TECHNICAL REVIEW

OF

THE MEADOWBANK GOLD MINE

TYPE A WATER LICENSE RENEWAL
(NWB 2AM MEA0815)

Prepared By:

NUNAVUT TUNNGAVIK INC.

And

KIVALLIQ INUIT ASSOCIATION

September 29, 2014

Prepared For:

NUNAVUT WATER BOARD

INTRODUCTION

Nunavut Tunngavik Inc. (NTI) and the Kivalliq Inuit Association (KIA) have completed a technical review of the Type A Water License Renewal for Agnico-Eagle Mines Limited's (AEM) Meadowbank Gold Mine.

The KIA, represents the Inuit beneficiaries of the Kivalliq Region, at the territorial and regional levels, and supports sustainable economic development opportunities for Inuit beneficiaries.

The purpose of the technical review of the Meadowbank gold Mine Type A Water License Renewal was to ensure adequate protection of the environment through best practices of the mitigation and monitoring programs.

The review was completed by the KIA's long-time technical consultants GeoVector Management Inc. of Ottawa, and Hutchinson Environmental Sciences Ltd. of Bracebridge, Ontario.

The information reviewed is outlined in Appendix 1. All the issues related to this review are documented in detail in Appendices 2 and 3.

Appendices 2 and 3 document thirty-one (31) issues that require a response from AEM to the KIA as part of the NWB water license renewal process.

The comments summarized below represent the KIA's recommendations on those issues that could have a significant impact on the environment in the area of the Meadowbank Gold Mine.

1.0 Main Supporting Document and Water License

1.1 Water License

Change in obtainable freshwater limit

AEM has proposed an increase in annual water takings from Third Portage Lake and state that no significant impacts to the local aquatic ecosystem are anticipated as a result of the requested increase in fresh water use, because the total volume withdrawn for mining under maximum use for 2010 – 2018 would be less than 2.5% of the volume of Third Portage Lake. Withdrawal of 2.5% of the lake volume annually will represent a consumptive use of water until the pits are refilled and the rate of withdrawal needs to be considered against the annual inflow to the lake to determine its significance. The KIA suggests that AEM provide a comparison of the projected increase in water volume taking against the annual volume of inflow to Third Portage Lake.

NTI – P.O. Box 1269, Cambridge Bay, Nunavut, X0B 0C0, Tel; (867) 983-5600, Fax: (867) 983-5624
KIA- P.O. Box 340, Rankin Inlet, Nunavut, X0C 0G0, Tel: (867) 645-2800, Fax: (867) 645-3855

Discharge limits and determination of environmental effects

AEM has concluded that the overall analysis of water quality is adequate based on internal monitoring stations and limits that are adequately protecting the receiving water environment. However, there have been a few periodic exceedances. The KIA is concerned that the assessment of impacts to receiving waters begins by comparison of monitoring results to Water License Limits. This presupposes that the Water License limits represent adequate protection of the receiving waters. The KIA recommend that the assessment should begin by checking the CREMP results to
a) determine if any changes were documented in the receiving waters, and
b) if the changes were within the ranges predicted in the EIS.

This would allow checking of water quality for parameters for which no license limits were set and allow a better assessment of the adequacy of the existing license limits. This would provide a more robust approach to adaptive management as it is based on testing the hypothesis that "Water License limits are adequate to protect the environment" vs testing the implications of not meeting license limits.

Altered License Conditions

Part D Item 11:
We request that AEM continue to name specific lakes they shall monitor to increase accountability in the AEMP

Part E Item 8:
The KIA recommend that the current schedule of annual comparisons of predicted water quality and quantity within the pits to measured water quality and quantity be continued.

Part F Item 2, Part F Item 3:
We request Portage Attenuation Pond effluent discharges monitored at Station ST-9 include weak acid dissociable cyanide as well as total cyanide in the suite of monitored parameters as it represents the toxic fraction of total cyanide and is associated with a CCME water quality guideline. We also request that effluent discharged from the Vault Attenuation Pond monitored Station ST-10 include the same provision for monitoring weak acid dissociable cyanide. The following row should be added to Part F Item 2 and Part F Item 3:

Parameter	Maximum Average Concentration	Maximum Allowable Grab Sample Concentration
Free Cyanide	0.0025 mg/L	0.005 mg/L

NTI – P.O. Box 1269, Cambridge Bay, Nunavut, X0B 0C0, Tel; (867) 983-5600, Fax: (867) 983-5624
KIA- P.O. Box 340, Rankin Inlet, Nunavut, X0C 0G0, Tel: (867) 645-2800, Fax: (867) 645-3855

Part F Item 3, Part F Item 23:
AEM should harmonize the required criteria between Part F Item 3 and Part F item 23. The breadth of the updated Part F Item 23 should reflect Part F Item 6. The introductory text should read "Effluent from fuel containment facilities that require Discharge to land, shall not exceed the following Effluent quality limits:".

Lead and ammonia should continue to be part of parameter list for Baker Lake Bulk Fuel Storage Facility and the Meadowbank Fuel Storage Facility (ST-37 through ST40).

Part I Item 7:
AEM should continue to confirm monitoring station locations with an Inspector if changes to the monitoring program are required to reflect current mine activity. Confirmation with an Inspector should also be required if any new stations are added during the proposed water license tenure.

Part H, Item 3.
The KIA requests that words "petroleum products" be included along with the word "fuel" in Part D, item 29.

Part I Item 18
The Water License should continue to require a digital photographic record of all watercourse crossings before, during and after the construction has been completed under the water license. The condition should not be removed from the license as it is reasonable to expect that additional construction activities may occur.

Part J, Item 6
The KIA requests that words "if possible" be removed as a significant effort should be put into re-vegetation of the tailings.

1.2 Main Supporting Document
Trend of Increasing Parameter Concentrations in Near Field sites **(**Review Freshwater Aquatic Environment between 2010 and 2013).

The KIA requests that AEM provide a discussion of mitigation measures which will be taken to address the trend of increasing key parameters in the Near Field sites. This discussion should provide modeled water quality in the Near Field receiving environment where appropriate and make comparisons of the observations with predictions made in the EIS.

NTI – P.O. Box 1269, Cambridge Bay, Nunavut, X0B 0C0, Tel; (867) 983-5600, Fax: (867) 983-5624
KIA- P.O. Box 340, Rankin Inlet, Nunavut, X0C 0G0, Tel: (867) 645-2800, Fax: (867) 645-3855

2.0 Review of Existing Monitoring Programs (CREMP)

2.1 Wally Lake Reference Site (Main Supporting Document, CREMP Stations and Control/Impact Designations)
The KIA recommends that AEM establish a reference site for Wally Lake. The evaluation of the advantages and disadvantages of establishing a separate reference station should be conducted and presented for review prior to water license renewal.

2.2 Data Quality Objectives (CREMP QA/QC, Appendix B5, QA/QC plan)
The KIA recommends that future CREMP years should use a more stringent DQOs to evaluate blanks and duplicates. It is suggested that the USEPA DQO criteria should be used. A discussion should be provided if AEM proposes continued use of less stringent DQOs.

Discussion of DQOs should also be added to Appendix B5. This discussion should also include what actions will be taken if data fails to achieve the DQO. Together this will ensure only high quality data is used to characterize the aquatic environment and provide the basis for management decisions.

2.3 Hold Times (CREMP QA/QC)
The KIA recommends that AEM commit to Part I, Item 23 of the existing water license requiring establishment of an accredited laboratory on-site. AEM has not adhered to this condition. Use of an on-site accredited laboratory will likely alleviate issues associated with sample hold times. As an alternative, please elaborate on what measures are being undertaken to improve holding time compliance.

2.4 Hold Times (CREMP Data Evaluation Criteria)
Yearly means are appropriate for sediment and benthic invertebrate samples as they are collected at a yearly frequency. Water quality samples are collected seasonally. Seasonal means should be used for decision making purposes or triggers should consider individual measurements or repeated individual measurements as decision criteria.

2.5 Water Chemistry Discussion Criteria (CREMP Water Chemistry Discussion)
AEM should alter the minimum criteria to discuss parameters to provide greater assurance that all potential adverse changes to water quality resulting from mine activity are highlighted. The KIA recommends that parameters are discussed in future CREMP reports when:

1) greater than 10% of the samples are above the MDL, and

2) parameters that are detected less frequently than in 10% of samples but are >5x MDL in some samples where they were detected.

This will provide assurance that the mine has had no or reversible adverse impacts to the aquatic environment under current water license conditions. This is critical as the water license has not been significantly altered in the renewal application.

NTI – P.O. Box 1269, Cambridge Bay, Nunavut, X0B 0C0, Tel; (867) 983-5600, Fax: (867) 983-5624
KIA- P.O. Box 340, Rankin Inlet, Nunavut, X0C 0G0, Tel: (867) 645-2800, Fax: (867) 645-3855

2.6 Elevated Sediment Concentrations: Zinc and Lead (CREMP Sediment Chemistry Discussion, table 3.4-1)

The KIA recommends that AEM harmonize the existing aquatic environment summary presented in the Main Supporting Document with results and findings presented in the CREMP. A discrepancy has been noted for zinc. The CREMP also does not discuss elevated lead concentrations in the WAL sediment samples. These concentrations are above both the trigger and threshold concentrations and require management actions. It is recommended that a condition be included in the water license that requires management actions when concentrations are above a threshold value. The KIA also requests an explanation as to why elevated lead concentrations were overlooked in the CREMP discussion.

2.7 Elevated Sediment Concentrations: chromium (CREMP Sediment Chemistry Discussion)

The CREMP recommends management action to follow up with increased chromium concentrations. Management action can be coupled with more stringent discharge criteria for chromium in the water license. The KIA recommends a condition in the water license to address elevated chromium in TPE sediments prior to reaching the threshold value.

2.8 Zooplankton Sampling (Appendix B2, Sampling Frequency)

The distribution of samples is acceptable as it adequately characterizes both under ice conditions and the open water. However, the KIA are concerned that zooplankton and periphyton sampling will be discontinued. The KIA recognizes that zooplankton sampling is not required by EEM under MMER. However, the inclusion of zooplankton monitoring is required by the NWT in Aquatic Effects Monitoring Programs (AEMPs) within similar environmental conditions. Furthermore zooplankton are important to young of the year fish and can help characterize changes related to mine impacts. The KIA recommends to continue including zooplankton as part of the AEMP for the project.

2.9 Depth Samples (Appendix B2, Experimental Design)

The KIA recommends that depth samples should be required from 1 meter off lake bottom as part of the CREMP at sample sites where stratification has been demonstrated through routine lake profiles of field temperature, conductivity, dissolved oxygen and pH.

2.10 Statistical comparison of Biological Monitors (Appendix B2, Experimental Design)

Biological monitoring is inherently variable but can be partially addressed using an approach recommended by Wiens and Parker[1] and used in the Doris North AEMP analysis of benthos. This approach is an impact level-by-time analysis, where the benthos and other biological monitor trends at exposure sites are compared to the trends at reference sites to determine if there is evidence of non-parallelism over time. The KIA recommends the use of the Wiens and Parker approach in addition to the BACI

[1] *Wiens, J. A. and Parker, K. R. 1995. Analyzing the effects of accidental environmental impacts: approaches and assumptions. Ecological Applications 5 (4): 1069-83*

NTI – P.O. Box 1269, Cambridge Bay, Nunavut, X0B 0C0, Tel; (867) 983-5600, Fax: (867) 983-5624
KIA- P.O. Box 340, Rankin Inlet, Nunavut, X0C 0G0, Tel: (867) 645-2800, Fax: (867) 645-3855

assessment for biological monitoring results (benthic invertebrates, phytoplankton, zooplankton).

3.0 Review of Management Reports and Plans

3.1 Lack of Event Monitoring Discussion (Appendix B6, Event Monitoring, Appendix B7 and Appendix B9)
AEM should include the event monitoring requirements in Appendix B7 and Appendix B9 as discussed in Appendix B6.

3.2 Monitoring Parameters (Appendix B6, Event Monitoring Water License, Schedule I, Monitoring Group)
The KIA requests that AEM commit to use of the lowest commercially available detection limits for water quality parameters and present a list of what these will be.

WAD cyanide should be included in Group 1 and Group 3 or AEM should commit to taking a conservative approach and compare total cyanide with the CCME guideline for free cyanide: 0.005 mg/L free cyanide.

3.3 Impact of violating obtainable freshwater limit (Appendix B9, What is a Spill? Appendix B9, Materials and reportable (to regulatory authorities) spills,)
The KIA requests that AEM provide a discussion of unanticipated seepages as part of the spill contingency plan. Seepages such as that in Lake NP2 was brought to the attention of regulatory bodies by an AANDC inspector rather than AEM itself. These seepages should be considered "spills" as they have unintentionally or accidently been allowed to breach their intended containment and may have an adverse impact on the environment. This is in line with AEM's definition of what a spill is: *"major spill is defined as an accidental release of product into the environment that has the potential for adverse impact."*

3.4 RSF Design (Appendix B10 section 2.3, page 4)
AEM has indicated that the Vault RSF is not expected to require capping, as the bulk of the material from this deposit is expected to be NPAG (Golder, 2005a). The KIA requests that AEM report on and monitor the amount of PAG versus NPAG material in the Vault RSF in order to ensure that, if required, the RSF is capped with an appropriate amount of material to ensure that freezeback of the RSF occurs upon closure.

3.5 Waste Rock Storage Facilities (Appendix B14 section 3.3.6.3, page 61)
AEM has indicated that runoff water quality and water volume from the Portage and Vault Waste Rock Storage Facilities will be monitored throughout the mine life, including operations, closure and post-closure. Given that the height and crest elevation of these facilities is 13% to 17% higher than the surrounding topography will fugitive dust emissions also be monitored, in particular, during closure and post-closure. The KIA requests that AEM include fugitive dust as part of closure and post-closure monitoring.

NTI – P.O. Box 1269, Cambridge Bay, Nunavut, X0B 0C0, Tel; (867) 983-5600, Fax: (867) 983-5624
KIA- P.O. Box 340, Rankin Inlet, Nunavut, X0C 0G0, Tel: (867) 645-2800, Fax: (867) 645-3855

3.6 Impact of violating obtainable freshwater limit (Appendix B18, 3.2.1 Water Management Plan and Water Balance)
The KIA recommends that AEM provide a discussion of the impact additional use of freshwater from Third Portage Lake for milling purposes has had. Initial discussion should outline the influence on lake level and outflow. If there was a significant change to either, a follow up discussion should focus on impacts to aquatic life (particularly fish habitat) and water quality. AEM should also provide a discussion of the impact diminished use of reclaim water will have on the TSF and what measures are in place to prevent a significant loss of freeboard or unanticipated discharge volumes.

3.7 Modeling Results and Mitigation (Appendix B18, Water Quality Modeling Report, Appendix D – Water Quality Report)
The KIA recommends that AEM provide modeling results for free cyanide or commit to comparing total cyanide to the free cyanide guideline in all samples. The approach varies between reports and plans and should be harmonized prior to renewal of the water license. The KIA also recommends that AEM provide modeling results in the water management report and plan indicating when pit water quality will meet CCME guidelines. This will provide insight into management actions AEM may consider to mitigate copper and ammonia concentrations in the pit water.

3.8 Depth sample collection for Dike Monitoring (Appendix B19)
Samples collected at depth downstream of all dikes during operation are required to detect water chemistry changes resulting from seepages. Aquatic life downstream of the dikes is unnecessarily put at risk by reliance on visual monitoring of seepage water in the ditches and the toe rather than in the potential receiver should failures occur.

Water quality monitoring should be required as part of the emergency response plans when conditions for Threshold Criteria "Yellow" or above are met:

- East dike: seepage through dike of > 3000 m^3/day and/or turbidity in seepage water.
- Bay Goose Dike at toe: seepage of > 300 m^3/day and/or turbidity in seepage water
- Bay Goose Dike at North Channel Area: seepage of > 150 m^3/day and/or turbidity in seepage water
- South Camp Dike: seepage of > 300 m^3/day and/or turbidity in seepage water
- Vault Dike: seepage of > 300 m^3/day and/or turbidity in seepage water

The KIA understands that AEM has taken daily profiles using a hand held turbidity meter during dike construction downstream of the silt curtains. The KIA requests that a turbidity profile be collected downstream of the dike when the outlined Threshold Criteria "yellow" is met. Potential profile collection locations and mitigation measures should be evaluated and presented for review prior to renewal of the water license.

NTI – P.O. Box 1269, Cambridge Bay, Nunavut, X0B 0C0, Tel; (867) 983-5600, Fax: (867) 983-5624
KIA- P.O. Box 340, Rankin Inlet, Nunavut, X0C 0G0, Tel: (867) 645-2800, Fax: (867) 645-3855

3.9 Anomalous Thermistor or Piezometer Reading Response (Appendix B20, 6.2.2 Anomalous Readings)

The KIA requests that AEM describe the frequency of monitoring associated with their instruction to *"increase monitoring frequency"*. This will provide assurance that the response to thermistor and piezometer reading changes is sufficient to protect the aquatic environment from potential seepages resulting from TSF structural deficiencies and wear over time.

List of Appendices

Appendix 1:
Information Reviewed for the Meadowbank Type A Water License (NWB 2AM MEA0815) Renewal

Appendix 2:
HESL Technical Memorandum for the Meadowbank Type A Water License (NWB 2AM MEA0815) Renewal

Appendix 3:
GeoVector Technical Memorandum Information Reviewed for the Meadowbank Type A Water License (NWB 2AM MEA0815) Renewal

NTI – P.O. Box 1269, Cambridge Bay, Nunavut, X0B 0C0, Tel; (867) 983-5600, Fax: (867) 983-5624
KIA- P.O. Box 340, Rankin Inlet, Nunavut, X0C 0G0, Tel: (867) 645-2800, Fax: (867) 645-3855