelling will be shared with the Board. A MDRB meeting will be held to have an depth discussion about this aspect of the design. The design report and technical specifications will also be shared with the Board.	Open	Q4 2020

1 : Previous year recommendations are kept only if they are outstanding

December 19th, 2020

Mr. Alexandre Cauchon
General Manager
Agnico–Eagle Mines, Meadowbank Division
Baker Lake Office

Email: alexandre.cauchon@agnicoeagle.com

Dear Mr. Cauchon,

Report No 28a
Meadowbank Mine Dike Review Board (MDRB)
Conference call October 9th, 2020

1.0 INTRODUCTION

A conference call was convened by Agnico Eagle Mines (AEM) on October 9th with the MDRB to present and discuss the thermal analyses being conducted for the design for the IVR Attenuation Pond Dikes. The Board is currently comprised of three members, Mr. K. Hawton, Mr. D. W. Hayley and Mr. D. A. Rattue. All three members participated in the conference call.

Prior to the call, the Board received a copy of the Technical Note (AEM # 6127-695-132-REP-006) entitled “Assessment of Ground Thermal Regime at IVR D-1 Dike”, that describes the analyses.

The recommendations are underlined in the text.

In correspondence dated December 13, 2020, the MDRB received responses from AEM relating to the recommendations. The Board is content that the recommendations have been accepted and are being acted upon. Consequently, no changes are warranted and the present document constitutes the final version of the MDRB report No. 28a.

2.0 IVR ATTENUATION POND DIKE D-1, THERMAL ANALYSES

The design studies for the IVR retention dikes include thermal analyses aimed at improving the understanding of the behaviour of the dike and the foundation in an environment that includes the influence of permafrost. SNC-Lavalin Inc. (SLI) prepared and presented material to initiate discussion. Golder Associates (GAL) also provided input to the information exchange in their role as Third Party Reviewer.

The IVR attenuation pond is intended to store mine contact water from the Amaruq facilities until such time as it can be passed through the water treatment plant prior to release. The pond is to be created by enlargement of the lake A53 by means of dikes D-1, and D-2. The present study addresses specifically the dike D-1, the largest of the two dikes.

The report and the PowerPoint presentation provide information relating to the:

- Geometry of the section analysed;
- Ground temperature measurements;
- Material physical and thermal properties;
- Assumed boundary conditions; and
- Analysis methodology.

GAL made the suggestion that some material properties could be revised as they are not necessarily conservative. A sensitivity analysis may prove informative. The Board concurs. There will always be a degree of uncertainty in the material parameters whether they are obtained from the literature or even from laboratory tests specific to the project. It would be appropriate that the sensitivity analyses bracket the most likely values.

SLI concludes from the analyses that the key trench area after the first winter will become frozen and will remain frozen during the expected life of the facility and under the assumed annual cycles of pond levels. They do acknowledge the limitations of the analyses which assume conductive heat transfer but not convective heat transfer. These assumptions were made to simplify the modelling. It is to be noted that the esker fill material, which could be silty according to the description, and the bentonite amended granular material impede the influx of water and thus limit the convective component.

The Board has the following observations and recommendations. Experience at other sites of the Meadowbank/Amaruq complex illustrate the need to consider several particularities of the site geology and the construction methods.

At the Saddle Dam 1 (Meadowbank), during freshet, water ponded at the downstream toe, entered the rockfill shell and raised temperatures in the foundation. As this structure was designed to store tailings, deposition of the same minimized any potential for seepage and the phenomenon was, in fact, inconsequential.

At the Whale Tail Dike (Amaruq), the highly fractured and frost jacked Greywacke rock exposed in the right bank key trench permitted minor ingress of water that quickly initiated thaw of the ice filled discontinuities and caused seepage flow rates greater than expected.

For the Waste Rock Storage Facility (WRSF) dike (Amaruq), it is surmised that water from Mammoth Lake at its high spring level entered the foundation of the dike from downstream and initiated thaw of the permafrost in the key trench area allowing under-seepage to occur.

Consequently, for the simplifying assumptions to remain valid, the local site geology and construction sequences need to be taken into account. The minimum overburden cover over bedrock was said to be around 2 m. Stripping down to the base of the active layer may expose this rock in the key trench. Design details should cover the rock type and necessary foundation treatment thereof, particularly if heavily fractured or ice jacked. Ground ice may also be encountered which needs to be considered in the foundation stripping and final geometry.

There was some discussion over the intended period of construction. Winter construction would better preserve the frozen condition of the foundation but would not allow the bentonite amended granular material to be placed at optimum moisture content and an initial ingress of water, albeit of limited volume, is required to achieve hydration of the bentonite to decrease permeability. A spring/summer construction period would induce thaw of the foundation and seepage could be

initiated through any pervious layers or lenses. Recognition of the presence of such material would be required. Overall, the Board views the winter construction period as the preferred option.

Contouring of the foundation to ensure drainage away from the dike toe, particularly during freshet, would also be required to minimize the possibility of water ingress as witnessed elsewhere.

Therefore, the Board acknowledges the effort that has gone into the analyses, sees value in the enhanced understanding of the various parameters and their influence, particularly with sensitivity analysis, but encourages the team to apply engineering judgement based on the evidence of other Meadowbank structures. The construction specifications, work methods and sequences, and details of the final structure geometry need to take into account all of the anticipated conditions. The various defensive features incorporated into the design should be described in the design report and, to permit use of the observational method during the construction, a surveillance plan and decision-making process should be developed ahead of time.

3.0 NEXT MEETINGS

The Board anticipates that the next meeting (conference call) covering, in general, the up-to-date performance of the Meadowbank structures will be held on November 24th and 25th, 2020 and that any other participation will be through further ad-hoc conference calls. The Board awaits instruction from AEM in this regard.

4.0 ACKNOWLEDGMENTS

The Board wishes to thank the personnel of AEM and SLI for the preparation of material and the participation of AEM, SLI and GAL in the conference call.

Signed:

Don W. Hayley, P. Eng Kevin Hawton, P. Eng D. Anthony Rattue, P. Eng.

ATTACHMENT A

ATTENDANCE AT OCTOBER 9th 2020 CONFERENCE CALL MEETING

Attendance		
Marc-Andre Beaudet	AEM	
Fredérick L. Bolduc	AEM	Geotechnical Coordinator
Nicole Brisson	AEM	?
Laurier Collette	AEM	
Patrice Gagnon	AEM	
Alexandre Lavallée	AEM	Geotechnical Coordinator
Thomas Lepine	AEM	EoR – Technical Specialist, Env. Management
Bruno Roy	AEM	
Yves Boulianne	GAL	Geotechnical Engineer
Simon Chapuis	GAL	
Fernando Junqueira	GAL	
Anh-Long Nguyen	SLI	Project Manager
Nina Quan	SLI	Geotechnical Engineer
Philip Gomes	SLI	
Mathieu Durand-Jezequel	SLI	
Don Hayley		Dike Review Board
Kevin Hawton		Dike Review Board
Anthony Rattue		Dike Review Board

AGNICO EAGLE

To: D. Anthony Rattue, Don W. Hayley, and K. Hawton

From: Agnico Eagle Mines, Meadowbank, Nunavut Division

Date: December 13, 2020

RESPONSE TO COMMENTS, MEADOWBANK DIKE REVIEW BOARD No.28A – MEADOWBANK REPORT

The twenty-eighth A meeting between the Meadowbank Dike Review Board (the Board) and Agnico Eagle Mines Limited (AEM) was held on October 9th, 2020 through a conference call.

The objective of the meeting was to present and discuss the thermal analyses being conducted for the design for the IVR Attenuation Pond Dikes.

On October 19th, 2020, the Board provided their report (MDRB Meeting No 28a IVR Thermal Analyses Report) with their recommendations. This letter provides the response from AEM related to the Board recommendations for the report. All Board recommendations are contained in the following table along with their location, action plan, current status, and anticipated completion date. This table will be used to follow up on each recommendation throughout the upcoming year and to update the Board when the next MDRB Meeting is held.

In addition to this table AEM would like to clarify the following points from the Board response letter:

- Golder role in the IVR Dike Design is as Third Party Reviewer instead of Owner's Engineer
- The IVR attenuation pond will become the main contact water management facility on site
- There is no till planned to be used in the IVR Dike cross-section

Best Regards,

Frédérick L.Bolduc M.Sc.A, P.Eng.
Geotechnical Coordinator & Responsible Person
Meadowbank Complex, Nunavut Division, Agnico Eagle Mines

MDRB28A Recommendations and Action Plan

Location/Structure	Report	MDRB Recommendation/Comments	AEM Answer	Status	Completion Date
AMQ - IVR Dike D1	MDRB#28A	SLI concludes from the analyses that the key trench area after the first winter will become frozen and will remain frozen during the expected life of the facility and under the assumed annual cycles of pond levels. They do acknowledge the limitations of the analyses which assume conductive heat transfer but not convective heat transfer. These assumptions were made to simplify the modelling. It is to be noted that till and bentonite amended granular material impede the influx of water and thus limit the convective component. Consequently, for the simplifying assumptions to remain valid, the local site geology and construction sequences need to be taken into account. The minimum overburden cover over bedrock was said to be around 2 m. Stripping down to the base of the active layer may expose this rock in the key trench. Design details should cover the rock type and necessary foundation treatment thereof, particularly if heavily fractured or ice jacked. Ground ice may also be encountered which needs to be considered in the foundation stripping and final geometry.	The site geology will inform the construction sequence and foundation treatment for IVR Dike D1. It is expected that most of the keytrench will not sit on bedrock. Bedrock is only expected in local ara located above the elevation of the maximum pond operating level. If open fractured are encountered they will be treated.	Closed	-
AMQ - IVR Dike D1	MDRB#28A	There was some discussion over the intended period of construction. Winter construction would better preserve the frozen condition of the foundation but would not allow the bentonite amended granular material to be placed at optimum moisture content and an initial ingress of water, albeit of limited volume, is required to achieve hydration of the bentonite to decrease permeability. A spring/summer construction period would induce thaw of the foundation and seepage could be initiated through any pervious layers or lenses. Recognition of the presence of such material would be required. Overall, the Board views the winter construction period as the preferred option.	Consideration for winter conditions will be added to the construction specifications and will be looked for when reviewing the contractor proposed work method.	Open	Jan-21
AMQ - IVR Dike D1	MDRB#28A	Contouring of the foundation to ensure drainage away from the dike toe, particularly during freshet, would also be required to minimize the possibility of water ingress as witnessed elsewhere.	Water will not be allowed to pond at the downstream toe of the structure. If this is observed mitigation measure including contouring or pumping will be taken	Closed	-
AMQ - IVR Dike D1	MDRB#28A	Therefore, the Board acknowledges the effort that has gone into the analyses, sees value in the enhanced understanding of the various parameters and their influence, particularly with sensitivity analysis, but encourages the team to apply engineering judgement based on the evidence of other Meadowbank structures. The construction specifications, work methods and sequences, and details of the final structure geometry need to take into account all of the anticipated conditions. The various defensive features incorporated into the design should be described in the design report and, to permit use of the observational method during the construction, a surveillance plan and decision-making process should be developed ahead of time.	SNC will perform a sensitivity analysis on the various material properties used in the thermal analyses. AEM and SNC will work on incorporating the anticipated site conditions into the construction specifications (which includes the work methods and sequences) and final structure geometry in the design drawings. In the design report a section will be added about how anticipated site conditions are incorporated into the design. The construction specifications will include the surveillance planned for during the construction as well as the decision-making process to be followed if non ideal foundation conditions are found (such as heavily fractured or ice jacked rock, ice lenses, etc.).	Open	Jan-21