Appendix B2

Independent Geotechnical Expert Review Panel Reports

Report 11: ***Meeting April 11-12, 2012***
Letter: ***Response to Report 11***

Report 12: ***Meeting September 10-12, 2012***

Report 13: ***Conference Call December 19, 2012***
Letter: ***Response to Report 12-13***

April 25th, 2012

Mr. Dominique Girard, P. Eng.
General Manager
Agnico–Eagle Mines, Meadowbank Division
Baker Lake Office

Email: dominique.girard@agnico-eagle.com

Dear Mr. Girard,

Report No 11
Meadowbank Mine Dike Review Board
Meeting April 11-12, 2012

1.0 INTRODUCTION

The meeting of the Dike Review Board was held in the head office of Agnico-Eagle in Toronto from April 11th to 12th. Don W. Hayley has been appointed to the Meadowbank Dike Review Board and the other two members, Dr. N. R. Morgenstern and Mr. D. A. Rattue, are delighted by this addition. All three members were present at the two day meeting.

The objectives were to review the progress of the works and mine operation, the design of the various structures, and the behaviour of the dikes.
The activities covered those outlined in the agenda which is included as Attachment A. The list of attendees at the meeting is given in Attachment B.

Digital copies of several documents were forwarded to the Board members in advance. Paper copies of the various PowerPoint presentations were submitted by Agnico-Eagle Mines (AEM) and Golder and Associates (GAL) during the meeting together with a CD compilation of the same. A list of the documents is to be found in Appendix C.

In the report which follows, the Board's recommendations are underlined.

2.0 UPDATE ON MINE STATUS

AEM provided an update on the mine status for information.

The current business plan is for a life of mine to 2017 which reflects a reduction in the reserves. As a consequence, the Tailings Storage Facility (TSF) will also be modified. The North cell will be full by mid 2015. Constructing the South cell to elevation 140 m will provide the required capacity, though raising to the originally planned crest elevation of 150 m would still be possible.

Additions to the process plant have permitted an improvement to be made in productivity but it is noted that the overall cost per oz. of gold is high by industry standards.

3.0 RESPONSE TO REPORTS NOS 9 and 10

AEM has prepared a comprehensive letter response to the MDRB Report No. 9 (Sept 2011). The Board is content that all items have been considered effectively. The revised organization chart as pertains to the dike construction, operation and maintenance was presented by AEM at the meeting. There was no formal response to Report No. 10 but, most of the issues raised have been considered in the updated design for the Central dike. Any outstanding issues are covered in the current report.

4.0 EAST DIKE

4.1 Instrumentation Review

Indications are that the East dike is performing in an acceptable manner. The instruments are reliable. Data is initially evaluated by the AEM team and the results forwarded to GAL for further analysis. The interpretation is an ongoing exercise.

The topographic survey of the surface monuments has been improved but additional monuments are proposed and the survey equipment will be upgraded.

4.2 Seepage Management

The improved water interception system, which was under construction at the time of the Board visit in September, is now operational. Measured outflow from the pumps indicates that the flows match previous records from weirs and that monitoring could now be accomplished by flow meters in the pipelines.

Water quality is judged by visual observation in the wells but a water sampling system should be used to permit quantifying any turbidity.

In the present circumstances, and in consideration of the fact that certain interventions may upset the current equilibrium, the Board does not anticipate any dike restoration measures.

5.0 BAY GOOSE

5.1 Bay Goose Dike

A comprehensive As-Built report was tabled for examination. The Board is pleased that this document is now available to assist with the interpretation of behaviour.

Initial dewatering was successful. The instrumentation is well distributed and effective. Automation is in progress. Piezometers and thermistors are hooked up to the data acquisition system. A high priority is to complete the functionality including the alarm capability.

The site team prepares a monthly inspection report for submission to the Mine Manager. This report covers instrument monitoring and field observations. The frequency of instrument readings varies according to the type of instrument but, a visual inspection is carried out on a daily basis. The software package Vista Data Vision is used to compile data and prepare

graphical presentations. The written report, though brief, covers the important aspects. It is suggested that the report begin with a short paragraph describing the salient points.

A number of anomalies in behaviour have been identified and are summarized on the attached table (Appendix D).

Many are undoubtedly minor. The Board's major concern is in the area denoted as Channel 1 (Stns 32+020 to 32+100) where a number of abnormalities come together to indicate a need for closer examination. These include:

- Piezometer records (series 29 at 32+105 exhibits greater fluctuation than others in the region);
- Inclinometer profiles (No. 8 at 32+065);
- Observed seepage (investigation by Patrice Gagnon);
- Thermistor warming (T29 in the rock).

It is to be noted that this area also coincides with an adverse curve in the dike axis and a relatively steeply dipping lake bed. Preparedness for potential deterioration is warranted.

5.2 South Camp Dike

Unfortunately, the thermistor string installed below this freeboard dike is no longer functioning but, the remaining lakeside instrument does not indicate any adverse trends.

5.3 Setback Study

The current mining plan is based on a setback of 70 m and a 43° average pit slope. The results of additional investigations and the observations of rock exposures in the neighbouring Portage Pit have permitted a re-assessment to be made of the pit wall design. This study was presented at the meeting by GAL personnel and has been productive in clarifying more favourable rock structure than had been previously recognized.

The study incorporates the information gathered from the inclined holes P12-GPIT5 to GPIT10, which included televiewer imaging, together with laboratory Direct Shear testing. This led to revised design parameters and an overall re-assessment of the slope design. The Board agrees with the proposed design Factors of Safety.

GAL concludes that the 40 m setback would be safe based on:

- the prescribed wedge failure mechanism;
- the role of rock bridges;
- a hydro-geological model taking account of the permafrost zone and with regular pressure dissipation through the rock mass;
- the results of various 2-D analyses performed with SLIDE software.

The Board appreciates the efforts made to better define the potential failure surfaces which take account of the shallow dipping discontinuities that dip into the slope, in contrast to a more conservative preliminary hypothesis of an outward dip. However, despite these theoretical arguments, the Board is of the view that a 40 m setback is aggressive and has little precedent. The remaining uncertainties should be recognized. For example, the water pressures may not adequately cover the plausible scenario of steeply dipping discontinuities under the lake that transmit water pressure to the base of the potential slide area. The issue of strain compatibility

should not be ignored when introducing the benefits of rock bridging. The Board recommends that a setback of 70 m be maintained but that the opportunity for steepening the slope from 43° to one at 49° to 53° be explored once the rock face has been adequately exposed to permit discontinuity mapping and when measurements are made of the real water pressures. There is therefore a pressing need to instrument the pit walls with priority given to the east face. Instrumentation should include deep piezometers in holes dipping to beneath the lakebed to permit installation along the dike centerline, as well as an adequate number of survey monuments/prisms on the rock of the in-field area and on the pit face. TDR arrays have also been suggested. Thermistors would also be useful to record freeze-back of the pit wall that could hinder drainage and result in elevated pressures within the rock wall.

Future studies would then validate the hydrogeological model, address the impact of stress relaxation on joint openings, and evaluate the implication of joint orientation and shear strengths that are less favourable than the mean values.

The Board is of the view that AEM is increasingly risk averse and that aggressive setback design should be reviewed in great detail before reaching out for any apparent prize.

5.4 Start-Up

The Bay–Goose pit excavation started in March 2012. Information pertaining to the planned pit development was provided.
Haul road geometry, concentrated on the west wall, has been determined so as to allow the east pit wall to be as steep as possible.

Blast monitoring has indicated low peak particle velocities (PPV), less than 8 mm/s so far.

6.0 OPERATION, MAINTENANCE AND SURVEILLANCE MANUALS

The operation, maintenance and surveillance (OMS) manual for the water retention dikes and the Tailings Storage Facility (TSF) have been issued in a preliminary form. These documents adequately describe the structures and present the various aspects to be considered in operation and maintenance.
The content of the manuals has been extended to include water quality and flow monitoring as well as Emergency Preparedness and Response Plans. Note that a site wide Emergency Response Plan has also been prepared to cover a variety of scenarios other than just incidents related to the dikes.
In general, the documents are comprehensive and provide the necessary information. However, certain comments are in order.

As mentioned, the documents provided were in draft form and comments are presumably anticipated from the various departments before issue of the final versions. Careful proof reading by the main authors will be required to remove any remaining inconsistencies. Note however, that this type of document will always be subject to revision as conditions change and personnel occupy different functions.

As far as detailed comments by the Board are concerned, the following may be noted:

The tables B-3 and B-4 in the OMS manual for the dewatering dikes give criteria such as inflow rate deemed to be appropriate for a category of performance judged to be acceptable. However, the same column goes on to mention that the design engineer will make a visit to site

to assess the situation and that the specialized contractors will be notified. Clarification of the intent is required.

The Emergency Response Plans make the point that a clear chain of command is necessary for all safety and health activities. However, all the ERPs consulted provide only a single generic flow chart for communications. The different potential scenarios will have varying degrees of severity and the level to which communications are made will vary. For example, an abnormal instrument reading will be handled by the on-site surveillance staff and if necessary will be brought to the attention of the design engineer before any other state is declared. On the other hand, a potential rupture of the dike will require implementation of evacuation plans and the involvement of a far wider group of people. A common communications flow chart is not appropriate. Furthermore, the said charts should include the names and coordinates of all the concerned parties. In an emergency situation, there should not be the need to search among lists of staff members to decide on the persons to be contacted.

The Board is content with the general project organization for emergency response but recommends that Action plans be drawn up to prepare for various remedial measures that could be implemented in the event of incidents such as leakage or sinkholes in a dike. An example would be whatever measures that could be envisaged for the Bay-Goose hot-spots in channel 1. Stockpiles of materials, protection of the same against freezing, construction equipment, manpower, and methods for effecting repairs need to be thought out in advance.

In order to get an early indication of the seepage at the dike toe in channel 1, it is recommended that snow removal be initiated as early as practicable this spring.

The criteria for pit evacuation should be clarified and implementation plans made with senior management.

7.0 TAILINGS STORAGE FACILITY OPERATION

7.1 2011 Construction

A presentation was made concerning the various construction details of the saddle dikes and their connections. The incidents of aerodynamic uplift of the exposed liners were mentioned. After high wind speed events, repair of the liner to remove large creases was required. Extra ballast will be applied in areas where the deposition of tailings will not occur for some time.

7.2 Summary of Instrumentation

The results of the instrument monitoring on the saddle dikes and storm water dike were presented. At Saddle dike 1, the thermistors indicate that freezing is ingressing at the upstream toe. However, the permafrost beneath the dike could still be affected by the inflow of water from downstream. The situation has not deteriorated over the last twelve months but automated pumping from a sump at the downstream toe is envisaged in order to prevent, or at least minimize, the cycles of inflow and outflow of water from the dike shell. During the operating life of the TSF, monitoring of water quality at the toe will be required and a permanent drainage ditch to Third Portage Lake cannot be constructed until the post closure period. Consequently, this controlled pumping will be a long term item.

The performance of Saddle dike No.2 and the Stormwater dike is good and there are no concerns for the Board.

8.0 CENTRAL DIKE

8.1 Design

The Board is in general agreement with the design as modified since the version presented and discussed during the November conference call (See MDRB report No. 10).

The specifications were also provided to the Board for comments but no detailed discussion took place at the meeting. The specifications are essentially a re-iteration of those prepared for previous dike construction on the project. A perusal of the document revealed a few items that had caught the attention of the Board at earlier meetings and still warrant validation, such as:

- The placement of run of mine rockfill in the body of the dams using mine equipment, thick lifts and nominal compaction (routing of hauling equipment only) even in the area underlying the upstream slope;
- The requirement to treat with slush grout only the open joints in the surface of the rock that exceed 10 mm in width;
- The dewatering section that has fairly modest requirements and does not include such items as deep pump wells.

The Board also has specific concerns with the key trench. The potential problems are related to dewatering for construction and the design against uplift, should artesian pressures prevail. The project is aware of the water management issues as it has moved the key trench to a central location further away from the cofferdam toe, and the design team has considered the trench side slope stability as one of the cases in the analytical studies. On the abutments, natural drainage will probably suffice. In the valley bottom the thickness of overburden is generally less than 5 m. However, the investigations have revealed a deeper gully (around 15 m) along the alignment of the fault that crosses the dike axis. Here, considerable difficulty may be encountered in excavating to rock, executing surface treatment, liner placement and backfilling in well compacted layers if the water table is not adequately controlled.

The Board recommends the following course of action.

- Excavate test pits to determine soil conditions, depth of frozen ground and likely inflows;
- Percussion drilling to establish the bedrock profile in a broad band centered on the dike axis to determine the most favourable locations for dewatering sumps and to ascertain whether local re-alignment of the key trench may be advisable.
- Installation of piezometers in the lake bed and underlying rock ahead of construction;
- Become familiar with the issues that caused problems in the Processed Kimberlite Containment at Diavik;
- Develop a design and a construction sequence that considers the possibility of uplift in the key trench and elsewhere beneath the LLDPE liner before the addition of adequate cover;
- Review the specifications and tender documents to ensure that all conceivable eventualities are covered;
- Discuss, internally and with the Contractor, the contract strategy and the schedule for the work.

The Board also has concerns that the potential for seepage, from the TSF basin and the underlying Talik, towards the Portage Pit may be underestimated and that the role of the grout curtain beneath the Central Dike may be undervalued. Significant seepage was noted during the construction of the cofferdam. Whilst it is understood that the latter operation was carried out shortly after the dewatering of the Second Portage Lake basin, and that observations in the pit indicate no large inflows from the west wall, the Board recommends that in-situ permeability testing be carried out in the North Cell of the TSF to determine whether the segregation that occurs on a beach deposit could result in values for permeability greater than those assumed for the seepage analysis.

The model used for the seepage analyses presented in Appendix C of the Detailed Design Preliminary Report for the Central Dike needs to be verified as the geometry of the equipotential lines , shown to board members at the meeting, does not seem to properly represent the flow barrier provided by the liner. Moreover, the input parameters should better reflect a distribution of permeability related to beaching.

Significantly higher seepage to the pit may be a serious limitation of the Central Dike design if no grout curtain is included. There is a contingency plan to carry out grouting at the downstream toe in the event that the migration of tailings through open joints is observed after the South Cell is put into operation. This is intended to close the large conductors but not to provide an impermeable barrier. However, any reduction of conductivity would have the effect of increasing the pressures beneath the dike and this is not judged to be a particularly favourable outcome. Consequently, the Board recommends that the merits and need for a grout curtain be more thoroughly examined prior to construction of the Central Dike and that a central location be favoured should the results support its inclusion .

8.2 Schedule

AEM has developed a construction schedule based on the productivity achieved in the various works carried out to date. While this is a useful exercise to establish that completion of the Central Dike can be achieved for the 2015 start of operation, the Board is of the opinion that the role of AEM as the construction planner merits review. This review should be made in the context of the specifications, drawings and milestones to be given to the Contractor. Unless the Contract will be drawn up on a time and materials basis, the Contractor will have the responsibility to mobilize the appropriate fleet of equipment, and to plan his activities to achieve the necessary productivity. It is a question of who assumes the responsibility for meeting the deadlines. AEM needs to clarify internally the Contracting strategy that will be adopted.

8.3 Quality Control and Quality Assurance

The QC/QA plan is satisfactory as proposed. Obviously, the Contractor will need to submit a detailed programme to cover his Contractual obligations in this facet of the work. The responsibility for inspection is included in the Contractors scope but some elements, such as foundation and earthworks approvals would be more appropriately carried out by the designer who is in a better position to judge whether the quality of the work corresponds to the design hypotheses and criteria. GAL needs to provide adequate staff to fulfill this role. Moreover, the sign-off procedures need to be clarified.

9.0 TAILINGS MANAGEMENT

The Board considers this to still be a work in progress and has a number of concerns that need to be addressed.

The tailings deposition simulation, as presented for the North cell, was based on only one spigot change per month. From the sequence of images, it was clear that the beach formation would be inadequate to meet the fundamental criteria of keeping pond water away from the exposed liner of the Stormwater dike, particularly during the periods when ice is expected. Additional calibration of the model is required.

As mentioned above in relation to seepage from the facility, the beach formation and the accumulation of unconsolidated slimes needs to be evaluated to better characterize the materials within the TSF and determine whether segregation is an issue for the design.

The Board made the suggestion that, concurrently with and independently of the Central dike design process, the Project examines possibility of adopting a method involving the "dry stacking" of filter press dried tailings for at least the latter part of the life cycle (beyond 2015) of the TSF. This may obviate the need to construct the South Cell. AEM informed the Board that the indications from other similar studies were that no significant benefit would be gained as costs for this alternative method would be high. Following this meeting, the Board received information that the tailings contain some fibrous and flakey shape particles that may affect filterability. Simple testing could identify this.

10.0 NEXT MEETING

The date for the next meeting, which would involve a site visit, is set tentatively for the early part of the week of September 10th, 2012. Due to prior commitments, Dr. Morgenstern will not be available to visit the site but Messrs Hayley and Rattue plan to attend. However, Dr. Morgenstern will be available by teleconference if scheduling is practical.

9.0 ACKNOWLEDGEMENTS

The Board once again wishes to thank the personnel of AEM and GAL for their participation in the meetings, and for the excellent documentation and presentations made by AEM and GAL which contributed to the efficiency and effectiveness of the proceedings.

Signed:

Norbert R. Morgenstern, P.Eng.

Don W. Hayley, P.Eng

D. Anthony Rattue, P.Eng.

ATTACHMENT A

AGENDA FOR BOARD MEETING NO. 11

April 11th-12th, 2012

Agnico-Eagle Mines-Meadowbank Division

Meadowbank Dike Review Board

Meeting # 11 – April 11 and 12, 2012

Agnico Eagle Head Office – Toronto, ON

AGENDA

April 11 **(Dewatering Dikes)**

8:00 Welcome (light breakfast served)

8:10 Mine operation status updates [AEM]

8:30 MDRB Report # 9

- Review Response to MDRB Report # 9 [AEM]

9:00 East Dike

- Review of instrumentations data [GAL]
- Update on seepage management and contingency plan [AEM]

10:15 Coffee Break

10:30 Bay Goose Dike

- Completion of the dewatering [AEM]
- Introduction to VDV software [AEM]
- Review of the instrumentation data [GAL]

12: 00 Lunch

13:00 Bay Goose Dike

- Setback study presentation [GAL]
- Discussion with Dike Review Board on dike setback study

15:00 Goose start-up [AEM]

16:00 OMS and As-built (draft) reports Dewatering

- Comments from the Dike Review Board related to the reports previously issued
  **Bay Goose Dike As-Built will be presented as Draft during the MDRB meeting*

17:00 End of the first day

April 12 **(TSF)**

8:00 Welcome (light breakfast served)

8:10 Central Dike

- Central Dike design details [GAL]
- Construction schedule, including QA/QC strategy [AEM]

10:45 Coffee Break

11:00 Operational TSF

- Review of 2011 works performed on TSF structures [AEM]
- Review of the instrumentation data [AEM]
- Review of Tailings Management in TSF [AEM]

12: 00 Lunch

13:00 Operational TSF

- Deposition plan [GAL]

13:30 OMS, Emergency Response Plan and As-built reports

- Comments from the Dike Review Board related to the reports previously issued
- Presentation of the Emergency Response Plan and discussion [AEM]

15:00 Deliberation by the Board Members

16:30 Preliminary Report by the Board Members

17:00 Closure

ATTACHMENT B

ATTENDANCE AT APRIL 2012 MEETING
Held at the Agnico-Eagle head office, Toronto

Attendance		
Pierre Bureau (Partial)	AEM	
Dominique Girard	AEM	General Manager, Meadowbank Mine
Louise Grondin	AEM	V-P, Environment and Sustainable Development
Alan XXXXX (Partial)	AEM	General Superintendant
Stephane Robert	AEM	Environment
Jean Robitaille (Partial)	AEM	V-P, Technical Services and Project Development
Yvon Sylvestre (Partial)	AEM	S-V-P, Operations
Julie Bélanger	AEM	
Michel Julien	AEM	
Patrice Gagnon	AEM	
Thomas Lepine	AEM	
Erica Voyer	AEM	
Paul Bedell	Golder Associates	
Yves Boulianne	Golder Associates	
Cameron Clayton	Golder Associates	
Fiona Esford	Golder Associates	
Karine Doucet	Golder Associates	

Megan Smithyman	Golder Associates	
Dan Walker	Golder Associates	
Don Hayley	EBA	Dike Review Board
Norbert Morgenstern	Self	Dike Review Board
Anthony Rattue	SNC Lavalin	Dike Review Board

ATTACHMENT C

DOCUMENTS FURNISHED

Documents provided in advance of meeting

AEM, January 2012, “Construction Summary Report, Cofferdam 2011-Central Dike”.
AEM, January 2012, “Draft, Dewatering Dikes, Operation, Maintenance and Surveillance Manual”.
AEM, January 2012, “Draft, Dewatering Dikes, Operation, Maintenance and Surveillance Manual, Appendices”.
AEM, February 2012, “Tailings Storage Facility, Operation, Maintenance and Surveillance Manual”.
AEM, February 2012, “ Inspection Report, Instrumentation Monitoring and Field Observation Summary, Bay-Goose Dike”.
AEM, March 2012, “Emergency Response Plan”.
AEM, March 2012, “Response to report No. 9, Meadowbank Dike Review Board”.
Golder, March 2012, “Detailed Design Preliminary Report for Central Dike”.
Golder, March 2012, “Drawing Package, Tailings Storage Facility, Central Dike”.
Golder, March 2012, “Central Dike Construction, Technical Specifications”.

Documents provided during the meeting

PowerPoint printouts
AEM, Meadowbank Overview.
East Dike Instrumentation Presentation.
Bay-Goose Dewatering.
Bay-Goose Instrumentation.
Instrumentation: South Camp Dike.
Bay-Goose Dike Action Plan.
Bay-Goose Dike Setback Assessment and East Pit Wall Stability.
Central Dike design Concept.
Central Dike Construction Schedule and QC/QA Strategy, 2012 Season.
TSF-SD2/Connection, 2011 Construction.
TSF, Review of Instrumentation Data.
Tailings deposition Plan.

A paper copy of the Bay-Goose As-Built Report was also provided for examination.

Documents provided subsequent to the meeting

SGS Canada Inc., April 2012, “Certificate of analysis, Mineralogy of tailings”
SGS Canada Inc., April 2012, “Certificate of analysis, Tailings water chemistry”
Extract from memorandum “MEAD-067-RFS0062” Tailings mineralogical and chemical analysis”

ATTACHMENT D

Bay-Goose Dike
List of Potential Areas of Concern

Potential Areas of Concern Based on Observations During Construction and Dewatering

SOUTH ABUTMENT		CUTOFF WALL
T-32+115.5	Moderately high and high take in shallow bedrock Stage 2 and Stage 2/3 combined.	SB
32+105	This is where jet grouting ended. Temporary thermistors installed at the time indicated this was the boundary between the talik and permafrost and the abutment was frozen. There is a possibility that the abutment is not as frozen as predicted and the jet grout curtain is not tied. There is significant amount of tilland relatively sharp transition in the bedrock.	SB/JET GROUT
32+105	Near boundary of talik/permafrost. Thermal trends unceratin.	SB/JET GROUT

CHANNEL 1 32+065 32+020 32+000	Piezometer array, gradual, steady increase in piezometric head in channel since end of dewatering. Potential seepage. Two drops in head (mid-Feb and mid-Mar).	SB/CSB/JET GROUT CSB/JET GROUT
T-32+103.5	Moderately high takes in Stage 2 and 4 and a very high take in Stage 3. No grouting performed below Stage 1 and no quaternary holes were completed.	SB/JET GROUT
32+100	Thermistor (T-29), thermal trends uncertain at bedrock contact and in shallow bedrock.	SB/ JET GROUT
32+093 to 32+099	Some high take secondary and tertiary stage 4's. Due to limited availability of the DM-45 drill rig, perforation of casings and grouting of all Stage 4 was not fully carried out. This area suffered in terms of proper treatment due to the rush at the end of the job.	SB/CSB/JET GROUT SB/JET GROUT
T-32+082.5	Very high take Stage 4 in this tertiary with a high take Secondary adjacent to it. There is a dip in the jet grouting sub-drill in the adjacent primary.	SB/CSB/JET GROUT
T-32+070.5	High take Stage 4 but you'll notice that the adjacent holes were grouted much higher up in Stages 3 and 4, and may not have received proper treatment of the contact / shallow bedrock due to some casing installation discrepancies.	SB/CSB/JET GROUT
32+065	Inclinometer, with differential movement noted at interfaces between cutoff wall material types.	SB/CSB/JET GROUT
T-32+040.5	Moderately high take in Stage 4 next to a moderately high take in the secondary and high take primary stage 4s. Achieved pressures were good but the sub-drill for jet grouting was really inconsistent over a few holes in this area. Nearby at Q-32+047.25 there was a moderately high take Stage 4 and some communication through the shallow bedrock during Stage 3 from S-32+045.	CSB/JET GROUT
32+020 to 32+040	Visible signs of seepage (i.e. slush, fresh ice, when exposed flow)	CSB/JET GROUT
S-32+003	Stage 1 was not completed in this hole and it is possible that there is a small window from the end of the casing to the top of stage 3, likely due to a casing installation discrepancy.	

The South Ridge	In general this entire area is where we encountered the worst bedrock of the whole dike. Around 31+976.75 in particular we had a medium high take during the first pass quaternary stage of grouting. The second pass was better with lower takes, but still an area of concern. There were also some Stage 4 tertiaries which did not close by penetrability around 32+001.5 which are of concern	CSB/JET GROUT
CHANNEL 2 31+930 31+885 31+815	Gradual, steady increase in piezometric head in channel since end of dewatering. Potential seepage, with 2 drops in head (mid-Feb, mid-Mar).	CSB/JET GROUT
31+863.5 to 31+899.5	A few tertiaries which did not close by penetrability in Stage 4, and a few which did not come up to pressure either.	CSB/ JET GROUT
CENTRAL CHANNEL		
31+126.25 to 31+150.25 and 31+165.25 to 31+171.25	Where quaternary stage 4's connected with one another during the first pass (every quaternary ending in 0.25). These were "sealed" as proved by while carrying out the second pass of quaternary stage 4's (ie. every quaternary ending in 0.75).	SB
NORTH CHANNEL	Gradual, steady increase in piezometric head in channel since end of dewatering. Potential seepage.	CSB/SB, CSB/JET GROUT
30+435 to 30+450	south side	CSB
30+230 to 30+360	Interface CSB/SB	CSB/SB
30+288.5	Thermistor (T5) bedrock contact and shallow bedrock (CSB/SB contact)	CSB/SB
30+330.5	Thermistor (T6) elevation 130 m (~ CSB/SB contact)	CSB/SB
GENERAL		
- edges of jet grouted zones		variable
- "boulder/cobble" potential "shadow areas" that could be an issue		variable

August 18Th, 2012

SUBJECT: RESPONSE TO REPORT no.11 MEADOWBANK DIKE REVIEW BOARD

TO: Norbert R. Morgenstern, D. Anthony Rattue, and Don W. Hayley

FROM: Agnico-Eagles Mines, Meadowbank Division

The eleventh meeting between the Meadowbank Dike Review Board (the board), Agnico-Eagle Mines Limited (AEM), and Golder Associates Ltd. (Golder) was held on April 11 and 12 at AEM's head office in Toronto. The objectives of the meeting were to review the progress of the works, the design of the various structures, the deposition and development of the tailings storage facility (TSF), and the performance of the dewatering dikes and the structures of the TSF.

On April 25, 2012, the board provided a report letter (Report 11) with their comments from the above meeting. This letter provides the response from AEM and Golder related to those comments.

1.0 EAST DIKE

1.1 Instrumentation Review

Comment:

> *The topographic survey of the surface monuments has been improved but additional monuments are proposed and the survey equipment will be upgraded.*

Response:

New prisms have been purchased and installed on East Dike. A new total station specially made for monitoring has also been acquired to enhance the precision of the monitoring. Settlement monuments will also be equipped with shelter to protect the total station from wind and adverse weather conditions in order to increase the precision of the readings. As the winter presents often strong windy conditions at Meadowbank, these shelters will likely be helpful to improve the quality of the readings. Monitoring should start shortly on East Dike.

Regional Office:
93, Rue Arseneault
Bureau 202
Val d'Or, Quebec J9P 0E9
Tel: 819-825-3744

Baker Lake Office:
P.O. Box 540
Baker Lake, Nunavut X0C 0A0
Tel: 867-793-4610 Fax: 867-793-4611

1.2 Seepage Management

Comment:

> *Water quality is judged by visual observation in the wells but a water sampling system should be used to permit quantifying any turbidity.*

Response:

The water quality at the seepage collection system is now being verified by sampling the water in the culvert with a bucket attached with a string. This simple system provides good visual assessment of the water turbidity. Water level in the culvert is also monitored during site inspection, usually twice a week

2.0 BAY GOOSE

2.1 Bay Goose Dike

Comment:

> *Initial dewatering was successful. The instrumentation is well distributed and effective. Automation is in progress. Piezometers and thermistors are hooked up to the data acquisition system. A high priority is to complete the functionality including the alarm capability.*

Response:

The data acquisition for the Bay Goose instrumentation is performing well. The software VDV for data management is constantly improved by the AEM engineering team to enhance the quality of data management and review. As discussed with the supplier who installed the VDV software, the current version does not offer the alarm capability for piezometric level and temperature changes. The next version of VDV will include an alarm capability system for piezometric level and temperature changes. The AEM engineering team will evaluate the necessity of the new software version when it becomes available.

Comment:

> *The site team prepares a monthly inspection report for submission to the Mine Manager. This report covers instrument monitoring and field observations. The frequency of instrument readings varies according to the type of instrument but, a visual inspection is*

carried out on a daily basis. The software package Vista Data Vision is used to compile data and prepare graphical presentations. The written report, though brief, covers the important aspects. It is suggested that the report begin with a short paragraph describing the salient points.

Response:

As suggested by the board, the monthly report starts with a short summary paragraph describing the most important field observations and instrumentation behaviors.

Comment:

A number of anomalies in behaviour have been identified and are summarized on the attached table (Appendix D).

Many are undoubtedly minor. The Board's major concern is in the area denoted as Channel 1 (Stns 32+020 to 32+100) where a number of abnormalities come together to indicate a need for closer examination. These include:

- *Piezometer records (series 29 at 32+105 exhibits greater fluctuation than others in the region);*
- *Inclinometer profiles (No. 8 at 32+065);*
- *Observed seepage (investigation by Patrice Gagnon);*
- *Thermistor warming (T29 in the rock).*

It is to be noted that this area also coincides with an adverse curve in the dike axis and a relatively steeply dipping lake bed. Preparedness for potential deterioration is warranted.

Response:

The southern area of Bay Goose dike around Channel 1 has been closely monitored since abnormalities have been noted. Following the Board meeting last April, a site investigation was conducted to assess the conditions by removing the snow and ice cover along the downstream toe of the dike. A detailed site investigation report was issued documenting procedures and observations. Detailed visual inspections of the downstream toe and the crest are done regularly to observe any signs of seepage or structural defects. The instrumentation located in the area continues to be closely monitored. The inclinometer N.8 is also read twice a month, along with the other inclinometers.

Review of the available material and equipment on site required for emergency action such as grouting or material backfill was also done by the engineering team. The response plan in case of deterioration elaborated during the last Board meeting and the threshold values contained in the OMS manual were also reviewed with the team in case of potential deterioration.

2.2 Set Back Study

> *There is […] a pressing need to instrument the pit walls with priority given to the east face. Instrumentation should include deep piezometers in holes dipping to beneath the lakebed to permit installation along the dike centerline, as well as an adequate number of survey monuments/prisms on the rock of the in-field area and on the pit face. TDR arrays have also been suggested. Thermistors would also be useful to record freeze-back of the pit wall that could hinder drainage and result in elevated pressures within the rock wall.*
>
> *Future studies would then validate the hydrogeological model, address the impact of stress relaxation on joint openings, and evaluate the implication of joint orientation and shear strengths that are less favourable than the mean values.*

Response:

Golder has provided AEM with a proposed instrumentation plan to monitor the pit walls and dike, with priority given to the east face. The plan includes the following instrumentation:

- A total of 62 survey prisms along the pit crest and selected benches, with a higher density in the east crest area (approximately 50 m spacing between prisms).
- Deep vibrating wire piezometers installed outside the predicted permafrost boundary. A total of 16 piezometers will be installed in three boreholes behind the east pit slope, and a total of 20 piezometers will be installed in three boreholes dipping to beneath the dike centerline.
- Thermistors installed in three boreholes behind the east pit slope, and in three boreholes dipping to beneath the dike centerline.
- TDR cables installed in seven boreholes behind the east pit slope.

Monitoring of the instruments will provide additional data to calibrate the existing

hydrogeological model, assess the impact of stress relaxation on joint dilation, and validate the assumptions made in recent evaluations of pit slope stability of the east pit wall.

3.0 OPERATION, MAINTENANCE AND SURVEILLANCE MANUALS

Comment:

> *As mentioned, the documents provided were in draft form and comments are presumably anticipated from the various departments before issue of the final versions. Careful proof reading by the main authors will be required to remove any remaining inconsistencies Note however, that this type of document will always be subject to revision as conditions change and personnel occupy different functions.*

Response:

Review of the OMS manual for the dewatering dikes and tailings facilities is ongoing by the AEM engineering team. Flow charts and tables are updated as required. Threshold values are also reviewed to remove inconsistencies.

Comment:

> *The Emergency Response Plans make the point that a clear chain of command is necessary for all safety and health activities. However, all the ERPs consulted provide only a single generic flow chart for communications. The different potential scenarios will have varying degrees of severity and the level to which communications are made will vary. For example, an abnormal instrument reading will be handled by the on-site surveillance staff and if necessary will be brought to the attention of the design engineer before any other state is declared. On the other hand, a potential rupture of the dike will require implementation of evacuation plans and the involvement of a far wider group of people. A common communications flow chart is not appropriate. Furthermore, the said charts should include the names and coordinates of all the concerned parties. In an emergency situation, there should not be the need to search among lists of staff members to decide on the persons to be contacted.*

Response:

A detailed chain of command for various levels of scenarios will be generated. This chart will be included in the ERPs and also in the OMS manuals. The chart will also be reviewed with the involved team members on site to ensure that in case of an emergency event, all staff members

will be aware of who must be informed about the situation. Update on this item will be discussed during the next Board Meeting.

Comment:

> *The Board is content with the general project organization for emergency response but recommends that Action plans be drawn up to prepare for various remedial measures that could be implemented in the event of incidents such as leakage or sinkholes in a dike. An example would be whatever measures that could be envisaged for the Bay-Goose hot-spots in channel 1. Stockpiles of materials, protection of the same against freezing, construction equipment, manpower, and methods for effecting repairs need to be thought out in advance. In order to get an early indication of the seepage at the dike toe in channel 1, it is recommended that snow removal be initiated as early as practicable this spring. The criteria for pit evacuation should be clarified and implementation plans made with senior management.*

Response:

See third response of Section 2.1 for detail on investigation and remediation plan for Bay Goose.

AEM, at the corporate level, will start in the next months a global risk assessment for their Canadian divisions. Risk assessment sessions will occur at the different sites and two sessions are planned for the Meadowbank Division. One of them will be focusing on the risk related with the dikes at Meadowbank. After those sessions an action will be put in place and the emergency response plan will be revised.

4.0 TAILINGS STORAGE FACILITY OPERATION

4.1 Summary of Instrumentation

Comment:

> *The results of the instrument monitoring on the saddle dikes and storm water dike were presented. At Saddle dike 1, the thermistors indicate that freezing is ingressing at the upstream toe. However, the permafrost beneath the dike could still be affected by the inflow of water from downstream. The situation has not deteriorated over the last twelve*

months but automated pumping from a sump at the downstream toe is envisaged in order to prevent, or at least minimize, the cycles of inflow and outflow of water from the dike shell. During the operating life of the TSF, monitoring of water quality at the toe will be required and a permanent drainage ditch to Third Portage Lake cannot be constructed until the post closure period. Consequently, this controlled pumping will be a long term item.

Response:

The installation of a permanent pumping system is ongoing at Saddle Dam 1. The existing sump has been lined with geotextile and clean rockfill to avoid mud accumulation. A culvert pipe is installed in the lowest point of the sump, where the pump suction is placed. An electric pump is used directly connected to the power supply available at Saddle Dam 1. The water is pumped regularly to avoid any accumulation and to minimize the cycles of inflow and outflow of water from the dike. A container will eventually be installed over the pumping system to protect the pump and the electric box.

5.0 CENTRAL DIKE

5.1 Design

Comment:

A perusal of the document revealed a few items that had caught the attention of the Board at earlier meeting and still warrant validation, such as:

1) *The placement of run of mine rockfill in the body of the dams using mine equipment, thick lifts and nominal compaction (routing of hauling equipment only) even in the area underlying the upstream slope;*

2) *The requirement to treat with slush grout only the open joints in the surface of the rock that exceed 10 mm in width;*

3) *The dewatering section that has fairly modest requirements and does not include such items as deep pump wells.*

Response:

1) Rockfill (Zone 4) is being placed in 2-m-thick lifts and compacted using six passes of a 20 t vibratory smooth-drum compactor. This methodology has been used since the start of the 2012 construction season and will be continued for the remainder of the rockfill (Zone 4) placement for the Central Dike.

2) As stated by AEM during MDRB Meeting No. 11, sufficient material will be ordered and the entire surface of exposed bedrock will be treated with slush grout.

3) The Board's recommendation was considered. A key trench excavation plan, including water management and contingency measures, was developed before the start of the key trench excavation. The plan was prepared, is continuously reviewed, and is revised as required, with the participation of AEM, Golder, and the Contractor. To date, the excavation and water management has been successfully performed. It is to be noted that conditions encountered in the field and additional investigations have resulted in modifications to the key trench; namely, that the key trench will not be excavated to the bedrock surface in locations where the bedrock is below El. 95 m. This modification was made in consideration of the Mine Development Sequence changes subsequent of the development of the Central Dike design including the revised "Life of Mine" (LOM) plan and changes to the Waste and Water Management plans. Details on the key trench modification will be provided to the board under separate cover.

Comment:

The Board recommends the following course of action:

1) *Excavate test pits to determine soil conditions, depth of frozen ground and likely inflows;*

2) *Percussion drilling to establish the bedrock profile in a broad band centered on the dike axis to determine the most favourable locations for dewatering sumps and to ascertain whether local re-alignment of the key trench may be advisable.*

3) *Installation of piezometers in the lake bed and underlying rock ahead of construction;*

4) *Become familiar with the issues that caused problems in the Processed Kimberlite Containment at Diavik;*

5) *Develop a design and a construction sequence that considers the possibility of uplift in the key trench and elsewhere beneath the LLDPE liner before the addition of adequate cover;*

6) *Review the specifications and tender documents to ensure that all conceivable eventualities are covered;*

7) *Discuss, internally and with the Contractor, the contract strategy and the schedule for the work.*

Response:

1) AEM and Golder considered this recommendation and several test pits were performed before the start of the key trench excavation. The results from this investigation were used in developing the above-noted excavation plan.

2) AEM and Golder considered this recommendation and several boreholes were advanced using percussion and diamond drill rigs. The results of these investigations were used to modify portions of the key trench alignment and to prepare the above-noted excavation plan.

3) AEM and Golder considered this recommendation and the installation of two nested piezometers within the till foundation of the cofferdam were installed. These installations were completed at the end of April 2012 and before starting the South Cell attenuation pond dewatering. One more piezometer was installed near the centreline of the Central Dike near Sta. 0+600 prior to the key trench excavation. These instruments are read frequently and used as part of the monitoring as required in the above-noted excavation plan.

4) The experience at Diavik was reviewed and used during the preparation of the above-noted excavation plan.

5) This was performed and forms part of the above-noted excavation plan.

6) The specification and tender documents were not modified, but discussions between AEM and the Contractor occurred. The above-noted excavation plan was also based on these discussions.

7) The Contractor produced a schedule in which key activities and milestones were identified. The schedule is updated every week during construction

Comment:

The Board also has concerns that the potential for seepage, from the TSF basin and the underlying Talik, towards the Portage Pit may be underestimated and that the role of the grout curtain beneath the Central Dike may be undervalued. Significant seepage was noted during the construction of the cofferdam. Whilst it is understood that the latter operation was carried out shortly after the dewatering of the Second Portage Lake basin, and that observations in the pit indicate no large inflows from the west wall, the Board

recommends that in-situ permeability testing be carried out in the North Cell of the TSF to determine whether the segregation that occurs on a beach deposit could result in values for permeability greater than those assumed for the seepage analysis.

Response:

As a result of the Mine Development Sequence review, no tailings are presently planned to be deposited into the South Cell prior to the end of Portage Pit operation. The attenuation pond in the South Cell will still be required during winters with an expected maximum elevation of 104 m. Updated seepage analyses are being completed at present; these form part of the above-noted key trench modification. The results of updated seepage analyses will be provided under separate cover.

Comments:

1) *The model used for the seepage analyses presented in Appendix C of the Detailed Design Preliminary Report for the Central Dike needs to be verified as the geometry of the equipotential lines, shown to board members at the meeting, does not seem to properly represent the flow barrier provided by the liner.*

2) *Moreover, the input parameters should better reflect a distribution of permeability related to beaching.*

Response:

1) The model considered the unsaturated hydraulic conductivity functions for the materials in the dike. Using unsaturated functions for hydraulic conductivity resulted in a different representation of the total head in the dike than one which could be expected by modelling the same conditions considering only saturated hydraulic conductivity.

   The total head, given by the sum of the elevation and pore water pressure, varies through the dike showing a smooth transition from the tailings surface near the crest (higher elevation and small positive pore pressure) towards the bottom and toe of the dike (lower elevation and small negative pore pressure), whereas the pore water pressure will show little variation along the vertical profile.

   In unsaturated conditions, the hydraulic conductivity associated with the negative pore water pressure in the rockfill material is similar to the one for the liner and is lower than that of the tailings. It also corresponds to very low water content. The results of the modelling indicate that little water will flow through the liner and the dike. In summary, the liner will significantly

reduce water flow through the dike and the total head distribution presented in the report is a result of using the unsaturated material properties.

2) As discussed above, the new Mine Development Sequence plan indicates that no tailings will be deposited into the South Cell before the end of the Portage Pit operation.

Comment:

Significantly higher seepage to the pit may be a serious limitation of the Central Dike design if no grout curtain is included. There is a contingency plan to carry out grouting at the downstream toe in the event that the migration of tailings through open joints is observed after the South Cell is put into operation. This is intended to close the large conductors but not to provide an impermeable barrier. However, any reduction of conductivity would have the effect of increasing the pressures beneath the dike and this is not judged to be a particularly favourable outcome. Consequently, the Board recommends that the merits and need for a grout curtain be more thoroughly examined prior to construction of the Central Dike and that a central location be favoured should the results support its inclusion.

Response:

It is agreed that a grout curtain for tailings barrier at the downstream toe of the Central Dike might increase the pressure beneath the dike; the filter blanket beneath the entire downstream shell mitigates this condition and will be connected to the grouting platform. The seepage analyses performed to date as a result of the revised LOM plan and the limiting of the base of the key trench excavation show that the seepage reports to the pit through the underlying bedrock. Further seepage analyses, including additional investigations, have been recommended to AEM to further evaluate the effect of bedrock grouting to reduce seepage to the pit. Discussions regarding these analyses are presently ongoing. Seepage management in the pit will be included in the evaluation for the requirement for grouting.

8.2 Schedule

Comment:

AEM has developed a construction schedule based on the productivity achieved in the various works carried out to date. While this is a useful exercise to establish that completion of the Central Dike can be achieved for the 2015 start of operation, the Board

is of the opinion that the role of AEM as the construction planner merits review. This review should be made in the context of the specifications, drawings and milestones to be given to the Contractor. Unless the Contract will be drawn up on a time and materials basis, the Contractor will have the responsibility to mobilize the appropriate fleet of equipment, and to plan his activities to achieve the necessary productivity. It is a question of who assumes the responsibility for meeting the deadlines. AEM needs to clarify internally the Contracting strategy that will be adopted.

Response:

The responsibilities of the Contractor and all the involved parties have been clarified before the contract was finalized in early May. After the contract was awarded, a "Kickoff" was organized with all the parties involved (AEM, Sana (Groupe Gilbert Ltee), Golder and Inspecsol). Responsibilities of each party were outlined during that meeting. Clear milestones have also been clarified during that meeting and during further discussion with the Contractor. The contract also specified clearly the responsibilities of the Contractor. The work schedule is the responsibility of the Contractor; a schedule is presented every week by the Contractor to AEM and Golder during a weekly meeting where salient items of the work are discussed. It is the responsibility of the Contractor to modify the schedule and the work plan according to the work progress, in order to meet the 2012 construction season goals.

5.3 Quality Control and Quality Assurance

Comment:

The QC/QA plan is satisfactory as proposed. Obviously, the Contractor will need to submit a detailed programme to cover his Contractual obligations in this facet of the work. The responsibility for inspection is included in the Contractors scope but some elements, such as foundation and earthworks approvals would be more appropriately carried out by the designer who is in a better position to judge whether the quality of the work corresponds to the design hypotheses and criteria. GAL needs to provide adequate staff to fulfill this role. Moreover, the sign-off procedures need to be clarified.

Response:

Shortly after the start of the excavation of soft sediment, staff from Golder (Designer, Responsible of QA Program) was present on site, along with staff from Inspecsol (responsible of QC program). General work observations and QC testing, as specified in the Technical Specifications are conducted by Inspecsol. Golder inspects the work periodically and conducts tests at the

frequency required by the Technical Specifications. The Owner's Representative supervises the work activities and ensures communication with Golder, Inspecsol and the Contractor. Critical work items always included all parties (AEM, Golder, Contractor, Inspecsol) to ensure that the work is done according to the design specifications and the schedule, in a safe manner. All the parties are also involved in foundation, geomembrane subgrade and geomembrane placement approvals. Inspection of foundation, subgrade and geomembrane is carried by the Owner's Representative, Golder and Inspecsol (or Texcel for the geomembrane). Approval forms, prepared by Inspecsol, are signed by all the parties conducting the inspection, given the final approval.

6.0 TAILINGS MANAGEMENT

Comment:

> *The Board considers this to still be a work in progress and has a number of concerns that need to be addressed. The tailings deposition simulation, as presented for the North cell, was based on only one spigot change per month. From the sequence of images, it was clear that the beach formation would be inadequate to meet the fundamental criteria of keeping pond water away from the exposed liner of the Stormwater dike, particularly during the periods when ice is expected. Additional calibration of the model is required. As mentioned above in relation to seepage from the facility, the beach formation and the accumulation of unconsolidated slimes needs to be evaluated to better characterize the materials within the TSF and determine whether segregation is an issue for the design.*

Response:

AEM will install a booster pump and valve system on the Stormwater Dike during the fall of 2012. This system will give AEM the flexibility to change the deposition point without stopping the Process Plant. This will allow to do more than one change of deposition point each month. Having this flexibility will help to produce better and more adequate tailing beaches along the structures. Tailing sampling is also planned to know better the composition and the segregation potential of the tailings.

7.0 RESPONSE TO REPORT No. 8

This section provides an update to subjects previously raised by the board, to which AEM committed to address in the future.

Bay Goose Dike

Based on current dike behaviour and revised operational life of the Bay-Goose Dike, AEM and Golder have determined that erodability testing on CSB samples (4% and 6% cement content), will not be conducted at this time. The original intent was to assess and compare the relative impacts on potential erodibility of the material and therefore impact on the long term performance of the cutoff wall's performance. Erodability testing may be reconsidered, in the event that the dike is not performing as planned or the design life of the structure is extended.

East Dike

A seepage analysis of the East Dike instrumented section at Stn 60+490 has been conducted and includes model calibration with piezometric and thermal data. It is currently under review by AEM and once finalized, will be provided to the board.

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October 2nd, 2012

Mr. Dominique Girard, P. Eng.
General Manager
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Baker Lake Office

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Dear Mr. Girard,

Report No 12
Meadowbank Mine Dike Review Board
Meeting September 10-12, 2012

1.0 INTRODUCTION

The meeting of the Dike Review Board was held on site as planned from September 10th to 12th. The Board is now comprised of three members, Mr. D. W. Hayley, Dr. N. R. Morgenstern and Mr. D. A. Rattue. Dr. Morgenstern was unable to participate due to prior commitments but members Hayley and Rattue were both in attendance. However, the data was transmitted to Dr. Morgenstern and he has contributed to the present report.

The objectives were to review the progress of the works, the dike behaviour, and make acquaintance with the initial plans for the Vault pit.
The activities covered those outlined in the agenda which is included as Attachment A. The list of attendees at the meeting is given in Attachment B.

Paper copies of the various PowerPoint presentations were submitted by Agnico-Eagle Mines (AEM) and Golder and Associates (GAL) during the meeting and a CD of the same was provided. A selection of photographs taken during the visits is to be found in Appendix C.

In the report which follows, the Board's recommendations are underlined.

2.0 UPDATE ON MINE STATUS

AEM provided an update on the mine status for information.

The Board was pleased to hear of the improvements made in the operations and in the financial outlook for the mine.

The currently projected life of mine is to 2017 but this is under review.

3.0 RESPONSE TO REPORT NO 11

The Board commends AEM/GAL on the format for the responses to previous reports which is both clear and concise. The responses fully cover the issues with the exception of one or two subjects which were discussed at the meetings or were clarified with Dr. Morgenstern subsequent to the meetings.

4.0 CENTRAL DIKE

4.1 Construction progress review

A presentation of the construction was made by AEM prior to the field visit.

The Board is pleased by the progress made in the 2012 season. The weather had been favourable and the work has advanced at least to the degree anticipated by AEM's planning.

Dewatering of the foundation and, in particular the key trench, did not present any significant problems. The groundwater elevation and local artesian pressures declined progressively as the pump sumps were adjusted to the excavation depths and surface control only was adequate (no deep wells).

The planning, work sequences, and methodology permitted good quality fill placement in the key trench.

The key trench work has attained elevation 118 m on the abutments while the fill at the cofferdam area and main embankment has reached elevations 113 and 110 m respectively. Embankment placing will continue in the fall and next spring but the contact work will have to await the thaw of the foundation.

4.2 Design modifications

The most significant modification was the field decision to leave the in-situ till at the bedrock contact in several areas. In the bedrock gully, the till remaining is up to 10 m in depth. The decision, made jointly between AEM and the designer, GAL, to accept the till as foundation was based on the visual appreciation of the material as exposed in the key trench. The till is a dense basal till, apparently free of pervious strata.

The Board's previous observation of till exposures in the 2nd Portage lake area corroborate the appreciation that the till is well graded and is likely to be a basal till rather than an ablation till. The possibility of significantly more pervious layers is remote and certainly not more pervious than the underlying bedrock. The Board supports this initiative.

The rock configuration at the abutments also necessitated an adaptation by way of changes to the key trench alignment and connections with the cofferdam impervious zone. Note that the dike liner has been provided with an upstream extension which ties into the cofferdam throughout the length of the latter. The Board judges these to be appropriate.

4.3 Seepage analysis

Seepage analyses have been conducted by GAL to evaluate the potential effect of a pervious lense in the till left at the rock contact in the key trench. As the lense inclusion in the analysis

was hypothetical, an arbitrary thickness and location were adopted. The mid depth position was not considered entirely appropriate as the downstream exit point was above the upstream water level in some analyses and therefore did not constitute the most conservative configuration. Nevertheless, the analyses did provide an appreciation of the sensitivity of flows into the pit to values of permeability in the foundation soils and rock. The Board is of the opinion that measurements and observations that focus on potential discharge at the pit wall over a full year (or a shorter period with controlled variable conditions as outlined below) are likely to be more useful for planning the future approach to water management.

The operating procedures for the central dike and the south cell have changed since the beginning of the detailed design of the central dike. This includes the duration of the operation of the south cell prior to re-filling of the Portage pit. Consequently, there is a need for a consensus on the design criteria for completion of the facility. The acceptable seepage inflow rate to the Portage pit needs to be selected, recognizing that the mine is probably capable of handling such flows without active mitigation measures. Any treatment of the foundation, such as grouting, will depend on the above. This is a different perspective from that discussed at the April 2012 meeting.

GAL has proposed an additional program of investigations including drill holes with packer testing in the bedrock gully and elsewhere immediately downstream of the key trench. A second phase would involve pump well testing in the vicinity of the toe area. The program objectives as indicated by GAL are to provide subsurface data for design of a grout curtain and identification of materials and equipment that would need to be deployed to site should it be necessary. It was the view of the board members present that the objectives of this program should be reconsidered. There is certainly a need to evaluate the seepage from the attenuation pond and to demonstrate that adequate seepage control has been achieved. Instrumentation will be required to adequately monitor pressures and flow in the short and long term. These could include piezometers with thermistors immediately downstream of the key trench and at the downstream toe. All installations should be designed to be permanent with cables led through protective ducts to the downstream slope. The drill holes required for these installations would contribute to the investigations but, further work with a focus on mitigation of seepage could be deferred to next year in order to allow a full year of observation. The Board did take note of the comment that if grouting is required, then mobilization on the first barge in 2013 would be desirable. The value of measurements and early detection of discharge into the pit could be enhanced by purposeful variations of the water level in the attenuation pond to determine the time lag of downstream pressure and temperature response. If the instruments can be installed before the winter, at least the progressive rise during the winter and more rapid freshet response can be captured.

The Board also believes that additional information on rock type/quality to judiciously select permeabilities could be gleaned from a more thorough examination of the existing borehole logs and core samples.

4.4 Field Inspection

The Board was able to visit the central dike to observe embankment placing. All work on the central cut-off planned for 2012 had been completed and only the extremities of the liner were visible. The visit consisted of a walk-over from right abutment to the left along the alignment of the upstream cofferdam and return by the downstream shoulder. The cofferdam area, the liner extension and the berm for the upstream face liner can be seen in photos #1 to 3.

The fine filter/transition material was homogeneous as would be expected with this type of material for which segregation should be easy to control. A thick layer had been placed over the liner to improve protection thereof during material transport and this was subsequently redistributed to complete the layer. (Photo #4)

The coarse transition zone (Photo #5) was generally devoid of any significant pockets of segregation, though local examples could be noted.

The rock type in the mine pits is obviously contributing towards the production of well graded rockfill with few oversize boulders. Observation of the leading edge of the lift shows a good control of rockfill placement. (Photos #6 to 8) The Board was pleased to see this quality of work being achieved with mine equipment.

The face of the Portage Pit downstream of the Central Dike can be seen in Photo #9. Some seepage is visible but flow quantities are apparently very small.

5.0 TAILINGS MANAGEMENT

A booster pump and, more importantly, extra control valves will be installed near the Stormwater Dike in order to facilitate the switching of flow between spigots. Beach management will be improved by this addition.

In order to maximize the use of storage volume, the Board suggests that consideration be given to the possibility of installing over-ice pipeline(s) to strategically deposit tailings in low spots, provided safe working procedures are established.

In addition, a bathymetric survey performed from the ice may help to define the geometry of the underwater slopes and to identify the presence of super soft fine tailings.

In the course of the meeting, AEM/GAL requested a clarification of a recommendation contained in the Board's previous report. Investigation of the segregation of the tailings was proposed. The intention was that the spatial variation of the tailings in the horizontal direction, from spigot out to the pond be determined. Grab samples for grain size analysis will be adequate to accomplish this.

6.0 PERFORMANCE MONITORING OF DEWATERING AND TSF DIKES

6.1 Results

Prior to making a field visit, the Board had the opportunity to review a selection of the results of the instrumentation.

At the Saddle Dam #1, the downstream water is now being adequately controlled so as to limit the movement of water in the embankment. Consequently, freezing of the foundation is advancing. Some temperature graphs show a period of time when the temperature remains around the zero point. This "zero curtain" is due to the heat required to be extracted in the phase change from water to ice and is to be expected.

At Saddle Dam #2, the upstream toe had been covered with till to create a "beach" in advance of tailings deposition and temperatures are below zero in the foundation. Note that the foundation of this structure was above the pre-construction lake level and permafrost was already established.

No anomalies have been noted in the Stormwater dike or the Rock Fills #1 and #2.

At the East Dike, conditions appear to be stable in terms of flows, piezometric levels and temperatures.

At the time of the Board's visit in 2011, the dewatering of the Bay-Goose Dike had only recently begun. In April, the Board was apprised of the observations of warm spots in the snow and ice. Subsequently, the on-site team, excavated snow and ice at the dike toe in order make early observations of seepage flows prior to the spring thaw. A few seeps were noted but, the flow rates have subsequently declined. The deformations that were measured during the initial dewatering have also stabilized. Note that the current survey monitoring gives only horizontal deformations (total station readings), as do the inclinometer measurements.

The piezometer and temperature readings are still evolving. These instruments are connected to the VDV data acquisition system and large amounts of data are quickly accumulating. Data management and visual presentation need to keep up with the input. Tools to identify any adverse trends are paramount. Parameter vs time plots are required for key instruments, not only for presentations to the Board, but for internal evaluation and the preparation of periodic reports. An integration of the previous manual readings with the new automated readings is also required. Apparently the VDV system is not particularly user friendly in this respect as transfer of data to Excel is not straightforward.

The Board noted that small sinkholes in the crest of the dikes continue to occur and, although appear to stabilize; these illustrate the need for continued vigilance.

6.2 Site visit

A visit was paid to the Saddle Dams, the Stormwater Dike, East Dike and Bay-Goose Dike.

At Saddle dam #1, the pump station installation was noted (Photo #10). A check should be made of the potential for freezing of the fill surrounding the sump as this may require the temporary installation of a portable submersible pump in the spring.

Photo #11 illustrates the beach constructed of till at the toe of Saddle Dam #2.

The valley that is closed by the East Dike contains a deep deposit of till which was exposed during the excavation of the Portage Pit. The face of this till deposit has now been protected as shown in photo #12.

At the Bay-Goose dike, the downstream toe areas can now be examined and the conditions in the channels 1, 2 and 3 are shown respectively in photos #13 to 15. Seepage was observed to be minor.

7.0 PIT SLOPE SETBACK

GAL presented the results of additional studies that support the idea of a reduced set-back for the pit wall at the Bay-Goose. However, AEM is content to maintain the 70 m set-back as was recommended by the Board at the April meeting. The slopes can be steepened as has been demonstrated by analysis using field verified foliation and discontinuity angles. Moreover, examination of the exposed pit face at the south end of the Portage Pit (photo #16) and of the first bench in the Bay-Goose pit (photos #17 and 18) also indicates that the 65°-70° face angle is reasonable. Note that the average slope will be of the order of 53-55°. However, as pointed out by GAL, AEM must remain diligent in the continuous observation and mapping of the pit walls to ensure that the currently observed orientations are applicable at greater depth.

Theoretical bench widths should be maintained at 10 m, as some lost wedges of rock will reduce the actual available width to retain rock falls.

AEM indicated that with this approach, total extraction of the ore body is potentially achievable. The Board endorses the approach.

8.0 RISK ASSESSMENT

For the information of the Board, a brief presentation was made on the planned sessions on risk assessment.

9.0 VAULT PIT

The Board was also advised of the design and construction schedule for the works to exploit the Vault ore body. The schedule is tight with pre-stripping to begin in 2013. The Board expects to be involved in design review as and when needed.

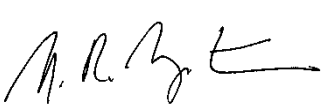
10.0 NEXT MEETING

The schedule for work on the Vault project may entail a meeting or teleconference call in December.
The next site visit is tentatively for September 2013 with exact dates to be determined.

11.0 ACKNOWLEDGMENTS

The Board once again wishes to thank the personnel of AEM and GAL for their participation in the meetings, and for the excellent documentation and presentations made by AEM and GAL which contributed to the efficiency and effectiveness of the proceedings.

Signed:



Norbert R. Morgenstern, P.Eng. Don W. Hayley, P.Eng D. Anthony Rattue, P.Eng.

ATTACHMENT A

AGENDA FOR BOARD MEETING NO. 12

September 10th-12th, 2012

Agnico-Eagle Mines-Meadowbank Division

Meadowbank Dike Review Board

Meeting # 12 – September 10-12th, 2012

Meadowbank Mine Site, Nunavut

AGENDA

Monday, September 10th

Arrival with Nolinor flight, approx. 12h30

12h30	Check in, room assignments and site H&S orientation, lunch (arrival time can vary; depending on charter route)
13h45	Welcome and Review of the Agenda
14h00	Meadowbank Mine Operation and Management Update
14h15	Review of MDRB Report #11
14h30	**Central Dike Stage 1** - Construction Progress Review
15h30	Central Dike Field Visit
17h30	**Central Dike -** Site Investigation Results and Design Modifications
18h30	Dinner (site cafeteria)

Tuesday, September 11th

7h30 **Central Dike** - Seepage Analysis

8h15 **Central Dike** - Path Forwards and Mitigation Options

9h00 **Tailings Storage Facilities – North Tailing Cell**

- Update on monitoring program and data review for dikes
- Review of tailings management in TSF

10h15 Coffee Break

10h30 **Dewatering Dikes – BayGoose, South Camp and East Dike**

- Update on monitoring program and data review of dewatering dikes and comment on dikes performance

11:45 Lunch (site cafeteria)

13h00 Site Visit – Bay Goose, East Dike and TSF

15h30 **Bay Goose (cont'd)**

- Final Set Back Report
- Downstream Bay Goose instrumentation plan and progress

17h45 New Philosophy of the Risk Analysis Assessment for Meadowbank

18h15 Comments from the Dike Review Board related to reports previously issued (OMS, As-built, ERP)

18h30 Dinner (site cafeteria)

Wednesday, September 12th

7h30	Vault Dike Design Progress and Review
8h00	Deliberations by the Board Members
10h00	Preliminary Report by the Board Members
11h00	Closure
12h30	Approximate Time of Departure

ATTACHMENT B

ATTENDANCE AT SEPTEMBER 2012 MEETING
Held at the Meadowbank Mine site, Nunavut

Attendance		
Dominique Girard (Partial)	AEM	Mine manager
Julie Bélanger	AEM	
Jean Béliveau	AEM	
Kevin Buck	AEM	
Patrice Gagnon	AEM	
Michel Julien	AEM	
Thomas Lepine	AEM	
Erica Voyer	AEM	
Yves Bouchaine	Golder Associates	
Cameron Clayton	Golder Associates	
Fiona Esford	Golder Associates	
Megan Smithyman	Golder Associates	
Dan Walker	Golder Associates	
Don Hayley	EBA	Dike Review Board
Anthony Rattue	SNC Lavalin	Dike Review Board

ATTACHMENT C

PHOTOGRAPHS

Photo #1 Central Dike, fill over U/S cofferdam

Photo #2 Central Dike, liner extension tied into cofferdam fill

Photo #3 Bench to tie in U/S face liner. Too narrow.

Photo #4 Redistribution of filter layer from thick layer designed to protect liner

Photo #5 Placing of coarse filter

Photo #6 General view of advancing face

Photo #7 Local area of large size rock fragments

Photo #8 Typical rockfill gradation

Photo #9 Portage pit wall D/S of Central Dike

Photo #10 Saddle Dam #1, downstream pump station

Photo #11 Saddle Dam #2, till placed as beach

Photo #12 Protection on overburden face D/S of East Dike

Photo #13 Bay-Goose Dike, channel #1

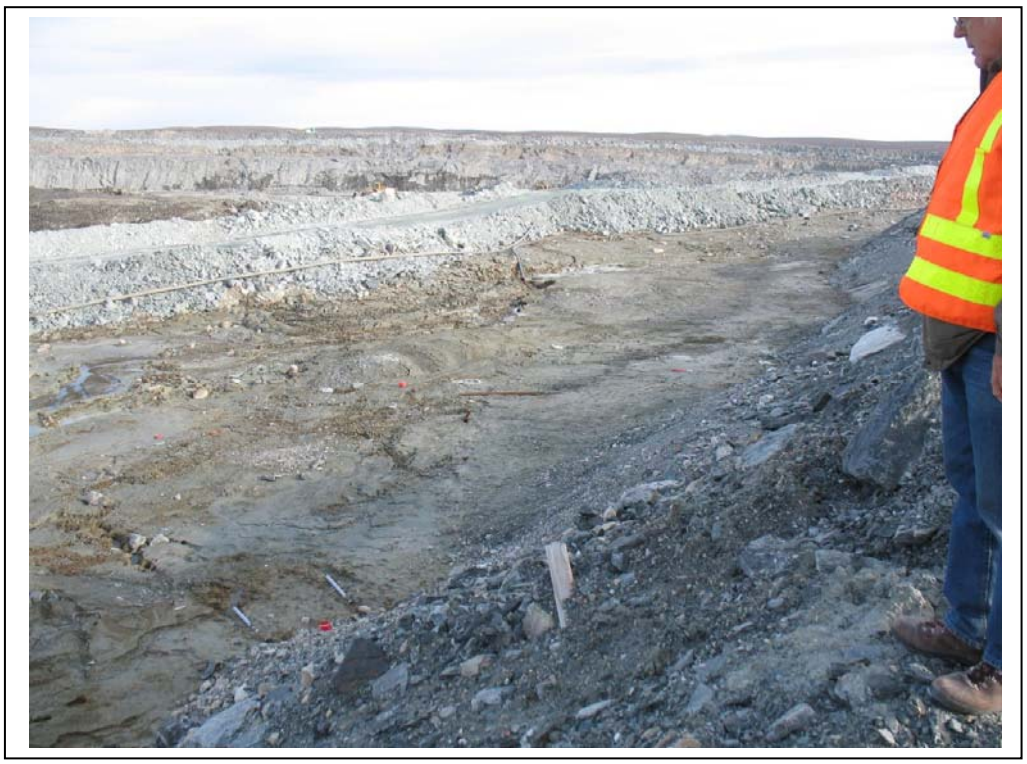


Photo #14 Bay-Goose Dike, channel #2

Photo #15
Bay-Goose Dike
channel #3

Photo #16
Southern extremity
of Portage Pit

Photo #17
East wall of Bay-Goose pit

Photo #18
East wall of Bay-Goose Pit

December 19th, 2012

Mr. Dominique Girard, P. Eng.
General Manager
Agnico – Eagle Mines, Meadowbank Division
Baker Lake Office

Email: dominique.girard@agnico-eagle.com

Dear Mr. Girard,

Report No 13
Meadowbank Mine Dike Review Board
Telephone/Webex Conference December 19, 2012

1.0 INTRODUCTION

The conference call with the Dike Review Board was held on December 19th. The Board is now comprised of three members, Mr. D. W. Hayley, Dr. N. R. Morgenstern and Mr. D. A. Rattue. All three members participated in the call.

The objectives were to review the progress of the detailed design for the Vault Dike. This structure is on a fast track with construction set to begin in February 2013.
The activities covered those outlined in the agenda which is included as Attachment A. The list of participants is given in Attachment B.

In the report which follows, the Board's recommendations are underlined.

2.0 PRESENTATIONS

Presentations, assisted by Webex transmission of the PowerPoint images, were made by personnel from Agnico-Eagle Mines (AEM) and SNC-Lavalin Inc. (SLI). These included an overview of the project, the design criteria, the site investigations for the Vault Dike and the results of studies and design for the dike.

The site investigations were conducted in November and December of 2012, and consisted of percussion soundings with a primary objective of establishing the bedrock profile. Three thermistor strings were installed, one on the left abutment and two in the stream bed.

The analytical work included thermal analyses and slope stability analyses.

3.0 COMMENTS BY THE MEADOWBANK DIKE REVIEW BOARD

3.1 Design parameters

The dike classification and the design parameters are appropriate for the type and scale of structure as well as for the limited planned life cycle.

3.2 Site investigations

The investigations were limited in scope, insofar as type of equipment was concerned, with little sampling of the overburden material being possible given the use of percussion drills. Some difficulty was apparently experienced during the installation of the thermistors, perhaps as a result of hole caving which is not uncommon in non-cohesive soils when air powered drill rigs are used. Nevertheless, the primary objectives of the programme were realized. As will be mentioned later, the Board sees a need to perform additional instrument installations immediately prior to the start of construction.

3.3 Stability analyses

Not surprisingly, given the low height and wide footprint, the analyses showed that static and pseudo-static minimum Factors of Safety were achieved for all the cases presented. The Board has no further comments in this regard.

3.4 Thermal analyses

The Board is of the opinion that the thermal analyses were well performed and pertinent to the work in hand. The results not only contributed to the interpretation of the measurements made by the thermistor strings but also permitted ideas to be advanced concerning the construction phases and eventual dike performance. The limited duration of temperature readings since the installations in December do not, by themselves, permit an understanding of the annual cycle of temperatures in the foundation, and particularly in the streambed. The TEMP/W simulations have made a significant contribution in this regard.

The analyses indicate that by constructing the dike in winter and by opening the cut-off trench as early as possible, frozen conditions should be sufficiently well established in the base of the dike to ensure seepage control.

3.5 Dike cross-section

The dike cross-section is conventional and follows precedent gained from other structures at the Meadowbank mine site.

A comparison of thermosyphon freezing and bituminous geomembrane for the creation of the impervious barrier demonstrated a preference for the latter.

Foundation preparation will consist of the removal of ice and snow followed by the excavation, aided by blasting, of a cut-off trench to bedrock.

The Board finds this to be a satisfactory approach for winter work but suggests that well graded, dense, ice poor till as has been encountered elsewhere at the site could also constitute an acceptable foundation. Beneath the extent of the geomembrane, any extensive ground ice should be removed even beyond the nominal width of the key trench. The Board recommends that additional thermistors be installed in advance of construction to assist with decision making process on the required depth of excavation, and to corroborate the simulation of the ground temperature regime.

If no suitable source of till is available, the Board concurs with the use of the bentonite amended 0-20 mm crushed stone as a material in which to anchor the geomembrane. AEM has experience with the use of such material. The Board suggests that the full width of the key trench at the base be backfilled with this material rather than attempting to place several different materials, given the anticipated difficult winter working conditions.

Given the low head, the Board concurs with the idea to place the geomembrane in horizontal bands rather than vertical as would normally be the placing configuration. The quality control for the first (lower) welded joint should be more stringent than subsequent joints which will be located in the freeboard area.

The Board is of the opinion that the pump well shown on the drawing may not be the most appropriate means to control seepage. It is inevitable that the bottom of the dike will become saturated and freezing may be inhibited if warmer water is drawn into the base of the fill by the pump. It is suggested that seepage be controlled at the downstream toe as a first measure with bedrock grouting as a contingency. However, it is believed that seepage quantities will be manageable and that freeze-back will occur in short order.

3.6 Construction management

The organigram presented shows that AEM will take the lead on construction management with various QC and QA services supplied by Inspec-Sol and SLI respectively. This follows the practice established for the central dike construction. Foundation acceptance and field design modifications will be made jointly by AEM and SLI. The Board is in agreement with this approach.

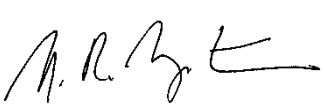
4.0 CONCLUSIONS

The Board is satisfied that the detailed design has advanced to a stage that permits specifications and construction drawings to be prepared, and construction to begin as scheduled. The construction will not be the first to have been carried out in winter conditions at Meadowbank but the Board would like to reiterate that greater diligence is required to ensure that the spirit and the letter of the specifications will be met and that any field design modifications are accomplished in a timely manner.

5.0 ACKNOWLEDGMENTS

The Board wishes to thank the personnel of AEM and SLI for their presentations. The Webex format permitted an efficient sharing of information.

Signed:



Norbert R. Morgenstern, P.Eng. Don W. Hayley, P.Eng D. Anthony Rattue, P.Eng.

ATTACHMENT A

AGENDA FOR BOARD MEETING NO. 13

December 19th, 2012

Agnico-Eagle Mines-Meadowbank Division

Meadowbank Dike Review Board

Meeting # 13 – December 19, 2012

Webex conference call

AGENDA

Wednesday, November 19

Webex conference call, start at 8:00 am Central Time

8h00	Connections to Webex
8h05	Welcome and Review of the Agenda - AEM
8h15	Vault project Update - AEM
8h30	Vault dike investigation - SNC
9h00	Vault dike design - SNC
9h45	Vault dike – QA/QC and construction schedule - AEM
10h15	Comments from the board
11h00	Closure

ATTACHMENT B

PARTICPATION AT DECEMBER 2012 CONFERENCE CALL

Participants		
Thomas Lepine	AEM	
Erica Voyer	AEM	
Simon Grenier	SNC-Lavalin Inc	
Yohan Jalbert	SNC-Lavalin Inc	
Jean-Francois St-Laurent	SNC-Lavalin Inc	
Don Hayley	EBA	Dike Review Board
Norbert Morgenstern	Self	Dike Review Board
Anthony Rattue	SNC Lavalin	Dike Review Board

February 23th, 2013

SUBJECT: RESPONSE TO REPORT Nos.12 &13 MEADOWBANK DIKE REVIEW BOARD

TO: Norbert R. Morgenstern, D. Anthony Rattue, and Don W. Hayley

FROM: Agnico-Eagle Mines, Meadowbank Division

The twelfth meeting between the Meadowbank Dike Review Board (the Board), Agnico-Eagle Mines Limited (AEM), and Golder Associates Ltd. (Golder) was held between September 10th and 12th, 2012 at the Meadowbank Site. The objectives of the meeting were to review the progress of the works, the design of the various structures, the deposition and development of the tailings storage facility (TSF), and the performance of the dewatering dikes and the structures of the TSF. Field visits of the different structures were also conducted during this meeting. On October 2nd, 2012, the Board provided a report letter (Report 12) with their comments from the above meeting.

The thirteenth meeting between the Meadowbank Dike Review Board (the board), Agnico-Eagle Mines Limited (AEM), and SNC Lavalin (SLI) was held December 19th, 2012 via Telephone/Webex Conference call. The objectives were to review the progress of the detailed design for the Vault Dike. On December 21st, 2012, the Board provided a report letter (Report 13) with their comments from the above meeting.

This letter provides the response from AEM, Golder and SLI related to the board comments for Meeting No. 12 and Meeting No. 13.

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Bureau 202
Val d'Or, Quebec J9P 0E9
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Baker Lake Office:
P.O. Box 540
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Tel: 867-793-4610 Fax: 867-793-4611

AGNICO-EAGLE

MEETING NO. 12

4.0 Central Dike

4.3 Seepage analysis

Comment:

Seepage analyses have been conducted by GAL to evaluate the potential effect of a pervious lense in the till left at the rock contact in the key trench. As the lense inclusion in the analysis was hypothetical, an arbitrary thickness and location were adopted. The mid depth position was not considered entirely appropriate as the downstream exit point was above the upstream water level in some analyses and therefore did not constitute the most conservative configuration. Nevertheless, the analyses did provide an appreciation of the sensitivity of flows into the pit to values of permeability in the foundation soils and rock. The Board is of the opinion that measurements and observations that focus on potential discharge at the pit wall over a full year (or a shorter period with controlled variable conditions as outlined below) are likely to be more useful for planning the future approach to water management.

The operating procedures for the central dike and the south cell have changed since the beginning of the detailed design of the central dike. This includes the duration of the operation of the south cell prior to re-filling of the Portage pit. Consequently, there is a need for a consensus on the design criteria for completion of the facility. The acceptable seepage inflow rate to the Portage pit needs to be selected, recognizing that the mine is probably capable of handling such flows without active mitigation measures. Any treatment of the foundation, such as grouting, will depend on the above. This is a different perspective from that discussed at the April 2012 meeting.

Response:

From past experience, AEM is confident that a flowrate similar to the one from East Dike (approx. 1000 m^3/day) can be handled and managed by the mine without impacting the mining operations. The lifetime of the Portage pit portions potentially impacted by seepage from Central Dike (Pit A, B and C) also needs to be taken into consideration. Pit B and C will respectively be closed in December 2013 (Q4) and April 2013 and could be used as sumps to manage potential seepage from Central Dike. If seepage similar to those experienced at East Dike occurs, and the structural integrity of the Central Dike is not jeopardized, flow can likely be managed in the closed pits.

With monitoring of the geotechnical instrumentation (to be installed in January 2013, see response below) during the next seasons, pressures and flows will be assessed, combined with visual monitoring in the Portage pit. Observations and data will be sent to Golder for evaluation and discussion. If significant seepage evidence or pressures are measured or observed, assessments will be undertakenby AEM in collaboration with Golder to determine if the structural integrity of the dike is threatened and if seepage can be handled by the mine without impacting operations. Appropriate mitigation methods, such as grouting, will be determined if required.

Comment:

GAL has proposed an additional program of investigations including drill holes with packer testing in the bedrock gully and elsewhere immediately downstream of the key trench. A second phase would involve pump well testing in the vicinity of the toe area. The program objectives as indicated by GAL are to provide subsurface data for design of a grout curtain and identification of materials and equipment that would need to be deployed to site should it be necessary. It was the view of the board members present that the objectives of this program should be reconsidered. There is certainly a need to evaluate the seepage from the attenuation pond and to demonstrate that adequate seepage control has been achieved. Instrumentation will be required to adequately monitor pressures and flow in the short and long term. These could include piezometers with thermistors immediately downstream of the key trench and at the downstream toe. All installations should be designed to be permanent with cables led through protective ducts to the downstream slope. The drill holes required for these installations would contribute to the investigations but, further work with a focus on mitigation of seepage could be deferred to next year in order to allow a full year of observation. The Board did take note of the comment that if grouting is required, then mobilization on the first barge in 2013 would be desirable. The value of measurements and early detection of discharge into the pit could be enhanced by purposeful variations of the water level in the attenuation pond to determine the time lag of downstream pressure and temperature response. If the instruments can be installed before the winter, at least the progressive rise during the winter and more rapid freshet response can be captured.

The Board also believes that additional information on rock type/quality to judiciously select permeabilities could be gleaned from a more thorough examination of the existing borehole logs and core samples.

Response:

Installation of geotechnical instruments to monitor pressures and flows on the downstream side of the Central Dike will be installed in January 2013. The installation campaign has been planned and will be supervised by AEM. Due to the availability of drilling equipment and the timing of the arrival of the instruments, an earlier installation has not been possible. However, the instruments will be able to measure the impact of the gradual raise of the water level in the Attenuation Pond throughout the winter, the freshet and also the drawdown of the pond level during the summer. Because the campaign is planned for the winter, certain drillholes have been prioritized in case of difficulties during the installation. A total of nine boreholes are planned, including 4 along the downstream side of the key trench, 2 at the downstream toe and also 3 along the west Portage pit limits. Thermistors and piezometers will be included in these boreholes at specific depths. The instruments will be installed to be permanent for the operational life of the dike. Cables will be lengthened and protected in pipes and ditches during the next construction season and will eventually lead towards a permanent data acquisition system. Drilling of these boreholes will be done by diamond drilling; the bedrock core samples will be saved and logged for better definition of the bedrock permeability. The examination of existing boreholes to select adequate

permeabilities in function of rock type and quality will be considered for designing the treatment of the foundations if finally judged necessary following the monitoring of the instrumentations describe above.

5.0 TAILINGS MANAGEMENT

Comment:

A booster pump and, more importantly, extra control valves will be installed near the Stormwater Dike in order to facilitate the switching of flow between spigots. Beach management will be improved by this addition.

In order to maximize the use of storage volume, the Board suggests that consideration be given to the possibility of installing over-ice pipeline(s) to strategically deposit tailings in low spots, provided safe working procedures are established.

In addition, a bathymetric survey performed from the ice may help to define the geometry of the underwater slopes and to identify the presence of super soft fine tailings.

In the course of the meeting, AEM/GAL requested a clarification of a recommendation contained in the Board's previous report. Investigation of the segregation of the tailings was proposed. The intention was that the spatial variation of the tailings in the horizontal direction, from spigot out to the pond be determined. Grab samples for grain size analysis will be adequate to accomplish this.

Response:

Starting in 2013, AEM plans to have better control and understanding of its tailing deposition plan at Meadowbank. Software has been acquired to better contrive the deposition plan and control more efficiently the deposition point changes according to the site conditions and constraints. Deposition points have been added on the RF1 road and along the SD2. Additional deposition points will be added all around the cells throughout the next operation years and more points could be added along the structures if needed. Additional deposition points and flexibility in deposition points switching given by the control valves will likely help to produce adequate tailing deposition beaches and to maximize the pond storage capacity. Over-ice piping will be an option revised during the reassessment of the tailing deposition plan to see if this option would be achievable on site and if it would represent a gain to maximize the storage volume.

Better procedures for the bathymetry will also be established to have the data required in a timely manner, to better integrate this information in the tailing deposition plan management.

AEM plans to take grab samples of tailing for grain size analysis next summer season.

6.0 PERFORMANCE MONITORING OF DEWATERING AND TSF DIKES

6.1 Results

Comment:

The piezometer and temperature readings are still evolving. These instruments are connected to the VDV data acquisition system and large amounts of data are quickly accumulating. Data management and visual presentation need to keep up with the input. Tools to identify any adverse trends are paramount. Parameter vs time plots are required for key instruments, not only for presentations to the Board, but for internal evaluation and the preparation of periodic reports. An integration of the previous manual readings with the new automated readings is also required. Apparently the VDV system is not particularly user friendly in this respect as transfer of data to Excel is not straightforward.

The Board noted that small sinkholes in the crest of the dikes continue to occur and, although appear to stabilize; these illustrate the need for continued vigilance.

Response:

The VDV software used for the display and analysis of the instrumentation data will continue to be updated in order to optimize the graphs and visual tools for analysis. Daily review of the data and monthly summary reports will continue to be done, including new visual updates from VDV. Some of the previous manual data has been included in VDV and the remaining manual data will be also added to complete the data history. Analysis of parameter versus time plots in VDV will be optimized or created in other software (ex. Excel) if required for better analysis.

Active monitoring and field inspection will continue to be conducted on a regular basis to identify any structural anomalies, seepage or unexpected instrument behavior.

6.2 Site visit

Comment:

A visit was paid to the Saddle Dams, the Stormwater Dike, East Dike and Bay-Goose Dike. At Saddle dam #1, the pump station installation was noted (Photo #10). A check should be made of the potential for freezing of the fill surrounding the sump as this may require the temporary installation of a portable submersible pump in the spring.

Response:

The fine material surrounding the sump has been cleaned and only rockfill remains. If the system is still frozen during the spring, a temporary back up pump will be installed to start pumping as soon as water is in the sump.

MEETING NO. 13

3.0 COMMENTS BY THE MEADOWBANK DIKE REVIEW BOARD

3.5 Dike cross-section

Comment:

The dike cross-section is conventional and follows precedent gained from other structures at the Meadowbank mine site.

A comparison of thermosyphon freezing and bituminous geomembrane for the creation of the impervious barrier demonstrated a preference for the latter.

Foundation preparation will consist of the removal of ice and snow followed by the excavation, aided by blasting, of a cut-off trench to bedrock.

The Board finds this to be a satisfactory approach for winter work but suggests that well graded, dense, ice poor till as has been encountered elsewhere at the site could also constitute an acceptable foundation. Beneath the extent of the geomembrane, any extensive ground ice should be removed even beyond the nominal width of the key trench. The Board recommends that additional thermistors be installed in advance of construction to assist with decision making process on the required depth of excavation, and to corroborate the simulation of the ground temperature regime.

If no suitable source of till is available, the Board concurs with the use of the bentonite amended 0-20 mm crushed stone as a material in which to anchor the geomembrane. AEM has experience with the use of such material. The Board suggests that the full width of the key trench at the base be backfilled with this material rather than attempting to place several different materials, given the anticipated difficult winter working conditions.

Given the low head, the Board concurs with the idea to place the geomembrane in horizontal bands rather than vertical as would normally be the placing configuration. The quality control for the first (lower) welded joint should be more stringent than subsequent joints which will be located in the freeboard area.

The Board is of the opinion that the pump well shown on the drawing may not be the most appropriate means to control seepage. It is inevitable that the bottom of the dike will become saturated and freezing may be inhibited if warmer water is drawn into the base of the fill by the pump. It is suggested that seepage be controlled at the downstream toe as a first measure with bedrock grouting as a contingency. However, it is believed that seepage quantities will be manageable and that freeze-back will occur in short order.

Response:

Following the board recommendations, an additional thermistor has been installed in the deepest portion of the key trench. The thermistor was installed by AEM at the location specified by SLI. Installation details and observations, along with the thermal data have been provided to SLI to assist with decision making process on the required depth of excavation in the key trench, and to verify the simulation of the ground temperature regime.

Following the board recommendations, specifications for the Vault Dike construction will indicate that ice poor till could also constitute an acceptable foundation and that beneath the extent of the geomembrane, any extensive ground ice should be removed even beyond the nominal width of the key trench. If till is encountered as foundation, till quality, void, ice and boulders content will be assessed to identify if the foundation is suitable or not. Foundation acceptance will be done jointly by AEM (Owner Representative), QA (SLI) and QC (Inspecsol), supported by signed documents, as preformed for Central Dike.

The width of the key trench on the downstream side of the liner has been widened (the blast pattern will be slightly enlarged as well) in order to facilitate the foundation cleaning within the key limit and beneath the extent of the geomembrane. The backfill of the trench will also be easier downstream of the liner (behind) even with coarser material.

As recommended, quality control and work inspection for the first (lower) welded joint will be especially strict to ensure the quality of the seam.

Finally, following the recommendations of the board, the pumping wells as mitigation measures have been removed from the design. Seepage signs will be monitored with the thermistors and visually. Seepage will be controlled at the downstream toe and subsequent mitigation measures such as bedrock grouting will be considered for contingency.

Geotechnical Engineering Team
Meadowbank Project
Agnico-Eagle Mines