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APPENDIX 2

HESL TECHNICAL MEMORANDUM for the MEADOWBANK TYPE A WATER LICENSE (NWB 2AM MEA0815) RENEWAL

Memorandum

Date: **September 29, 2014**

To: **Luis Manzo, Director of Lands , Kivalliq Inuit Association (KIA)**

From: **Neil Hutchinson, Richard Nesbitt (HESL)**

Re: **Technical review of the Meadowbank Type A Water License**

(NWB 2AM MEA0815) Renewal

The Kivalliq Inuit Association (KIA) requested a review of Agnico Eagle Mine's (AEM) Meadowbank Mine Type A Water License – 2AM-MEA0815 (issued June 9, 2008 by the Nunavut Water Board) Renewal application by Hutchinson Environmental Sciences Ltd. (HESL). The original license (NWB 2AM MEA0815) was issued on June 9th, 2008 and expires May 31st 2015. AEM has proposed a 10 year license renewal; the expiration date proposed for the renewal is June 1, 2025 and is expected to take the mine into the closure and reclamation plan.

In general we feel that this renewal period is appropriate. AEM now has 3-4 years of operational experience at the Meadowbank Project and so a 10 year term will allow them to apply the experience learned to date to the entire operational period of the mine and will allow the next renewal to focus on the closure phase. We have broken down our review of the Water License Renewal application (NWB File No: 2AM-MEA0815 / Renewal) with individual staff responsibilities for specific sections based on their skillset. Our approach to the review is systematic and is broken down into broad tasks:

1. **Review the Main Supporting Document and Water License**

   The conditions in the existing water license and AEM's proposed changes were compared. This allowed the areas of potential concern to be highlighted. This also provided a reference for the assessment of mine activities covered under the existing license and provided the basis for the conditions which AEM were required to meet over the last seven years.

2. **Review existing monitoring programs**

   This task included a focused review of AEM's monitoring data conducted under the previous water license. Specifically, a review of the CREMP and AEMP design and reports. In particular, the areas were identified where AEM had not met the requirements of the existing water license, where insufficient mitigation might pose a risk to the environment and current risks to the receiving environment (ie: spills, leaks and seeps).

3. **Review approved plans**

   This phase of the review assessed the plans approved by the NWB to ensure that these plans will prevent adverse changes to the environment. Particular attention was paid to plans addressing issues highlighted through the review of the CREMP and AEMP results.

4. **Recommendations**

   Throughout the review changes via the technical comments were recommended to the plans, monitoring programs and Water License to address issues highlighted by the HESL review in order to ensure adequate protection of the aquatic environment.

1. Main Supporting Document

1.1 General Overview of Water License

The existing Water License with proposed changes indicated through the "Track Changes" feature of Microsoft Word was included as part of AEM's submission to the Nunavut Water Board for the Type A Water License Renewal Application – Main Supporting Document (NWB 2AM MEA0815).

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-01
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Change in obtainable freshwater limit**
References:	Water License
Issue / Concern and Rationale:	The greatest change to the water license is a proposed increase in the permissible quantity of freshwater the mine obtains per year. AEM was permitted to obtain 700,000 m3 freshwater per year under the existing license. Freshwater use exceeded the limit in 2010 through 2013 due to *"higher than anticipated rates of ore processing, and an adjustment of the initial water balance model, resulting in a deficit of reclaimed water"*. It is clear that AEM opted to process ore at a higher than anticipated rather than to adhere to the existing license and this raises concerns over a) licence compliance by AEM and b) inspection and oversight of the licence by responsible authorities. AEM proposes a new maximum freshwater quantity of 9,119,652 m3 per year which will include the water required for reflooding the open pits. Proposed yearly freshwater usage is presented in Table 6-1 from the Main Supporting Document and is an order of magnitude greater than that currently permitted. This summary of freshwater requirements indicates that the 9,119,652 m3 freshwater per year will only be required from 2018 through to 2023 and decrease slightly in 2024. No freshwater will be obtained in 2025 when completion of closure is anticipated.

Table 6-1 - Freshwater requirements from Third Portage Lake, Unnamed Lake and Wally Lake. Updated and Adapted From SNC 2013 Water Management Plan (Table 4-2)

Year	Mill/Camp Freshwater Use from TPL (m^3/yr)	Emulsion Plan Freshwater Use from Unnamed Lake (m^3/yr)	Portage and Goose Pit Flooding from TPL (m^3/yr)	Vault Lake Pit Flooding from Wally Lake (m^3/yr)
2013	1,585,009	2,400	0	0
2014	1,147,600	2,400	0	0
2015	1,147,600	2,400	450,000	0
2016	1,147,600	2,400	1,200,000	0
2017	1,147,600	2,400	1,200,000	0
2018	55,000*	0	4,880,000	4,184,652
2019	55,000	0	4,880,000	4,184,652
2020	55,000	0	4,880,000	4,184,652
2021	55,000	0	4,880,000	4,184,652
2022	55,000	0	4,880,000	4,184,652
2023	55,000	0	4,880,000	4,184,652
2024	55,000	0	4,880,000	4,053,862
2025	55,000	0	0	0

*Fresh water consumption for domestic camp use.

AEM has demonstrated a lack of adherence to the maximum obtainable quantity of freshwater permissible under their current water license. We understand that additional water usage was permitted under an amended water license for 2013 and 2014. Permitting the proposed volume of 9,119,652 m3 freshwater per year prior to being required may mask excessive use of water in the interim. This comment is also made in light of the IVR discovery sites continued expansion mentioned in the Main Supporting document and publicized on AEM's website.

Technical Comment/ Information Request:	The NWB should permit maximum yearly obtainable quantities of freshwater based on the yearly requirements anticipated by AEM. These should cover known water requirements and are not to encompass anticipated water use as part of the IVR site should AEM move forward with the environmental assessment process there.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-01-B
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Neil Hutchinson, Hutchinson Environmental Sciences Ltd.
Subject:	**Change in obtainable freshwater limit**
References:	Water License Renewal Application, p. 22
Issue / Concern and Rationale Technical Comment:	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. Monitoring of water levels will continue as per the water license amendment application. 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. Please provide a comparison of the projected increase in water volume taking against the annual volume of inflow to Third Portage Lake.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-2
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Neil Hutchinson , Hutchinson Environmental Sciences Ltd.
Subject:	**Discharge Limits and Determination of Environmental Effects**
References:	Water Licence Renewal Application pp. 23-28
Issue / Concern and Rationale:	AEM state that into the receiving environment. Therefore, in the occasional case where licensed limits for these onsite stations were exceeded, water quality data from the closest offsite stations was reviewed (based on CREMP, 2013) to determine whether any corresponding offsite impacts or receiving environment trends could be identified. And "Overall, the analysis demonstrates that despite a few periodic exceedances, internal monitoring stations and limits are adequately protecting the receiving water environment.
Technical Comment:	While we do not challenge the conclusion we are concerned that the assessment of impacts to receiving waters begins by comparison of monitoring results to Water Licence Limits. This presupposes that the Water Licence limits represent adequate protection of the receiving waters. We would 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 licence limits were set and allow a better assessment of the adequacy of the existing licence limits. This approach provides a more robust approach to adaptive management as it is based on testing the hypothesis that "Water Licence limits are adequate to protect the environment" vs testing the the implications of not meeting licence limits.

1.1.1 Other Proposed Changes

Most changes proposed by AEM in the water license reflect current mine operations. It is acceptable to remove conditions from the license addressing completed activities.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-03
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Altered License Condition**
References:	Water License Part D Item 11:
Issue / Concern and Rationale:	AEM has proposed a changed wording from "in Third Portage Lake, Second Portage Lake and Wally Lake" to "nearby Lake". This may alleviate the need to sample each lake, particularly because lake has not been pluralized.
Technical Comment:	We request that AEM continue to name specific lakes they shall monitor to increase accountability in the AEMP.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-04
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Altered License Condition**
References:	Water License Part E Item 8
Issue / Concern and Rationale:	AEM has proposed to remove the following condition: *"The Licensee shall, on an annual basis during Operations, compare the predicted water quantity and quality within the pits, to the measured water quantity and quality. Should the difference between the predicted and measured values be 20% or greater, then the cause(s) of the difference(s) shall be identified and the implications of the difference shall be assessed and reported to the Board."* We find it concerning that AEM will not be required to validate model predictions under the water license and that removal of the annual comparison will not provide the timely feedback that is necessary for effective adaptive management.
Technical Comment:	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.

<table>
<tr><td>Comment Source:</td><td>Kivalliq Inuit Association</td></tr>
<tr><td>Comment Number:</td><td>KIA-05</td></tr>
<tr><td>Project:</td><td>Meadowbank Project Water License Renewal</td></tr>
<tr><td>Comment From:</td><td>Kivalliq Inuit Association</td></tr>
<tr><td>Comment For:</td><td>Agnico Eagle</td></tr>
<tr><td>Reviewer:</td><td>Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.</td></tr>
<tr><td>Subject:</td><td>Altered License Condition</td></tr>
<tr><td>References:</td><td>Water License Part F Item 2, Part F Item 3</td></tr>
<tr><td>Issue / Concern and Rationale:</td><td>Total cyanide does not have an associated CCME guideline. While it is helpful to measure the total within the water column, weak acid dissociable cyanide represents the toxic fraction and should be assessed as part of routine monitoring</td></tr>
<tr><td>Technical Comment:</td><td>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:

<table>
<tr><th>Parameter</th><th>Maximum Average Concentration</th><th>Maximum Allowable Grab Sample Concentration</th></tr>
<tr><td>Free Cyanide</td><td>0.0025 mg/L</td><td>0.005 mg/L</td></tr>
</table>
</td></tr>
</table>

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-06
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Altered License Condition**
References:	Water License Part F Item 3, Part F Item 23
Issue / Concern and Rationale:	AEM has removed Part F Item 3 stating it will it will be included under Part F Item 23. The parameter list for Part F Item 23 does not include all removed parameters and only applies to the "*Baker Lake Bulk Fuel Storage Facility and the Meadowbank Fuel Storage Facility (ST-37 through ST40)*". AEM has also proposed removing total lead and ammonia from the parameter list. Increases in either of these parameters may impair aquatic life and should be included in the discharge criteria for fuel containment facilities discharging to Land. We recognize that, while MMER and CCME do not apply to discharges to land, the criteria provide a framework for assessing these discharges in the event that runoff reaches the aquatic environment.
Technical Comment:	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).

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-07
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Altered License Condition**
References:	Water License Part I Item 7
Issue / Concern and Rationale:	AEM has proposed rewording the condition to read: "*The Licensee shall confirm the locations and GPS coordinates for all monitoring stations referred to in Schedule I ~~with an Inspector~~.*" External accountability is a critical part of environmental protection and begins with site selection.
Technical Comment:	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.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-IR-08
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Altered License Condition**
References:	Water License Part I Item 18
Issue / Concern and Rationale:	AEM has proposed removing this condition. Any new construction required over the next ten years will alter the existing environment. A photographic record will assist AEM in reclamation activities.
Technical Comment:	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.

1.2 Summary of Water Quality Results between 2010 and 2013

As per Table 8-1 "Compliance Assessment with current Type A Water License" AEM was in compliance with all but two conditions under the existing water license.

Meadowbank was Non-Compliant with Part E Item 3 specifying the maximum obtainable quantity of freshwater for use at the mine. This is seen as a significant breach and is discussed in greater detail in Section 0 of this report.

Meadowbank was also Non-Compliant with Part I Item 23 requiring the use of an accredited laboratory on-site. All samples were sent to an off-site accredited laboratory thus rendering this breach of low concern.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-09
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Trend of Increasing Parameter Concentrations in Near Field sites**
References:	Main Supporting Document, Review Freshwater Aquatic Environment between 2010 and 2013
Issue / Concern and Rationale:	Several parameters of concern were identified as part of the water quality results review between 2010 and 2013. Sites in which water quality that may be of concern to the environment were identified were those which 1) had measured water quality parameters exceeding applicable criteria (MMER, CCME, BC MOE) or 2) trends in key parameters that are considered to be representative of mine activity (SO4, TDS, TSS, conductivity, NH3, Fe and cyanide) which were tracked to identify any apparent patterns. Station locations with exceedances and parameters with increasing trends were: • Associated with the diversion ditches with water discharging to Third Portage Lake, • The attenuation pond discharging to Third Portage Lake, • Near the Tailing Storage Facility (TSF) eventually discharging to Second Portage Lake • Stations which discharged to land. Note criteria may not be applicable as these discharges do not directly reach surface water but we note that the close proximity of surface water receivers to land and for inundation during the freshet suggest that any exceedances warrant concern. The aquatic ecosystem monitoring program also identified waterbodies and watercourses with changes resulting from mine activity. TSS exceeded criteria where indicated; other parameters indicate an increasing trend: • Third Portage Lake (East) – TSS, conductivity, calcium, TDS, sulphate, phytoplankton, benthic invertebrates • Third Portage Lake (North) – conductivity, sulphate • Third Portage Lake (South) – Sulphate, phytoplankton, benthic invertebrates, zinc in sediment • Second Portage Lake – TSS, alkalinity, TDS, phytoplankton, benthic invertebrates • and Tehek Lake (near field site) – TSS, sulphate, benthic invertebrates

	AEM indicated that several parameters were elevated during the dike construction. Elevated parameters during construction of the East Dike were nitrate, total phosphorus, total aluminum*, total chromium*, total copper*, total iron*, total manganese, total nickel, total titanium, and total uranium. Elevated parameters during construction of the Bay-Goose Dike were TSS, total aluminum*, total chromium*, total copper*, total iron*, total manganese, total nickel, total titanium, and total uranium. Parameters with a * exceeded CCME guidelines.
Technical Comment:	We request 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.

TSS appears to have been well managed during routine dewatering activities to the receiving environment as a result of active treatment, with the exception of losses of TSS during dike construction activities that KIA documented previously. Effluent discharge to Third Portage Lake from the Attenuation Pond has not breached license criteria. Although AEM has documented increases in conductivity, sulphate, TDS, TOC, and total and dissolved strontium relative to baseline; these concentrations were below applicable guideline and license criteria.

2. Review of Existing Monitoring Programs

The main lakes in the Meadowbank project area include: Third Portage Lake (TP), Second Portage Lake (SP), Tehek Lake (TE), and the Vault Lake system – Vault, Wally (WAL) and Drilltrail lakes.

2.1 CREMP

AEM states that the CREMP *"refers to the "core receiving environment monitoring program"; this is synonymous with "core monitoring program". While this term was first used for the 2009 annual report, it is meant to encompass the entire core receiving environment monitoring program since 2006."*

The CREMP program was based on Azimuth's (consultants to AEM) understanding of mine construction, operation and infrastructure (e.g., dikes, effluents, stream crossings, roads, etc.) and has been developed to detect mine-related effects at temporal and spatial scales that are ecologically relevant. The program was expanded to include Baker Lake in 2008. The program was updated based on the recommendations of the CREMP Design Document 2012 (Azimuth, 2012d). The study design is based on a before-after-control-impact (BACI) approach. Azimuth has broken down the program into 13 sampling areas spanning 4 categories. From the report:

- Near-field (NF) areas – Areas are situated in close proximity to the development (planned or constructed), in particular near dikes, dewatering discharge, and proposed effluent sources.
    - Meadowbank Study Sites: Third Portage Lake North (TPN), Third Portage Lake East (TPE), Second Portage (SP), and Wally Lake (WAL)
    - Baker Lake Study Sites: hamlet's barge landing area (Baker Barge Dock [BBD]) and the other AEM fuel storage facility (Baker Proposed Jetty [BPJ])
- Mid-field (MF) area – This area designation was added in 2011 to be consistent with the area categorizations used in the CREMP design review

- Meadowbank Study Sites: Tehek Lake (TE) and Third Portage Lake South (TPS)

- Far-field (FF) area – The intent of this area is to monitor water and sediment quality downstream of project infrastructure to provide insights into the spatial extent of any effects observed at the near-field areas
  - Meadowbank Study Sites: Tehek Farfield (TEFF)
- Reference (Ref) areas – By definition, reference areas are sufficiently removed from the mine that they are presumed to be unaffected by any infrastructure (roads, dikes, runways) and point sources (aerial and aquatic) associated with mine development
  - Inuggugayualik Lake (INUG) and Pipedream Lake (PDL). They are both headwater lakes and flow north into the Arctic Ocean. Despite the different drainage basin, both these lakes satisfy the requirements of an external reference lake from a physical/chemical perspective because they are at similar latitude, have similar geology, relief and climate, do not have any significant inflows and has generally similar limnological features, water chemistry and aquatic biological community structure to the project lakes

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-10
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Wally Lake Reference Site**
References:	Main Supporting Document, CREMP Stations and Control/Impact Designations
Issue / Concern and Rationale:	AEM states *"A reference station for Wally Lake has not been established. While the characteristics of Wally Lake are somewhat unique (it is much shallower than other lakes), further evaluation of the advantages and disadvantages of establishing a separate reference station (versus using existing reference stations) is needed in advance of the commencement of construction activities at Wally Lake."* The Vault Site is entering operation which may influence water quality in Wally Lake, the near field site. Despite lack of baseline information, establishment of an appropriate reference lake will discern changes in water quality resulting from year to year variation from mine related impacts.
Technical Comment:	We recommend 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.

2.1.1 Approach and Methods

The CREMP describes a two-tiered approach for decision criteria at Meadowbank based on 'trigger' and 'threshold' level concentrations. Trigger values are typically lower or less conservative than threshold values. These are defined as:

- Triggers are early warning criteria that may lead to action. Exceedance of a trigger value does not necessarily imply that an adverse effect may be expected. The triggers may be based on absolute numbers (e.g., an increases half-way from baseline to an identified effects threshold) or

statistical criteria (e.g., statistically significant trend that predicts exceedances of a threshold within 3 years).

- Thresholds are legal requirements, regulatory guidelines (e.g., CCME), or other discrete benchmarks, below which unacceptable adverse effects are not expected and above which adverse effects may occur. If effects-based thresholds do not exist or are not warranted for a particular variable, then early warning triggers will be developed without thresholds. In such cases, if triggers are exceeded then the implications of such exceedances can only be understood through the integration of results from other AEMP monitoring programs, or, if important information gaps still exist, through focused studies (e.g., risk assessment).

Samples were collected in all sites during the July and August open water season as demonstrated in Table 2.2-1 from the CREMP. Samples were also collected under ice at the Meadowbank sites. This sample distribution is sufficient to capture impacts in the Meadowbank area where activities occur throughout the year and at Baker Lake which is only used seasonally during the open water season.

Table 2.2-1. CREMP sampling summary, Meadowbank study lakes and Baker Lake, 2013.

				Meadowbank									Baker			
Sampling Event	Sampling Crew	Conditions	Components	TPN	TPE	TPS	SP	TE	TEFF	WAL	INUG	PDL	BBD	BPJ	BAP	BES
January	AEM	Ice	L	×	×	×	×									
February	AEM	Ice	L	×	×	×	×									
March	AEM	Ice	L	×	×	×	×									
Apr 18-20	AEM	Ice	L,W,P	✓	×		✓	×		✓	×					
Jul 15-21	AEM	Open	L,W,P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Aug 22-30	Azi	Open	L,W,P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
			B, S	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sep 15-18	AEM	Open	L,W,P	×	×	×	✓	×	×	✓	×	×				
Nov 24-30	AEM	Ice	L,W,P	✓	✓		✓	✓		✓	✓					
Dec 8-22	AEM	Ice	L,W,P	✓	✓		✓	✓		✓	✓					

Notes:
L = Limnology
W = Water chemistry
P = Phytoplankton
B = Benthos
S = Sediment
✓ = samples collected
× = areas and components that were not collected, but were scheduled for sampling

2.1.1.1 Quality Assurance / Quality Control (QA/QC)

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-11
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Data Quality Objectives**
References:	CREMP QA/QC Appendix B5, QA/QC plan
Issue / Concern and Rationale:	Data quality objectives used for the QA/QC program were less stringent than indicated by the USEPA. The water sample Data Quality Objectives (DQOs) for this project were: • Laboratory Duplicate = 25% RPD for concentrations that exceed 10x the method detection limit (MDL). • Field Duplicate = 50% RPD for concentrations that exceed 10 x MDL. The USEPA DQO is a 20% RPD for all concentrations that exceed 5x the MDL and is a more widely accepted standard[1]. AEM reported that *"Although there were some exceedences of the established DQOs, these exceedances represent much less than 1% of the total for QA samples and parameters measured."* While this is an acceptably low rate of DQO failure, we are concerned the failure percentage may increase to an unacceptable level if more stringent DQOs are applied. Similarly the DQO failure rates for other sample types were: • 0 of the sediment samples • ~1% in phytoplankton samples • 2.2% in benthic invertebrate samples Discussion of DQOs are also not provided in Appendix B5, the QA/QC plan.
Technical Comment:	Future CREMP years should use a more stringent DQOs to evaluate blanks and duplicates. We suggest use of the USEPA DQO criteria. 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.

[1] *United States Environmental Protection Agency. 1994. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review.*

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-12
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle, Golder Associates
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Hold Times**
References:	CREMP QA/QC
Issue / Concern and Rationale:	AEM discussed several problems with sample transportation. Most issues appear to stem from mine proximity to an accredited laboratory. AEM identifies: 1. Hold times were most often exceeded for the following parameters: a. Colour b. Turbidity c. Nitrate d. Nitrite e. Ortho-phosphate (dissolved as P) 2. Lack of temperature control resulted in broken bottles on route to analysis We are concerned the violation of hold times may compromise data quality used to make management and mitigation decisions and characterize the aquatic environment.
Technical Comment:	We recommend 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.

2.1.1.2 Data Evaluation Criteria

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-IR-13
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Hold Times**
References:	CREMP Data Evaluation Criteria
Issue / Concern and Rationale:	Data was evaluated against trigger and threshold values. Trigger values for AEM consider that corrective actions are initiated: 1. When a threshold (e.g., CCME guideline) was established, the trigger was set as the maximum of either (a) the value halfway between the baseline median and the threshold ("Method A"), or (b) the 95th percentile of the baseline data ("Method B"). 2. When a threshold was not established, the trigger was set equal to the maximum of either the 95th percentile of the baseline data ("Method B") or two times the current detection limit ("Method C"). In most cases, the threshold was equal to a given guideline. In cases where a water quality guideline exists but Method B was used for trigger development (i.e., cases where baseline data already exceed the guideline for > 5% of cases), it is possible for the trigger to equal or exceed the guideline. In such cases, the guideline is reported as the threshold but is not used as a criterion for action; rather, the trigger is the only criterion for action as is the case for variables lacking water quality guidelines. This additional consideration was not needed for sediment data as threshold values could be developed for all parameters. AEM states that the "*formal application of the trigger for decision-making purposes was to the yearly mean for each sampling area*". This is concerning as parameters concentrations vary more over the course of a year than a month making it difficult to statistically differentiate a yearly mean from a trigger concentration.
Technical Comment:	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.

2.1.2 CREMP Results

2.1.2.1 Limnology

No results of concern were noted at the Meadowbank sites. Baker Lake has increased salinity at depths greater than 12 m requiring greater sampling effort to characterize water quality. Samples should routinely be collected at the surface and at depth to characterize differences in water quality which may arise as a results of barriers to mixing resulting from increased salinity. This was recognized by AEM: *"consequently, we identified a need to better characterize Baker Lake limnology at depth."*

Conclusion: Limnology results do not pose concern requiring amendments to the water license and we respect that Baker Lake IQ has also documented changes in the salinity of Baker Lake as a possible consequence of climate change.

2.1.2.2 Water Chemistry

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-14
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle, Golder Associates
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Water Chemistry Discussion Criteria**
References:	CREMP Water Chemistry Discussion
Issue / Concern or Information Deficiency and Rationale:	Water quality parameters were only reported on when at least 10% of the samples exceeded the MDL. This presents a minimum threshold for discussion that may cause significant but acute changes to water quality to be overlooked. For example, a temporary failures in the treatment process may increase some water quality parameters in the effluent. These elevations still warrant discussion in the CREMP despite not exceeding license conditions.
Technical Comment/ Information Request:	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. We recommend 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.

AEM noted cyanide and metal concentrations increased due to the seepage from the Rock Storage Facility (RSF) at ST-16 and in Lake NP2. These changes were not detected in Second Portage Lake, the end receiver. Other mine related changes to water quality have been noted in Section 1.2 of this report; the CREMP does not indicate an alternate conclusion.

2.1.2.3 Sediment Chemistry

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-15
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Elevated Sediment Concentrations: Zinc and Lead**
References:	CREMP Sediment Chemistry Discussion, table 3.4-1
Issue / Concern and Rationale:	There were a few trigger values exceeded at impact areas (e.g., copper [WAL], chromium [TPN] and zinc [SP, WAL] but were within the range of baseline conditions. Interestingly zinc was not highlighted as a potential risk to the environment in the CREMP but was highlighted in the summary in the Main Supporting Document. Lead was found at above both the trigger and threshold concentrations in WAL sediment samples in August 2013 but was not highlighted in the text.
Technical Comment:	AEM should 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. We recommend a condition in the water license that requires management actions when concentrations are above a threshold value. We also request AEM explain why elevated lead concentrations were overlooked in the CREMP discussion.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-16
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Elevated Sediment Concentrations: chromium**
References:	CREMP Sediment Chemistry Discussion
Issue / Concern and Rationale:	There was a temporal/spatial pattern observed in 2013 for chromium in TPE sediments which demonstrated a continued increase from the pattern highlighted in the 2012 CREMP. Chromium exceeded the trigger concentration in 2013 TPE sediments. A coring study is currently planned for 2014 to confirm the trend. This study is timed to coincide with the year's EEM program.
Technical Comment:	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. We recommend a condition in the water license to address elevated chromium in TPE sediments prior to reaching the threshold value. We initially suggest more stringent discharge criteria for chromium. We invite AEM to provide other management options.

No new concerns were highlighted in the Baker Lake Sediments.

2.1.2.4 Phytoplankton

Both the Meadowbank and Baker Lake sites were evaluated to identify specific effect sizes of interest: 20% (trigger) and 50% (threshold). Statistically significant relative increases in mean total biomass in 2013 were identified at the near-field areas TPN, TPE, SP, TE and WAL and species richness at TPN. AEM stated this was due to decreases at INUG in 2013 rather than absolute increases at the impact areas, where results were consistent with historical trends.

No trends were identified in the Baker Lake sites.

Conclusion: Phytoplankton results do not pose concern requiring amendments to the water license.

2.1.2.5 Benthic Invertebrates

Similar results to phytoplankton were observed for benthic invertebrates - decreases in total abundance were identified for most Meadowbank areas in 2013 due to anomalously high abundance at reference area INUG. These results are unlikely due to mining activity as total abundances in all areas were similar to respective baseline ranges and no associated decreases in taxa richness were observed at near-field areas (TPN, TPE, SP) in 2013.

Results in the Baker Lake sites were variable making it difficult to identify trends in benthic invertebrate community composition or richness. The historic presence of the Hamlet of Baker Lake makes it

impossible to identify a true baseline condition. Yearly sampling frequency used by AEM is sufficient to detect changes in the benthic community that may result from altered use of the lake due to mine related activities.

Conclusion: Benthic Invertebrate results do not pose concern requiring amendments to the water license.

2.1.3 CREMP Design Considerations

These comments follow from a review of Appendix B2 – Core Receiving Environment Monitoring Program (CREMP), Design Document, Version 1 (Dec. 2012).

2.1.3.1 Sampling Frequency

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-I7
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Zooplankton Sampling**
References:	Appendix B2, Sampling Frequency
Issue / Concern and Rationale:	AEM has indicated a violation of the water license condition requiring monthly water quality samples. We are sympathetic to this violation based on our understanding of challenges faced by arctic environmental sampling. Statements such as *"Sampling in June, October and early November is highly dangerous due to thin ice conditions"* reflect AEM's understanding of these challenges. Six months (April, May, July, Aug, Sept, plus November or December) of full water chemistry data for the annual period was proposed to support BACI analyses of the aquatic environment. AEM has also proposed collection of "basic field water quality data" in nearfield areas (i.e., TPN, TPE, SP and eventually Wally) at least once mid-winter. AEM has provided a useful rationale for sampling frequency of each parameter based on expected response time to mine impacts. • Water quality – up to 6x/year • Phytoplankton – up to 6x/year in open water season samples • Sediment – yearly • Benthic invertebrates – yearly • Zooplankton and periphyton – discontinued due to variability in data collected to date
Technical Comment:	We find this distribution of samples to be acceptable as it adequately characterizes both under ice conditions and the open water. However, we are concerned that zooplankton and periphyton sampling will be discontinued. While we recognize that zooplankton sampling is not required by EEM under MMER, 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. Please include zooplankton as part of the AEMP for the project.

2.1.3.2 Threshold development

AEM provides more detail for the selection of trigger and threshold values used in the CREMP. We find no issue with those selected for water and sediment quality parameters. Significantly greater clarity is provided for the selection of biological indicator trigger and threshold values. Critical effect sizes (CES) were used for biological variables using the CCME water quality guideline derivation process, general risk assessment practice in Canada and site-specific toxicity test procedures used by British Columbia as precedents. This logic is used to permit an impact on a small proportion of the exposed population. Examples given include 1) an effect size of 5%[2] for CCME water quality guidelines and 2) an effect size of 20% in the BC site-specific toxicity tests.

AEM has selected 20% as the trigger to account for natural variability in biological populations; an effect size of 50% has been set as the threshold value. This is acceptable.

2.1.3.3 Experimental Design

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-18
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Depth Samples**
References:	Appendix B2, Experimental Design
Issue / Concern and Rationale:	Depth water quality samples are not proposed for Meadowbank. They were collected in 2009-2010, to determine the potential importance of differences in measurements associated with depth but the magnitude of differences associated with depth was minimal compared to the magnitude of differences occurring naturally between samples and stations. AEM did document an earlier response of elevated TSS in Third Portage Lake resulting from dike construction. Concentrations during the curtain breach were elevated at surface but above the threshold for acute lethality to fish at depth, as shown in the special investigations undertaken by Azimuth in response to the silt curtain breach. Consistent sampling at depth may better inform mitigation decisions through increased probability of detection of any episodic changes to water quality. This point will be further discussed in KIA-IR 23, Seepage at ST-16 and Lake NP2
Technical Comment:	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.

Sediment sampling design consists of both cores for chemistry and grab samples for particle size. We find no issues with the sediment sampling experimental design relevant to the water license.

[2] *5% is the effect size selected by the CCME when the species sensitivity distribution procedure is used to derive a Type A water quality guideline. AEM has indicated an effect size of "10% or less" which, while not incorrect, misrepresents the magnitude of an accepted size by the CCME.*

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-19
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Statistical comparison of Biological Monitors**
References:	Appendix B2, Experimental Design
Issue / Concern and Rationale:	The use of Before-After-Control-Impact (BACI) analysis is an appropriate analysis framework to evaluate potential impacts in a particular lake or basin over a particular time period. It is also effectively used to identify long-term trends in data. Benthic invertebrate and phytoplankton sample and statistical design are not problematic. We acknowledge the low statistical power of phytoplankton sample comparison resulting from high natural variability. Similarly as stated by AEM: *"zooplankton variables are not realistically capable of detecting effects in a given year"*. However, we disagree with AEM's decision to remove zooplankton from the CREMP.
Technical Comment:	Biological monitoring is inherently variable but can be partially addressed using an approach recommended by Wiens and Parker[3] 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. We recommend use of the Wiens and Parker approach in addition to the BACI assessment for biological monitoring results (benthic invertebrates, phytoplankton, zooplankton).

3. Review of Management Reports and Plans

3.1 APPENDIX B3- WATER QUALITY MONITORING AND MANAGEMENT PLAN FOR DIKE CONSTRUCTION AND DEWATERING, VERSION 4 (APRIL 2010)

This plan provides details of water quality monitoring and management actions specifically related to the dike construction and dewatering activities at the Meadowbank mine. The plan does not cover complementary monitoring of limnological parameters in Second Portage Lake (as part of the Fish- Out Program) nor routine water quality monitoring of both Second and Third Portage lakes (as part of the Aquatic Effects Management Program).

AEM discussed the breaches of silt curtains in 2008 and 2009 during construction of the East Dike. The following mitigation measures were proposed for construction of the Bay-Goose Dike.

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

- Minimize water current out of the construction area to reduce potential for outflow of turbid water; this will be done by 1) slow-pace winter construction of a causeway about 25 m wide (the downstream portion of the dike), and 2) open-water installation of pumps in front of the rock platform deposition creating a no-current to inward-current zone inside the curtains. With the presence of the causeway, pumping water out from inside of the 'impoundment' should create an average negative pressure and will cause 'clean' water to move through the causeway into the impoundment.
- Provide a wind-breaker to protect turbidity curtains against the effects of high winds; this will be achieved by winter construction of the same causeway as mentioned above. Since the causeway is the downstream portion of the dike, it will be the same height as the dike. The concept of the causeway was developed based on observations from the 2009 wind storm event that the integrity of the inner curtain portion closer to the rock platform was not affected by wind activity.
- Reduce the height and length of the curtains as much as possible to make them less prone to breakage from wind action; this will be achieved by 1) installation of the inner turbidity curtains in small cell-like patterns along the causeway to prevent wholesale breakage of the curtain due to effect of high winds, and 2) installation of outer curtains, as much as possible, in depths of no more than 10 m to reduce the effects of high winds.
- Deploy turbidity curtains downstream from deep lake depressions to minimise escape of sediments below the curtains.
- Reduction of the TSS loading inside the turbidity curtains; this is achieved by 1) the above mentioned pumping of water in front of the rock platform construction, and 2) pumping of water from the trench (the water with the highest TSS concentrations), both to be treated at the dewatering water treatment plant.

Conclusion: Review of the CREMP indicates that TSS and turbidity was successfully managed during construction of the Bay-Goose dike using the outlined mitigation techniques.

AEM further states that additional monitoring occurs in response to the silt curtain breaches noted in 2008 and 2009: "*A turbidity meter will be used to perform the analysis at each station. One or two times per day a vertical profile will be conducted at each station, at two meter intervals. All values are recorded but for compliances purposes only the maximum value in the profile is used."*

3.2 APPENDIX B6- WATER QUALITY AND FLOW MONITORING PLAN, VERSION 3 (JULY 2014)

The Plan is one component of the Aquatic Effects Management Program (AEMP) and is closely associated with the Water Management Plan.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-20
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Lack of Event Monitoring Discussion**
References:	Appendix B6, Event Monitoring Appendix B7 Appendix B9
Issue / Concern and Rationale:	A critical aspect of the water management plan is event monitoring. The reader is directed to Appendix B6 - Meadowbank Gold Project Spill Contingency Plan (November 2013); and Appendix B9 - Meadowbank Gold Project Emergency Response Plan (August 2013). Event monitoring has not been addressed in these appendices.
Technical Comment:	AEM should include the event monitoring requirements in Appendix B7 and Appendix B9 as discussed in Appendix B6.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-21
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Monitoring Parameters**
References:	Appendix B6, Event Monitoring Water License, Schedule I, Monitoring Group
Issue / Concern and Rationale:	AEM has proposed to simplify the number of monitoring groups used at each sample site. The parameters included in each group are acceptable. This list has been presented in both Appendix B6 and as part of the Water License. Use of adequate detection limits is a common problem when assessing environmental data. Detection limits used for silver, cadmium and total phosphorus are often too high to allow for a useful assessment of environmental conditions. We also note that weak acid dissociable (WAD) cyanide has not been included in all parameter groups where cyanide will be assessed.
Technical Comment:	We request 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 APPENDIX B9 - SPILL CONTINGENCY PLAN, VERSION 4 (NOV. 2013)

<table>
<tr><td>Comment Source:</td><td>Kivalliq Inuit Association</td></tr>
<tr><td>Comment Number:</td><td>KIA-22</td></tr>
<tr><td>Project:</td><td>Meadowbank Project Water License Renewal</td></tr>
<tr><td>Comment From:</td><td>Kivalliq Inuit Association</td></tr>
<tr><td>Comment For:</td><td>Agnico Eagle</td></tr>
<tr><td>Reviewer:</td><td>Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.</td></tr>
<tr><td>Subject:</td><td>Impact of violating obtainable freshwater limit</td></tr>
<tr><td>References:</td><td>Appendix B9, What is a Spill?
Appendix B9, Materials and reportable (to regulatory authorities) spills,</td></tr>
<tr><td>Issue / Concern and Rationale:</td><td>The plan provides guidance for addressing a spill and a hierarchical framework to progress through a spill response. Chemicals stored on site are described and a list of response equipment and locations is provided.

Materials and reportable (to regulatory authorities) spills on site are described. The substances and compulsory reporting amounts are provided in Table 1 of the appendix:

Table 1 - Spill quantities that must be reported to the NT-NU 24-HOUR SPILL REPORT LINE
<table><tr><th>Transportation Class</th><th>Type of Substance</th><th>Compulsory Reporting Amount</th></tr><tr><td>1</td><td>Explosives</td><td>Any amount</td></tr><tr><td>2.1</td><td>Compressed gas (flammable)</td><td>Any amount of gas from containers with a capacity exceeding 100 L</td></tr><tr><td>2.2</td><td>Compressed gas (non-corrosive, non- flammable)</td><td>Any amount from containers with a capacity exceeding 100 L</td></tr><tr><td>2.3</td><td>Compressed gas</td><td>Any amount</td></tr><tr><td>2.4</td><td>Compressed gas (corrosive)</td><td>Any amount</td></tr><tr><td>3.1, 3.2, 3.3</td><td>Flammable liquid</td><td>100 L</td></tr><tr><td>4.1</td><td>Flammable solid</td><td>25 kg</td></tr><tr><td>4.2</td><td>Spontaneously combustible solid</td><td>25 kg</td></tr><tr><td>4.3</td><td>Water reactant solids</td><td>25 kg</td></tr><tr><td>5.1</td><td>Oxidizing substances</td><td>50 L or 50 kg</td></tr><tr><td>5.2</td><td>Organic peroxides</td><td>1 L or 1 kg</td></tr><tr><td>6.1</td><td>Poisonous substances</td><td>5 L or 5 kg</td></tr><tr><td>7</td><td>Radioactive substances</td><td>Any amount</td></tr><tr><td>8</td><td>Corrosive substances</td><td>5 L or 5 kg</td></tr><tr><td>9.1 (in part)</td><td>Miscellaneous substances</td><td>50 L or 50 kg</td></tr><tr><td>9.2</td><td>Environmentally hazardous</td><td>1 L or 1 kg</td></tr><tr><td>9.3</td><td>Dangerous wastes</td><td>5L or 5 kg</td></tr><tr><td>9.1 (in part)</td><td>PCB mixtures of 5 ppm or more</td><td>0.5 L or 0.5 kg</td></tr><tr><td>None</td><td>Other contaminants</td><td>100 L or 100 kg</td></tr></table>Note: L = litre; kg = kilogram; PCB = polychlorinated biphenyls; ppm = parts per million.

Seepages have not been considered spills under the spill contingency plan. We are concerned that seepages like that from the waste rock storage facility to Lake NP2 was not immediately reported when changes were detected at sampling station ST-16.</td></tr>
<tr><td>Technical Comment:</td><td>We request 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.”</td></tr>
</table>

We otherwise find the spill contingency plan currently in place acceptable for renewal of the water license.

3.4 APPENDIX B18 - 2013 WATER MANAGEMENT REPORT AND PLAN, VERSION 1 (MARCH 2014)

3.4.1 Water Management Plan and Water Balance

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-23
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Impact of violating obtainable freshwater limit**
References:	Appendix B18, 3.2.1Water Management Plan and Water Balance
Issue / Concern and Rationale:	AEM outlines the water management strategy stating *"At Meadowbank, there are three major sources of water entering into the water management system: freshwater pumped from Third Portage Lake, natural pit groundwater inflow and freshet flows. The water is removed from the system through the following mechanisms: water treatment plants at the attenuations ponds (Portage ATP and Vault ATP), trapped in the capillary voids of the tailings fraction and ice entrapment at the TSF, East Dike seepage discharge into Second Portage Lake and water trapped within the in-pit central wasterock disposal area voids.* *The AEM water balance is subdivided into the following sections: Fresh Water from Third Portage, Reclaim Tailings Water, Mill, North Cell TSF, South Cell TSF, ATPs (Portage and Vault), Portage Pit, Goose Pit, Water Transfers and East Dike Seepage pumped to Portage. The following sections will discuss each item and their inherent parameters."* The strategy continues to outline exactly how water was used, a critical point in understanding why the current maximum quantity of obtainable freshwater outlined in the existing water license was exceeded in 2013 and earlier years. AEM attributes exceedances of the 700,000m^3/year license limit to *"problems associated with the booster pump and the reclaim barge at the North Cell TSF"*. The impact of the additional draw on Third Portage Lake is not discussed nor are the implications of unused reclaim water on the TSF capacity.
Technical Comment:	AEM should 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.

3.4.2 Water Quality Modelling Report

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-24
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Modeling Results and Mitigation**
References:	Appendix B18, Water Quality Modeling Report, Appendix D – Water Quality Report
Issue / Concern and Rationale:	Condition Part E Item 6 of the existing water license requires AEM to compare predicted (originally modelled during the NWB Type A License) water quality parameters in the pits to actual measurements. Total cyanide has been modeled rather than free cyanide as is regulated by the CCME. The summary of water quality in the pits is presented in Table 4.1 from the Water Management Report and Plan below. The full SNC Water Quality Report is presented in Appendix D – Water Quality Report.
Technical Comment:	AEM should 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. Furthermore, AEM should 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.

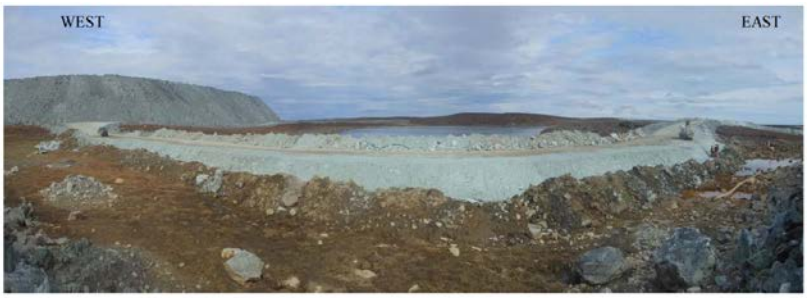
Table 4.1: Comparison of originally predicted pit water quality versus SNC(2014) modelled water quality

	CCME	Portage Pit (mg/L)				Goose Pit (mg/L)			
Parameter	(mg/L)	Original Prediction		SNC, 2014		Original Prediction		SNC, 2014	
		Probable	Possible Poor end Scenario	Aug 2017	Dec 2025	Probable	Possible Poor end Scenario	July 2015	Dec 2025
Total Cyanide (CN)	0.005 as free CN	-	-	0.00	0.00	-	-	0.00	0.00
Copper (Cu)	0.004	0.0014	0.013	0.0042	0.06	0.001	0.001	0.0048	0.28
Iron (Fe)	0.3	-	-	0.00	0.006	-	-	0.00	0.029
Ammonia (NH3)	0.86 (mg N/L)	0.00057	0.0006	0.212	0.97	0.0006	0.0006	0.2956	3.38
Nitrate (NO3)	2.9 (mg N/L)	2.60	4.40	0.00	0.26	4.00	4.00	0.00	1.13
Chloride (Cl)	120	630	630	0.00	12.97	440	440	0.00	51.61

Grey shading indicates exceedances of CCME guidelines

Comparison of total cyanide concentrations to the free cyanide guideline is sufficiently conservative. Free cyanide is a component of the total thus use of the free cyanide guideline would over represent the risk posed to aquatic life. Mitigation would be required at lower concentrations of free cyanide.

The full SNC water quality report outlines the potential for elevated copper and ammonia concentrations in the pits after reflooding. This poses a risk to aquatic life in Third Portage Lake which will mix with pit water once water levels are equivalent to Second Portage Lake and the dike is breached. The water license stipulates that this will not occur until pit water quality meets CCME criteria.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-25
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Seepage at ST-16 and Lake NP2**
References:	Appendix B18, Appendix D – Water Quality Report
Issue / Concern and Rationale:	This report details AEM's response to the seepage discovered at the ST-16 site in Lake NP2 from the rock storage facility. The interim till plug was located on the upstream side of the access road to the North Cell Ditches, between the Waste Rock Storage Facility (RSF) and the NP2 lake. A staff gauge was been placed at the seepage location to determine and visually quantify the water level increases. AEM has instructed a water truck to pump the water and dispose of it in the tailings pond should water levels become too high on the upstream side of the till plug as seen in Appendix A Figure 10.  *Figure 10: photo of the final result of the entire till plug from West to East. The actual pumping station and the 2 active seepage channels are visible on the eastern abutment.*
Technical Comment:	As indicated in HESL 2014[4], we conclude that both Golder and AEM have followed a reasonable approach in response to the seepage detected at ST-16. Monitoring ST-16 and Lake NP2 during and after the 2014 freshet will confirm if the mitigation measures were successful.

[4] *Hutchinson Environmental Sciences Ltd. 2014. Review of Golder Assessment on RSF Seepage Issue at Meadowbank. Prepared for the Kivalliq Inuit Association.*

3.5 APPENDIX B19 - DEWATERING DIKE : OPERATION, MAINTENANCE AND SURVEILLANCE MANUAL, VERSION 3 (SEPT. 2013)

This document includes procedures for the operation, maintenance and surveillance (OMS) of the Dewatering Dikes at the Meadowbank Gold Project. These structures are: East Dike, Bay-Goose Dike, South Camp Dike, and Vault Dike. AEM has stated that the East Dike and Bay- Goose Dike are rated as "High" consequence of failure structures based on the potential for loss of life and "High" economic loss. The South Camp Dike and Vault Dike are rated as a "Significant" consequence of failure structure based on a temporary risk to workers, and classified as "Low" due to economic loss. This is based on Table 1.2 of the report.

Table 1.2 Classification of Dams in Terms of Consequences of Failure (CDA 2007)

Dam Class	Population at Risk [Note 1]	Incremental losses		
		Loss of Life [Note 2]	Environmental and Cultural Values	Infrastructure and Economics
Low	None	0	Minimal short-term loss No long-term loss	Low economic losses; area contains limited infrastructure or services
Significant	Temporary only	Unspecified	No significant loss or deterioration of fish or wildlife habitat Loss of marginal habitat only Restoration or compensation in kind highly possible	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes
High	Permanent	10 or fewer	Significant loss or deterioration of *important* fish or wildlife habitat Restoration or compensation in kind highly possible	High economic losses affecting infrastructure, public transportation, and commercial facilities

Comment: We agree with AEM's consequences of failure rating for the Meadowbank dewatering dikes.

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-26
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Depth sample collection for Dike Monitoring**
References:	APPENDIX B19
Issue / Concern and Rationale:	AEM discusses the East Dike - Seepage Collection System stating its purpose is to collect and convey seepage and runoff away from the downstream toe area; and allow measurement of seepage through the dike. It was installed to capture and pump the seepage water that started in September 2011. Despite the potential risk posed to aquatic life, detection of seepages during construction rely on visual monitoring in combination with installed thermistors and piezometers for dike integrity. Assessment of TSS and turbidity concentrations are not conducted. In a previous HESL (2013[5]) review, TSS were reported to escape the silt curtains by movement beneath or between the curtain panels during routine operations and extremely high TSS values were recorded in a deep plume of TSS in Third Portage Lake in late August 2009. Elevated TSS was potentially acutely lethal at depth but not at the surface. TSS also escaped the silt curtains in the fall of 2008 during construction of the East Dike. Reliance of visual inspections alone may be insufficient to detect implications of the TSS seepage of September 2011 allowing AEM to employ mitigation measures in a timely manner. AEM states regarding water quality that *"Water quality of the seepage and runoff collected in the sumps and ditches at the toe of the Dewatering Dikes is to be monitored during operations. Daily inspections during dewatering and weekly inspections during operation are required as an indicator of dike performance to note whether seepage water is clear, cloudy or if fine material is present."* As part of the seepage monitoring during operations, AEM also states "*the water quality should be monitored daily by visual observations for sediments (turbidity).*" Visual inspection should document sediment, ice or snow deposits in the ditches and sumps. This represents the detail of water quality monitoring which is employed during mine operation as described in the manual. Further water quality monitoring will occur during dewatering as described in the water management plan as per the Water License.
Technical Comment:	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

[5] *Hutchinson Environmental Sciences Ltd. 2013. KIA Compensation Claim for Sediment Releases at Meadowbank Site Prepared for the Kivalliq Inuit Association.*

	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 We understand that AEM has taken daily profiles using a hand held turbidity meter during dike construction downstream of the silt curtains. We request a turbidity profile is 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.

3.6 APPENDIX B20 - TAILINGS STORAGE FACILITY: OPERATION, MAINTENANCE AND SURVEILLANCE MANUAL, VERSION 3 (SEPT. 2013)

Comment Source:	Kivalliq Inuit Association
Comment Number:	KIA-27
Project:	Meadowbank Project Water License Renewal
Comment From:	Kivalliq Inuit Association
Comment For:	Agnico Eagle
Reviewer:	Richard A. Nesbitt, Hutchinson Environmental Sciences Ltd.
Subject:	**Anomalous Thermistor or Piezometer Reading Response**
References:	APPENDIX B20, 6.2.2 Anomalous Readings
Issue / Concern and Rationale:	AEM has provided a response progression when anomalous readings are recorded from thermistors or piezometers used to monitor the tailings storage facility (TSF). Operators are instructed to *"increase monitoring frequency to assess progression of [the] anomaly"* if they are able to confirm readings are not a relic of the instrumentation. While this is the appropriate response it provides no assurance monitoring will be sufficiently increased to detect failures that may results in increased seepage. This concern is bolstered by delayed detection of the seepage from the waste rock facility bordering the northeast side of the TSF.
Technical Comment:	We request 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.