

## Environment Canada's Intervention on the Meadowbank Gold Project Water Licence Public Hearing

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## Mandate and Role

- The primary relevant legislation and standards administered or adhered to by EC which influenced the content of this submission are:
  - Section 36(3) of the *Fisheries Act* – Pollution Prevention Provisions;
  - *Metal Mining Effluent Regulations*;
  - *Canadian Environmental Protection Act* (CEPA);
  - Canada-wide Standards for Mercury Emissions; and
  - Canada-wide Standards for Dioxins and Furans.

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## Water Quality Issues

- Issues include:
  - *Lake dewatering*
  - *Monitoring programs*
  - *Effluent quality criteria*
  - *Water quality predictions*
  - *Pit lakes*
  - *Groundwater monitoring*

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## Lake Dewatering

- **Issue:** Dewatering discharges will be controlled by the amount of sediments in the water. EC has specific comments on monitoring and proposes use of turbidity as a regulated parameter.
- **Recommendations:** EC supports the approach outlined by AEM to use thresholds for stopping discharge and/or triggering management actions. EC also recommends use of discrete samples, use of a 6-day average for TSS, regulation of other parameters in addition to TSS (i.e. turbidity, aluminum, pH), and submission of a dewatering plan as a condition of the water licence.

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## Water Quality Monitoring Programs

- **Issue:** Required monitoring will include compliance monitoring (SNP), receiving environment monitoring (AEMP) and MMER EEM monitoring. Ongoing groundwater monitoring is also an important aspect of water management and closure planning.
- **Recommendations:** All monitoring requirements should be harmonized in a consolidated plan, with construction-phase Sampling and Analysis Plans developed as soon as possible for approval by the NWB. Groundwater monitoring should be described in a stand-alone plan which includes schedules and rationale for well installations.

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## Site Water Quality Monitoring

- **Issue:** EC has identified some specific concerns with the proposed water quality monitoring. Details are outlined in our intervention.
- **Recommendations:** AEM has proposed a good framework for site water quality monitoring, but this should be further developed and submitted to the NWB for approval.

## Effluent Quality Criteria

- **Issue:** Proposed effluent quality criteria have been drafted by the proponent, and EC has suggested additional and/or more conservative criteria in some cases, and suggests only monitoring for other parameters.
- **Recommendations:** Appendix B of EC's intervention outlines our recommendations for discharge criteria, including:
  - Turbidity be regulated for discharges from the dewatering areas and attenuation ponds;
  - Chloride be regulated at lower levels;
  - Sewage-associated parameters be regulated for discharges to surface waters.

## Water Quality Predictions

- **Issue:** There is some uncertainty regarding the modeling of nitrogen compounds from cyanide breakdown, and regarding the levels of ammonia which will accumulate in the attenuation pond and reclaim pond. AEM will monitor and periodically re-model.
- **Recommendations:** EC supports AEM's approach, and recommends periodic recalibration of the water quality modeling be a licence condition. We also recommend rigorous source control of amounts of cyanide and ammonia through implementation of an approved ammonia management plan.

## Pit Lakes Water Quality

- **Issue:** EC has concerns with the evolution of pit water quality due to unknowns with groundwater discharges, and uncertainty around the formation and persistence of chemoclines in the pit lakes.
- **Recommendations:** EC seeks clarification of the role of groundwater inputs/discharges in the evolution of pit water quality, and an evaluation of the stability of meromixis, and how that will affect water quality at closure. Updating and re-running of the pit water quality model should be done once further groundwater quality data are available.

## Groundwater Monitoring

- **Issue:** EC had identified several problems with the handling of groundwater data, although we did agree data were adequate to predict salinity and major ion concentrations and dissolved metals.
- **Recommendations:** Development and implementation of a comprehensive groundwater monitoring plan which addresses data presentation concerns, including installation of more robust permanent monitoring wells as soon as possible, is recommended.

## Tailings and Waste Rock Issues

- **Issues include:**
  - Design depth of the long-term active zone
  - Waste rock pile management
  - Till characteristics
  - Mine rock segregation

### *Design Depth of the Long-term Active Zone*

- **Issue:** Problematic mine solid wastes must be encapsulated in perpetuity, global warming notwithstanding. AEM has committed to a minimum two meter rock cover over reactive rock, tailings, and overburden to confine the active layer, and will instrument to monitor freezeback efficiency and cap performance.
- **Recommendations:** EC recommends that AEM's commitments be included in a rock management plan, to be updated periodically as data are collected and reported.

### *Contingency Planning for Waste Rock Piles*

- **Issue:** Specific contingencies have not been presented should early work on the waste rock piles indicate freezing would not be sufficient to isolate potentially problematic rock types.
- **Recommendations:** AEM should be required to periodically review and document the performance of its monitoring systems, of segregation methods, evolving water quality, cover material requirements, and of relevant technology developments and study results.

### *Till Characterization*

- **Issue:** Although most till materials will be non-ARD generating, there are exceptions in soils above the ore deposit. AEM commits to testing the till prior to use in any environmentally sensitive structures, screening against the most stringent federal and territorial criteria for soils.
- **Recommendations:** EC recommends that test results be reported to the Board on an annual basis as part of a rock management plan.

### *Site Mine Rock Segregation*

- **Issue:** Segregation of rock will be done based on sulfur content for ARD potential, and total metal content for metals leaching potential. AEM is committed to updating and adapting the plan as mining advances and additional data is obtained.
- **Recommendations:** A credible segregation system should be in place prior to excavation and based on best current understanding. During mine development, criteria of a conservative measure should be employed. The segregation system should be audited periodically to affirm it continues to operate effectively as designed.

### *Waste Management*

- Waste management issues include:
  - *Incineration management*
  - *Compliance with Canada-wide Standards*
  - *Landfarm operations*

### *Waste Incineration*

- **Issue:** AEM plans to incinerate used petroleum products, food waste and sewage treatment sludge and has committed to use a dual chamber, high temperature incinerator (yet to be selected). Incinerator ash will be disposed of by spreading within the landfill following limited testing for compliance with the Environmental Guideline for Industrial Waste Discharges (GN, 2002). Compliance with the CWS will be demonstrated through monitoring and stack testing.
- **Recommendations:** EC recommends inclusion of the incineration management plan as a licence requirement, with reporting of test results in the annual reports. Best practices should be implemented for ash disposal.

## Landfarming of Contaminated Materials

- **Issue:** AEM has satisfactorily addressed concerns previously identified with the landfarm operations.
- **Recommendations:** Areas of concurrence between EC's recommendations and AEM should be documented for future follow-up, perhaps in the form of adding to a commitments list, or as an addendum to the plan.

## Emergencies

- **Issue:** AEM has addressed concerns identified with the Hazardous Material Management Plan and revisions to the Spill Contingency Plan.
- **Recommendations:** Areas of concurrence between EC's recommendations and AEM should be documented for future follow-up, perhaps in the form of adding to a commitments list, or as addenda to the plans.

## Closure and Reclamation

- Closure issues include:
  - Removal of dewatering dykes
  - Post-closure monitoring
  - Closure of treatment plant facilities
  - Progressive closure of the rock storage facilities

## Removal of Dewatering Dikes

- **Issue:** AEM is committed to ensuring appropriate mitigation measures are identified and implemented prior to initiation of breaching dikes, and these will be detailed in a plan submitted to the NWB in advance of the work.
- **Recommendations:** EC recommends the licence require submission of detailed information regarding the method to be used to remove/breach the dewatering dikes at least 18 months prior to commencing this work. Potential impacts of the chosen method should be discussed and mitigation measures identified.

## Post-closure Monitoring

- **Issue:** Monitoring is being developed as part of an Operation, Maintenance and Surveillance Manual, and the manual will incorporate recommendations made by EC at the Pre-hearing technical meetings.
- **Recommendations:** EC recommends that the OMS Manual be updated periodically in conjunction with the closure plans, and circulated for review.

## Closure of Treatment Plant Facilities

- **Issue:** A water treatment plant is likely to be required, and details on closure of this facility could be provided on a general basis. For example, if the mill is modified to include a treatment circuit at closure how would this affect timing and details of decommissioning?
- **Recommendations:** Details on how any such facility would be decommissioned should be included in future updates to the closure and reclamation plan.



### *Progressive Closure of Rock Storage Facilities*

- **Issue:** AEM has committed that a detailed monitoring and instrumentation plan will be prepared and submitted to the NWB for review once a final waste rock deposition plan has been developed.
- **Recommendations:** EC recommends that submission of monitoring plans be a licence requirement, with results linked to closure planning.

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### *Conclusion*

- EC would like to thank the NWB for the opportunity to participate in the water licence process for the Meadowbank Gold Project.
- We would also like to thank the proponent for a constructive and interactive approach which has helped resolve concerns ahead of this hearing.

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