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RESPONSE TO REPORT NO.4 MEADOWBANK DIKE REVIEW BOARD, DATED AUGUST 19, 2009
SUBJECT: REVIEW COMMENTS

Dear Dr. Lamontagne,

On July 20 to 23, 2009, the fourth meeting was held between Meadowbank Dike Review Board (MDRB), Agnico-Eagle Mines Limited (AEM), and Golder Associates Ltd. (Golder). The meeting was held on the Meadowbank site so that the East Dike could be inspected and the construction preparation work at the Bay-Goose Dike and Tailings Storage Facility (TSF) could be observed. The East Dike instrumentation and grouting contingency planning update were also discussed. In addition, the technical specifications, construction work plans and construction schedules for the Bay-Goose Dike and TSF structures were presented along with the quality assurance (QA) and quality control (QC) program.

On August 19, 2009, the MDRB provided a letter with their comments from this meeting. This letter provides Golder's response to the MDRB questions and comments which is being submitted on behalf of AEM.

1.0 PROJECT STATUS

Comment: *The responsibilities for tailings management during mill operation will fall on the Mill Superintendant and the Environmental Manager. This facet of the work should not be underestimated given the added complexities of working in an extreme northern climate. Consequently, the Board would like to be provided with a copy of the detailed organization chart at the next meeting.*

Response: Agreed. A copy of the OMS Manual for the TSF structures will be provided to the Board once it is finalized by AEM.

Comment: *The Board was advised of a potential increase in ore reserves, which places additional emphasis on the need for good advance planning of tailings facilities with regards to the capacity and management for the anticipated future production. It is expected that this item will be the subject of discussion at future meetings.*

Response: AEM and Golder acknowledge this statement and confirm that TSF development is considering the eventual need for greater capacity than currently anticipated. The tailings deposition planning, currently done in parallel with the dike construction work, is taking the mine expansion into account. Design and specifications for the future TSF dikes, such as Central Dike and other Saddle Dams, will be presented to the MDRB in future meetings.

2.0 SITE INSPECTION

Comment: *A stockpile of 0-20 mm material has been built near the abutment from which the Bay-Goose embankment will be launched. Some segregation was noted as shown in photo #2. Although material with a maximum size such as 20 mm is not particularly prone to segregation, care is still required when handling the material in a dry state. Lifts in the pile should not exceed 2 m in height. The pile should be stepped and material should not be allowed to spill down the full length of side slopes.*

Response: Agreed. Stockpiling procedures and supervision are part of the QA/QC program.

Comment: *Seepage emanates from the* [East Dike] *toe in the area between Stn. 6+450 and 6+490…The seepage exited from the east side of the fill (photo # 4) until a channel was excavated on the west side. The majority of the flow is now seen to originate on the west side (photos # 5 and 6). Monitoring by way of weirs or flow pipes is required at both locations, and visual description of changes in suspended fines is necessary.*

Response: Following the site inspection, a rectangular weir was designed and installed to measure the flow through a channel excavated on the south side of the dewatering pipe ramp downstream of the East Dike (at about Sta.60+490) where most of the flow was found to occur.

The weir was monitored in July and August and seepage has been estimated at about 15 L/s on average, considering an additional 20% that did not report to the weir based on visual evaluation. The water flow rate appeared somewhat stable and the water was clear.

The weir became submerged in early September due to rising downstream water levels.

East Dike visual inspection and piezometer monitoring remain part of the QA/QC program.

Comment: *A walkover inspection of the Stormwater Dike foundation was carried out from east to west. The variable foundation conditions from soft lakebed to extensive boulder fields to bedrock outcrops were noted (photos # 11 to 13). The boulder fields… are to be addressed in the detailed directives to be formulated to cover foundation preparation.*

Response: AEM and Golder acknowledge this statement and confirm that TSF dike construction Technical Specifications require that a rough grading of the foundation surface be performed to remove boulders protruding more than 300 mm above the ground and scalp tops of hummocks to form a smooth surface. A copy of the TSF IFC Specifications will be provided to the MDRB prior to the next meeting.

QA/QC activities included the monitoring of the foundation preparation work specified.

3.0 TECHNICAL COMENTARY

3.1 East Dike

Comment: *There is an immediate need to monitor D/S seepage flow rates by whatever means are practical.*

Response: As described above, monitoring of seepage observed by the MDRB was performed between July 24 and September 6, 2009.

Comment: *There is also a need for prompt response, including contingency grouting plans, should there be a recurrence of the leak.*

Response: Discussions on an emergency/remedial action plan are ongoing between AEM and Golder. An initial grouting response plan was prepared during the original seepage event (May 2009). A draft remedial action plan was prepared in August which included a list of supplies and equipment required for emergency grouting. A copy of this action plan will be issued to the MDRB prior to the next meeting. The supplies included in this plan have been purchased by AEM and are now on site as is the required equipment. Personnel to carry out the emergency measures would be mobilized, if required.

The remediation action plan will be implemented in a phased approach and will be reviewed and updated as the work progresses.

Comment: *The detailed design (including collection system and pump station) for long-term seepage management should be tied to levels of leakage rate. In this regard, it would be useful to document: What is the design seepage scenario, how it will be handled, what is the demand capacity ratio for the collection system and how robust is the logic, how does this relate to the AEM emergency measures and evacuation plan for the pit, is there an Emergency Response Plan (ERP) to define responsibilities, lines of communication and actions to cover abnormal instrument readings, inspector observations, etc?*

Response: A detailed seepage management plan is currently in preparation. It will be presented to the MDRB at the next meeting of the Board.

Comment: *It is to be noted that the behaviour during drawdown has been highly non-linear with a rapid increase from almost zero seepage to something of the order of 600 l/s. This inflow was sufficient to negate the influence of the dewatering pumps installed at that time. It is therefore important to establish the design basis and it is recommended that a series of alert levels be established (for example green, orange and red alert levels) through which the type and rapidity of response can be better assured.*

Response: An East Dike OMS Manual has been prepared and is currently under review. The manual includes an emergency preparedness plan based on the CDA Dam Safety Guidelines. Updates to the OMS manual will include trigger or alert levels for monitoring.

Comment: *The appearance of a sinkhole reveals that not only was there loss of water but also the migration of solids which is a more serious issue. Likely the sinkhole is a result of leakage prior to the remedial grouting program but this requires confirmation. The situation requires immediate attention to confirm that leakage is not increasing with time and the integrity of slurry wall has not been compromised.*

Response: As a part of the remedial action plan described above, a series of investigation measures have been identified and are being conducted with the objective to assess the slurry wall integrity.

A cone penetration testing (CPT) program has been performed and results are being documented. This document will be provided to the MDRB prior to the next meeting of the Board.

A drilling and monitoring program, including packer testing in the immediate vicinity of the sinkhole has been completed. A geophysical program, including the use of a borehole televiewer in the diamond drilled holes, near the sinkhole and surface geophysics using ground penetrating radar (GPR) over the crest of the dike was conducted in parallel with the drilling and monitoring program.

Results of the drilling investigation and geophysics program will be discussed during the MDRB meeting currently planned for December 2009.

In parallel with the investigation program, the water level and instrumentation data collected on site are being reviewed on a regular basis.

Comment: *The Board requested that a teleconference be held in the week of August 10 for an update on the findings and recommendations for advancing this component of the work. This meeting was held on August 11, prior to completion of this report. A record of this teleconference is to be provided by GAL.*

Response: The minutes of the teleconference meeting were issued on September 21, 2009.

3.2 Bay-Goose Dike – North portion

Comment: *The Board agrees with the alignment and the cross-section as currently proposed for the northern sector but noted…that input should be sought from the Contractor to confirm the constructability of the slurry trench at the points of deflection in the dike axis.*

Response: Discussions were held between Golder, AEM, and the contractor prior to slurry wall construction. Turning points in the cutoff wall were successfully constructed by creating a small overlap in the two axes. The photograph below shows one such turning point in the cutoff wall alignment. The alignment was also slightly modified during the construction process near Goose Island.

Comment: *The Board notes that inadequate attention may have been paid to the influence of freeze/thaw effects on the soil/bentonite slurry wall conductivity and recommends a test program tied to thermal modeling and cyclic freeze-thaw effects.*

Response: Samples have been taken during the construction and a program for freeze-thaw modeling and seepage-thermal analysis is scheduled to commence in November. The results of this program will be provided to the Board once finalized.

Comment: *Although the onus is on the slurry wall contractor to determine if the densification of the central zone of the embankment is adequate to ensure trench stability, the Board agrees with the use of the Large Penetration Test (LPT) to guide future work and identify any current flaws.*

Response: An LPT program was conducted in September, 2009. A technical memorandum summarizing the results of this program will be issued to the MDRB prior to the next meeting of the Board.

Comment: *Based on the sinkhole experience, and despite the fact that the root cause has yet to be identified, the Board is of the opinion that continuity of the downstream filter and possible extension into a blanket beneath the shoulder would contribute to control of piping.*

Response: AEM and Golder acknowledged this statement from the MDRB and discussed its feasibility. Given the very tight construction schedule and the granular material availability, the decision was taken to replace the lower portion of coarse filter with core backfill and the width of the excavation on the downstream side of the cutoff wall was increased. This increased width of excavation means the length of core backfill (filter) material in contact with the bedrock has increased. Drawings were revised and construction was carried out in accordance with the revised design. (These updated documents will be forwarded to the MDRB prior to the next meeting). Golder is reviewing the need for any further design modifications for the southern portion of the dike alignment and whether any other filters (*i.e.* vertical downstream chimney filter) may be necessary for the northern portion of the dike.

Comment: *The Contractors constructing methods should be reviewed to ensure continuity in the placement of the CSB as there is a concern about the possibility of cold joints within the CSB. The Board prefers ensuring no shearing of CSB interface and hence a minimum set time should be adopted prior to placing SB material. However, there should also be a control of the maximum time before SB placement to minimize the accumulation of sand settling out of the bentonite slurry.*

Response: CSB placement occurred primarily in the deeper portion of the cutoff wall alignment during the 2009 Bay-Goose Dike construction. CSB placement was discussed in detail with the Contractor on site. Due to schedule and equipment constraints, CSB placement was done using the same construction methodology as was used for SB rather than the tremmie method outlined in the specifications.

Placement of CSB material began above the existing SB material already in the trench prior to reaching the deeper portion of the cutoff wall. Placement occurred continuously until the cutoff wall depth decreased to 6.5 m or less. Placement of SB material then resumed. As a result of the placement methodology used, the CSB material extended up to the surface of the trench. The CSB mix was reduced to 6% from the 8% specified based on Contractor lab results.

A second zone of CSB was placed at the end of the 2009 cutoff wall. The width of the cutoff wall in this portion was increased to 3 m over approximately a 10 m length. The CSB mix design was modified as well to include 2% cement, rather than 6%. The overlap portion of CSB over SB at this area will also need to be addressed in the 2010 construction season.

Comment:

With respect to grouting, the Board notes with favour a number of potential improvements that have or are to be added to the specifications but, given the

experience on the East dike, the Board questions whether there is more that can be done to improve completeness of treatment and the reduction of the possibility of a repetition of the incident of high seepage and the coarse particle erosion that appears to have occurred.

Response:

AEM, Golder and the Contractor are assessing the grouting technique and methodology for the Bay-Goose Dike. Grouting at Bay-Goose Dike is not scheduled to commence until March or April 2010.

The change in the design involving replacing the lower portion of coarse filter with core backfill, and increasing the amount of core backfill material in contact with the bedrock surface downstream of the cutoff wall, as described above, was advanced based on learnings from the East Dike.

An LPT program has been performed in order to gain further knowledge on the relative core backfill compaction efficiency. The results of this program are being documented in a technical memorandum that will be provided to the MDRB prior to the next meeting of the Board. Monitoring during excavation of the cutoff wall indicated that the trench remained open to the full depth of the excavation.

During the 2009 construction of the northern portion of the Bay-Goose Dike, an accumulation of silt at the base of the initial excavation was observed. The source of the silt may be from fines within the core backfill and coarse filter material being placed within the excavation, and/or from lakebed materials. A review of the gradation of in situ core backfill materials collected during the LPT program is currently underway in an attempt to further clarify the potential source of this material. The results of this analysis will be presented to the MDRB at the next meeting of the Board.

The thickness of the silt varied depending on:

- proximity to the face of the trench where backfill material was being placed;
- shape of the bedrock surface; and
- length of time the excavation was left open.

Following discovery of the silt accumulation, subsequent portions of the excavation were cleaned continuously in front of the backfilling operation to minimize the presence of silt at the base of the excavation between the bedrock surface and the core backfill. In addition, the cutoff wall excavation was continuously monitored to ensure that the base of the excavation was extended to bedrock and to an elevation below the base of the initial trench excavation. This helped to ensure that no silt material remained at the base of the cutoff wall.

Comment: *It is suggested that drilling parameters may assist in the identification of joint openings, as may televiewer images. Side discharge bits may improve the effectiveness of hole washing. The need for further investigation, after construction of the initial rockfill embankment, should be considered. There is a need for* [Golder] *to advise on the best technology to optimize the grouting effort in order to avoid sinkholes in the future.*

Response: A geotechnical investigation program for the southern portion of the Bay-Goose Dike is in preparation. This program may include collection of additional data related to the quality of bedrock and fracture structure beneath the Bay-Goose Dike. Details of the program will presented to the Board prior to initiation of the program currently planned for February 2010. Information obtained from the East Dike investigation program, including televiewer and detailed rock core logging will be considered for the Bay-Goose Dike as well.

3.3 Bay-Goose Dike – South portion

Comment: *The Board is of the view that the base case design should be a cut-off to rock and this design should advance. However, the Board is open to a demonstration by detailed site investigation that a partial cut-off is an acceptable optimization.*

Response: Golder and AEM are reviewing the potential design options for the southern portion of the Bay-Goose Dike. If AEM decides to pursue the “partial cutoff wall design option” it is recognized that an extensive investigation program with detailed collection and logging of lakebed soils will be required, and that information obtained from such

investigation, may or may not support this design. This item is intended to be discussed further during the next MDRB meeting.

Comment: *The Board is of the view that a filter beneath the rockfill shell is an integral part of the design.*

Response: Review of the south portion of the Bay-Goose Dike is currently underway and will be based on additional knowledge acquired during the 2009 construction period, the East Dike investigation program, and the 2010 geotechnical investigation program.

3.4 TSF – Stormwater Dike

Comment: *The cut-off trench should be moved upstream out from under the dam to facilitate construction. Furthermore, there is a need for clarification of the specifications covering the backfill materials and its placement in the trench.*

Response: Stormwater Dike design was reviewed prior to the construction. The alignment was reviewed and revised in the field based on the pond water level and field conditions and the cut-off trench was constructed at the upstream toe of the dike.

Comment: *The Board accepts the use of the Coletanche but insists on meticulous inspection of bedding and coarse filter. Thus it is questioned whether protection could not be adequately provided by relying on tailings beaches, pond control, or a Linear Low Density Polyethylene (LLDPE) rub sheet.*

Response: Coletanche is being used in the construction of the Stormwater Dike. Observations on the liner bedding and coarse filter were discussed with AEM and documented in daily and weekly reports.

Comment: *The Board expresses the wish to review the specifications, when issued.*

Response: TSF Technical Specifications were issued for construction in October and will be provided to the MDRB prior to the next meeting.

Comment: *The Board wishes to receive a copy of the* [construction] *planning so it can participate in tracking the effective sequencing.*

Response: The initial planning for the construction of Stormwater Dike was prepared by AEM and discussed with Golder. Additional information was communicated during the daily construction meetings and during the additional planning meetings held prior to the resumption of work at Stormwater Dike following completion of the earthworks component for Saddle Dam 1 Stage 1 construction. Schedule changes have occurred throughout the construction due to material and equipment availability, and overall priorities.

Comment: *There is a particular urgent need for investigation of the till/rock conditions along the cut-off trench alignment. The presence of jointed and frost jacked rock (photo #12) indicates a requirement for an adequate filter between fine grained materials and the rock wherever the hydraulic gradient could lead to piping.*

Response: Several test pits were advanced along the cut-off trench alignment. The conditions observed in the test pits, and those during cut-off trench excavation and embankment foundation preparation were used to determine the actual cut-off trench alignment. The cut-off trench was aligned to tie-in with more massive bedrock, where practical, and the placement of graded fill materials was performed to provide an appropriate filter system.

This construction approach was developed in consultation with AEM and satisfactorily manages the risk of tailings migration and/or seepage through the Stormwater Dike. It shall be recalled that this structure is internal to the TSF and, as such, any tailings migration and/or seepage through the structure will not report to the surrounding environment; any tailings and/or seepage will report to the South Cell of the TSF.

3.5 TSF – Saddle Dam No.1

Comment: [Saddle Dam 1]*, and the other saddle dams merit their own Design base Memorandum (DBM) and Design Report.*

Response: The decision to have both TSF dikes under the same technical specifications was based on a construction efficiency point of view as both Stormwater and Saddle Dam 1 structures were to be built during the same period and by the same contractor. Nonetheless, care has been made on clearly describing the requirements for both structures. Both structures also have their own drawings sets.

Comment: *As with the Stormwater Dike, the Board suggests that a simplified key trench detail be adopted to move this element upstream so as to facilitate construction. However, before this decision can be made there is a need to review the anticipated performance of the dike and its foundation.*

Response: The Saddle Dam 1 design has been revised. The key trench, as constructed, is located at the upstream toe of the structure.

4.0 CLOSURE

We hope the above information provides the required clarification. If additional information is required, please do not hesitate to contact us.

Yours very truly,

GOLDER ASSOCIATES LTD.

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