



Our reference
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January 8, 2010

Richard Dwyer
Licensing Administrator
Nunavut Water Board
Gjoa Haven, Nunavut
X0E 1J0

Your reference
2AM-ME0815/D11

Sent Via Email

Dear Richard,

**Subject Water License #2AM-MEA0815, Agnico-Eagle Mines Ltd.,
Meadowbank Gold Project, Kivalliq Region, Revised Water
Quality Monitoring Plan for Dike Construction and Dewatering
– Version 3**

Please be advised that on behalf of Indian and Northern Affairs Canada, I have completed a review of the above referenced Agnico-Eagle Mines Ltd. submission to the Nunavut Water Board.

A Technical Review Memorandum (attached) is provided to the Board for consideration.

Should you have any questions regarding this submission, feel free to contact me at 867-975-4555 or David.Abernethy@inac-ainc.gc.ca.

Regards,

David W. Abernethy
Water Resources Regional Coordinator
Operations Directorate, Nunavut Regional Office
Indian and Northern Affairs Canada
Iqaluit, Nunavut
X0A 0H0

Attached.

Cc: Lou-Ann Cornacchio, INAC Water Resources Manager, Nunavut Regional Office

TECHNICAL REVIEW MEMORANDUM

Date: Jan. 8/10

To: Richard Dwyer, Nunavut Water Board

From: David Abernethy, Indian and Northern Affairs Canada

Re: **Water License #2AM-MEA0815, Agnico-Eagle Mines Ltd.,
Meadowbank Gold Project, Kivalliq Region, Revised Water
Quality Monitoring Plan for Dike Construction and Dewatering
– Version 3**

PROJECT DESCRIPTION

On Dec. 2/09 Agnico-Eagle Mines Ltd. (AEM) submitted their Revised Water Quality Monitoring and Management Plan for Dike Construction and Dewatering (Version 3) to the Nunavut Water Board (NWB or Board) for approval pursuant to Part D, Item #11 of their Type A Water License, #2AM-MEA0815.

Part D, Item #11 of the License states,

The Licensee shall submit for approval, at least thirty (30) days prior to Construction, a Final Water Quality Monitoring and Management Plan for Dike Construction and Dewatering. The Plan shall include a protocol to monitor and maintain water levels in Third Portage Lake, Second Portage Lake, and Wally Lake within natural variation.

Although AEM will monitor several parameters to determine water quality (e.g., nutrients and metals) during dike construction and dewatering activities, Total Suspended Sediments (TSS) and turbidity (primarily as a surrogate for TSS) will be the major drivers for management actions. Due to the time requirements for the analysis of TSS, AEM has developed a linear regression relationship between TSS and turbidity that allows for the use of turbidity as a surrogate for TSS to obtain real time results.

The submitted plan emphasizes TSS management / containment practices associated with completing the construction of the Bay-Goose Dike (Phase 2). These TSS management / containment practices have been modified based appropriately on the lessons learned from the 2008 East Dike and 2009 Bay-Goose Dike (Phase 1) construction events.

RESULTS OF REVIEW

The following comments/recommendations are provided for the Board's consideration,

- As a minimum, AEM must sample TSS on a weekly basis at all monitoring stations throughout dike construction and dewatering activities. During dike construction, samples should be collected at depths with the greatest turbidity concentrations. Results must be provided for review in Monthly Monitoring Report submissions;
- Item #4 of the Standard Operating Procedure (SOP) for Winter Construction of the Causeway of the Bay-Goose Dike (Phase 2) provided in Section 4.3 of the plan states, "if the 7-day moving average TSS concentration exceeds the maximum monthly mean of 15 ppm, the deposition rate will be slowed down to allow more sedimentation time." AEM should provide more detail on the methodology that will be used to determine when it is acceptable to resume to the normal pace of 2,400 tons per day and what is meant by a slowed deposition rate;
- Section 4.1.4 of the plan states that the winter construction of a causeway will provide a wind-breaker to protect turbidity curtains against the effects of high winds. AEM should provide a technical rationale for the type of windbreak that is suggested supported by an assessment of wind effect wave action and subsequent impacts on the integrity of the turbidity curtain. In effect, given lessons learned the Aug. 31/09 breach of turbidity curtains there should be some form of analysis to support the height, etc. of the causeway as being an effective wind-breaker to prevent further breaches in turbidity curtains;
- Item #6 of the SOP for Winter Construction of the Causeway of the Bay-Goose Dike (Phase 2) provided in Section 4.3 of the plan states that sediment traps were mobilized in the East Basin of Third Portage Lake for the winter. It is recommended that this plan be revised to include a diagram with coordinates (GPS, UTM) indicating where these sediment traps are located;
- It is recommended that additional TSS monitoring stations be established between the inner and outer turbidity curtains during the open water construction of the Bay-Goose Dike (Phase 2). Monitoring data acquired from these stations should be used to determine the effectiveness of TSS containment measures and be included in AEM's decision making process for the implementation of mitigation measures;
- Collecting sample results from TSS monitoring stations within and beyond the outer curtain once per day would be sufficient during the open water

construction of the Bay-Goose Dike (Phase 2) to facilitate the suggested monitoring between the inner and outer curtains. Previous monitoring results suggest that the twice daily monitoring in the open bay could be reduced to daily;

- It is recommended that additional turbidity curtains be considered between the causeway and the unnamed island immediately south of Goose Island during open water construction of the Bay-Goose Dike (Phase 2). These curtains may effectively contain suspended sediments in the immediate construction area;
- As an additional safeguard it is recommended that AEM factor into the SOP for Open Water Construction of the Bay-Goose Dike (Phase 2) an altered aggregate deposition rate based on visual inspections of the turbidity curtain and the turbidity of water;
- INAC concurs with Environment Canada's Jan. 8/10 recommendation that during open water construction of the Bay-Goose Dike (Phase 2) "the four highest results from all monitoring stations (profile maxima) be averaged to compare to licensed limits and thresholds for action." TSS monitoring results at certain stations may be much lower than others due to their positioning and sedimentation patterns. A delay in implementing warranted mitigation measures could take place if data from all monitoring stations are included in the calculation of the 24-hour, 7-day moving, and 30-day moving averages;
- It is recommended that divers inspect the turbidity curtains prior to the start of dike construction activities during the open water season to confirm that the curtains have been properly mobilized. Divers should also be engaged as a mitigation measure if TSS concentrations exceed license limits at any monitoring station;
- AEM must revise their Quality Assurance / Quality Control Plan (required by Part I, Item #19 of the License) to address those procedures that are followed for the collection and analysis of turbidity and TSS data; and,
- The following comments provided in INAC's May 29/09 Technical Review of this plan's previous version remain outstanding,
 - Due to the planned construction of various water retention dikes (i.e., Bay-Goose Dike, East Dike, South Camp Dike, and Vault Dike), AEM should submit diagrams that reference water quality monitoring locations, dewatering locations, and construction timetables specific to each or all water retention dikes. Currently this plan is specific to the Bay-Goose Dike construction and makes reference to the East Dike that was constructed in 2008; and,

- Rephrased for greater clarity: AEM must implement low-impact construction techniques throughout their dike construction activities to minimize any increase in suspended sediments in the immediate and surrounding lake environment. One such measure would include the use of aggregate materials that contain minimal fines.

Prepared by David Abernethy

Cc: Lou-Ann Cornacchio, Indian and Northern Affairs Canada