Environment Canada Environnement Canada

ENVIRONMENT CANADA'S INTERVENTION TO THE NUNAVUT WATER BOARD

RESPECTING RENEWAL OF THE MEADOWBANK GOLD PROJECT TYPE "A" WATER LICENCE

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APRIL 2015

Canada

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1.0 Preamble

Agnico Eagle Mines Ltd. (AEM, or the Proponent) submitted their application to the Nunavut Water Board (NWB, or the Board) for renewal of their Type A Water Licence (2AM-MEA0815) on July 23rd, 2014. Following the completeness review, the NWB gave notice of the commencement of the technical review period on Nov. 24, 2014. Environment Canada (EC) has participated in that review process, providing technical review comments to the NWB on Dec. 24, 2015, and attending the Technical Meeting and Pre-Hearing Conference held in Baker Lake Jan. 14-15, 2015

This submission summarizes the results of EC's review of the renewal Water Licence Application, and reflects ongoing discussions with AEM and information and commitments provided by AEM throughout the review process.

As a result of these discussions, EC is pleased to note that there are no outstanding issues from the technical review. The following section outlines the areas where resolution was achieved, and the full table of technical comments (now all resolved) is attached as "Appendix A".

EC would like to acknowledge the proactive and professional manner with which AEM and their consultants have approached the review process, and the collaborative approach taken to work through outstanding issues. EC also acknowledges the role of the NWB staff in facilitating this through the technical meetings and Pre-Hearing Conference.

The scope of specialist or expert information or knowledge provided by EC in this submission to the NWB is within EC's mandate as defined by the *Department of Environment Act* and through other legislation assigned to the Minister of the Environment. It is important to note that the *Fisheries Act*, the *Canadian Environmental Protection Act, 1999* (CEPA 1999), the *Species at Risk* Act, the *Migratory Birds Convention Act*, and regulations made under these Acts, are applicable to the Project and binding on the Proponent.

2.0 EC's Technical Review Comments

EC's review encompassed the NWB (2AM MEA0815) Type A Water Licence Renewal Application - Main Supporting Document and included the draft proposed water licence, and the management plans which fell under EC's mandated interests.

2.1 Draft Water Licence Conditions:

EC reviewed the draft water licence terms proposed by AEM, and has identified areas where EC's recommendations have been made for revisions, and where EC agreed with AEM's suggested revisions. Details are provided in "Appendix A" for items EC-01 to EC-17; all of which are noted as resolved.

Of these items, two required follow-up work to reach resolution or conclusion:

Item EC-04 was an area of concern, regarding the inclusion of licence criteria for major ions (Total Dissolved Solids or TDS) for discharges from the Tailings Impoundment Area.

The Meadowbank Gold Project does not propose to discharge any effluent from the Portage site mining and milling operations to the receiving environment (other than dike seepage) as storage in the Goose Pit is now available. Although no further effluent discharge from the main mine final discharge point ST-9 is contemplated, licence effluent criteria will be maintained in the renewal Licence. Following discussions at the Technical Sessions and Pre-Hearing Conference, agreement was reached with AEM to have a limit for major ions, i.e. discharge criteria for TDS. The NWB noted that although there are no discharges planned, this would keep the options open for the Proponent, rather than having to modify the licence to discharge from ST-9 at the main mine effluent outfall, if it became necessary. No TDS limit is contemplated for the other existing discharges (Vault and the dike seepage).

EC recommends for the NWB's consideration using 1400 mg/L as a conservative discharge limit for TDS from the Meadowbank Gold Project. Because of the potential for toxicity above this concentration, this would be both the Maximum Grab and Monthly Average Concentration limit.

EC received email confirmation from Stephane Robert, Manager, Regulatory Affairs, AEM on Feb 19, 2015 that AEM was comfortable with the proposed limit.

Item EC-09 noted EC's concerns with the licence wording for the Aquatic Effects Monitoring Plan (AEMP) conditions, and agreement was reached with AEM on a revised wording for the NWB's consideration, as follows:

> *PART I: CONDITIONS APPLYING TO GENERAL AND AQUATIC EFFECTS MONITORING*
>
> *1. The Licensee shall comply with the Aquatic Effects Management Plan (AEMP) and Core Receiving Environmental Monitoring Program (CREMP) as approved by the Board (including updates) and in accordance with Schedule I.*
>
> *The AEMP shall include:*
> *a. Comprehensive receiving environment monitoring to identify changes to the aquatic environment associated with mine activities;*
> *b. Linkage between monitoring results and adaptive management response;*
> *c. Monitoring of lake productivity;*
> *d. Sampling and analysis plans; and*

e. *Monitoring under Fisheries Authorizations, NWB Licence Compliance Monitoring, Metal Mining Effluent Regulations (MMER) Environmental Effects Monitoring, and Groundwater Monitoring.*

2.2 Plans and Reports

EC's review of the various plans and reports submitted with the water licence renewal application identified a number of comments and recommendations to be incorporated into ongoing updates of the plans. These are noted in "Appendix A" as items EC-18 to EC-29 and EC-32 to EC24, inclusive. AEM has made commitments or provided information which has resulted in all these being noted as resolved.

2.3 Closure

AEM seeks a ten year licence term, which under the current mine plan would span the transition from operations to closure, and beyond into post-closure monitoring. EC has emphasized the importance of using monitoring and updated modeling to inform closure planning, particularly of the open pits (items EC-30 and EC-31). AEM has committed to continue monitoring and update water quality models for the pits on an annual basis. EC considers these items as resolved.

3.0 Conclusions

EC acknowledges and appreciates the efforts that AEM has taken to address technical concerns and issues raised by interveners, and to proactively manage and mitigate potential effects through monitoring and adaptive management.

EC looks forward to participating in the ongoing licence reviews, and thanks the NWB for this opportunity to provide input to the Meadowbank Gold Project Type A Water Licence Renewal Application.

Appendix A: EC's Items of Concern

TC #	Reference to Comments	Proponent's conclusion / statement	EC's Comment / Rationale	EC's Technical Comment	AEM response to Technical Comments	Resolution
EC-01	Draft Water Licence Section E6		This clause needs rewording to reflect when an action plan would actually be implemented. Canadian Council of Ministers of the Environment (CCME) guidelines may not always be the best objective (noting that not all parameters have guidelines) so further detail on setting objectives for dike breaching would be appropriate.	"The Water Management Plans shall include an action plan *to be implemented* if predicted reflooded pit water quality indicates treatment is necessary. The dike will not be breached until the water quality in the reflooded area meets CCME Water Quality Guidelines for the Protection of Aquatic Life*, baseline concentrations, or appropriate site specific water quality objectives.* Subject to Board approval, if water quality parameters are above CCME guidelines, a site specific risk assessment must be conducted *to identify water quality objectives that are protective* of the aquatic environment.	AEM agrees with EC's recommended changes to the text.	***Resolved***
EC-02	Draft Water Licence Section E7		Wording changes suggested.	"The Licensee shall submit a Water Quality Model for pit reflooding as part of the Water Management Plan which shall be re-calibrated as necessary, and *updated* at a minimum of once every two (2) years *during Operations*. The results and implications of the predictive model shall be reported to the Board."	AEM agrees with EC's recommended changes to the text.	***Resolved***
EC-03	Draft Water Licence Section E8		Deletion is acceptable with the amendments to E6 and E7			***Resolved***

EC-04	Draft Water Licence - Section F.2 and F.3.	The 2013 AEMP reports water chemistry for the Meadowbank Lakes. Total Dissolved Solids (TDS) in Third Portage Lake and Second Portage Lake	The expiring licence does not include discharge criteria for major ions. At this point in the mine life further effluent discharge is not planned, but there may be operational changes that occur with mine expansion. Consideration should be given to adding TDS, nitrate, and SO4 to the regulated criteria.	EC suggests further discussion on the addition of TDS, nitrate, and sulphate discharge criteria.	At this point AEM believes the strategy for monitoring TDS, nitrate and sulphate is adequate. AEM currently monitors all of these parameters in the CREMP receiving environment monitoring and compares them to relevant limits including the CCME water quality guideline for the protection of aquatic life. The effluent monitoring program (for discharges at ST-9 and ST-10) is based on MMER requirements, toxicity testing and stipulates standard decision criteria for management actions. AEM's position is that MMER requirements are protective of the environment, that the receiving environment is thoroughly monitored under the CREMP and that EC's recommended addition is not necessary.	***Resolved*** AEM is not opposed to the inclusion of effluent criteria for TDS for sampling location ST-9 should a discharge occur in the future. EC has provided a recommendation of 1400 mg/L for the EQC based on review of the effluent quality and receiving environment.
EC-05	Draft Water Licence - Section F14		The proposed rewording would require all liquid wastes whether hazardous or otherwise, to be removed. Reword.	"The licencee shall remove from the project site, all *solid and liquid* hazardous Wastes…"	AEM agrees with EC's rewording.	***Resolved***
EC-06	Draft Water Licence Section F23	Change discharge limit for Pb to 0.1mg/L	Agree for land discharges; add soil testing to closure plan for discharge areas.		AEM agrees and will include soil testing in these areas in the final closure and reclamation plan.	***Resolved***
EC-07	Draft Water Licence Section F23	Narrow applicability to fuel storage locations	Agree; if only applicable to fuel sites then do not need to test for ammonia and cyanide.	Remove ammonia and cyanide	AEM agrees with EC as this is only applicable to secondary containment sites that are storing diesel, gasoline, Jet A or Jet B fuel.	***Resolved***

EC-08	Draft Water Licence - Section F24b	No change proposed.	The MMER do not include *the Daphnia magna* bioassay as a regulated test, and EC suggests that the Daphnia test be moved to the monitoring section of the licence rather than kept as a regulated criteria. EC notes that there have been periodic fails of the Daphnia test, and it is important to gain an understanding of what is causing those failures.	EC recommends that the Daphnia bioassay test be included in Schedule I rather than in Section F.	AEM agrees with the change proposed by EC.	***Resolved***
EC-09	Draft Water Licence Section I1		The AEMP clause wording should be updated. Delete consultation from main clause. The list is also awkward and could be improved.	"…shall conduct the AEMP and CREMP as approved by the Board" – now that they are developed do we need to list consultation? The AEMP shall include: a. Comprehensive receiving environment monitoring to identify changes to the aquatic environment associated with mine activities; b. linkage between monitoring results and adaptive management response; c. Monitoring of lake productivity; d. sampling and analysis plans; and e. (as is)	AEM agrees with the changes proposed by EC. The plan has been developed and is now in the implementation stage.	***Resolved*** Revised wording suggested by EC for the NWB consideration.
EC-10	Draft Water Licence Section J6			"if practicable" rather than "if possible".	AEM agrees with the change proposed by EC.	***Resolved***
EC-11	Draft Water Licence - Definitions		Update CCME guideline – delete "Freshwater"		AEM agrees with the change proposed by EC.	***Resolved***
EC-12	Draft Water Licence		Should the operations landfill definition have the reference to year 9 removed as there may be a mine life extension?		AEM agrees. This reference should be removed.	***Resolved***

EC-13	Draft Water Licence Schedule 1 Table 1 Group 1		Delete ammonia (redundant to ammonia-Nitrogen as dependent on pH and ambient temperature); add nitrite. Any hits on total CN should trigger analysis of free CN and WAD CN, or these could be added to the list. Add phosphorus and orthophosphate to track discharge loadings.		AEM agrees and will revise the Freshet Action Plan to note that any hits on total CN will trigger additional follow up and analysis of free CN and WAD CN if practicable. AEM request that EC justify request with supporting information showing issues of concern justifying parameters (phosphorus and orthophosphate) requested.	***Resolved*** EC agrees with AEM that phosphorus and orthophosphate do not need to be added to Schedule 1, Group 1, Table 1.

EC-14	Draft Water Licence Schedule 1 Table 1 Group 2		Add WAD CN 10		AEM's strategy for cyanide monitoring includes complementary monitoring of both the receiving environment and effluent. As proposed in the renewal, AEM will continue to monitor total cyanide and free cyanide in the receiving environment as part of the CREMP. Our approach is consistent with KIA and EC's recommendation to ensure that receiving environment sampling includes the bioavailable/toxic forms of cyanide. To that end, the CREMP includes free cyanide (in addition to total cyanide), which is consistent with CCME's water quality guideline for the protection of aquatic life (i.e., based on free cyanide). The effluent monitoring program (for discharges at ST-9 and ST-10) is based on MMER requirements, which includes characterization of total cyanide and toxicity testing and stipulates standard decision criteria for management actions. AEM's position is that MMER requirements are protective of the environment, that the receiving environment is thoroughly monitored under the CREMP and EEM and that the recommended addition of CN WAD is not necessary. AEM request that EC justify request with supporting information showing issues of concern justifying parameter requested.	***Resolved*** AEM agrees to monitor for WAD-CN at monitoring stations in the receiving environment subject to Schedule 1, Table 1, Group 2 for any hit on Total CN above 0.05 mg/L.

EC-15	Draft Water Licence Schedule 1 Table 1 Group 4		Remove CN (not needed here). If adding TPH, oil and grease will be redundant.		AEM agrees with the removal of CN for this group. AEM agrees, in adding TPH. Therefore oil and grease is redundant and AEM agrees that oil and grease be removed.	***Resolved***
EC-16	Draft Water Licence Schedule 1 Table 1 Group 4		MMER should be clarified to say "acute toxicity (Rainbow Trout and *Daphnia magna*)" – the licence requirement is written to include the daphnia as a non-acutely toxic test as well as the trout, so either list both, or neither. Add line "Acute lethality" and specify the two tests (trout and daphnia).		AEM agrees with this text change.	***Resolved***
EC-17	Draft Water Licence Schedule 1 Table 2		Keep Vault Pit Lake separate as ST-26 with monthly frequency during flooding.		AEM agrees with this text change.	***Resolved***
EC-18	Appendix B4 Groundwater Monitoring Plan 3.3 Pit Wall Seeps	The report indicates that one method for groundwater sampling that will be used at Meadowbank is sampling directly from pit wall seeps.	EC notes that although this method would provide a water sample, the sample could contain a mixture of both groundwater and lake water, not will not be a true representative groundwater sample.	EC recommends that it be acknowledged during reporting that any samples taken from the pit walls are not true groundwater samples and that any conclusions drawn from these samples take into account that an undetermined portion of the sample is likely to be lake water.	AEM will acknowledge this in the annual reporting.	***Resolved***

EC-19	Appendix B4 Groundwater Monitoring Plan 4.2 Quality Assurance/Quality Control	The QA/QC procedures include methods for data handling and methods for collecting duplicate samples. However, this section does not include mention of either trip blank or field blank samples as part of the QA/QC procedures.		EC recommends that both trip and field blanks be included in the groundwater monitoring plan.	AEM will revise the groundwater monitoring plan within 60 days of issuance of the License to include both trip blanks and field blanks.	***Resolved***
EC-20	Appendix B5 Quality Assurance/Quality Control (QA/QC) Plan, Version 2 July 2014 Section 2.1.4 Preservation	Table 2-1 outlines sampling requirements including preservatives. Preservatives are added to the sample bottles by the laboratory, or added by the technician after filling, as directed by the analytical laboratory.	The QA/QC plan is to be prepared according to the 1996 guidance document *Quality Assurance (QA) and Quality Control (QC) Guidelines for use by Class "A" Licensees in Meeting SNP Requirements and for Submission of a QA/QC Plan* (INAC and the NTWB). Table 2-1 is not in agreement with the guidelines (Appendix 1) for a number of parameters with respect to bottle type, time of filtering, or preservatives.		AEM seek clarification from AANDC on the validity of the almost 20 years old Guidelines.	***Resolved*** EC and AEM suggest that this condition be reworded to state that: The QA/QC plan shall be prepared and updated as needed in accordance with current Standard Methods and in consultation with the accredited laboratory conducting the analyses.
EC-21	Appendix B5 Quality Assurance/Quality Control (QA/QC) Plan, Version 2 July 2014 Section 2.2.4 Table 2-1	Table 2-1 outlines sample handling and volumes.	EC notes that some of the protocols vary from those recommended by the EC lab.	The following vary and should be reviewed: • Volume required for ammonia-N and TKN should be 250 mL rather than 125 mL; if particulates in sample then 1000 mL. • Holding time for chlorine is 6 hours rather than 48; should be analyzed in the field. • pH should be analyzed in the field. • Preservatives used for sulphides analysis should be shown (AcZn + NaOH)	AEM will review EC's comments and recommendations with the certified laboratory that provided this table. AEM use certified laboratory and use their protocol.	***Resolved***

EC-22	Appendix B5 Quality Assurance/Quality Control (QA/QC) Plan, Version 2 July 2014 Section 2.2.5 Field Duplicates and blanks	One field duplicate, one filter blank and one field blank are collected for a) every 10 samples (i.e. duplicate samples are taken for 10% of the samples), b) each sampling event or c) once per year as shown in Table 2.2		Field and trip (travel) blanks as well as duplicate field samples should be collected at a frequency of 5-10% of the total number of samples, and this should be shown as a minimum level of QA/QC sampling effort. EC questions if this would be the case with the option of having only annual field duplicates for mine facilities and attenuation ponds. Also, trip blanks should be periodically done at all sampling sites; this is a way to check contamination from sample bottles, caps and preservatives during transport, storage and analysis.	AEM will review EC's comments and recommendations and revise Table 2-2 of the QA/QC plan within 60 days of issuance of the License.	***Resolved***
EC-23	Appendix B6 Water Quality and Flow Monitoring Plan Figure 2-2	The figure indicates that monitoring will take place at sample station ST-16 to monitor runoff and seepage from the Portage Waste Rock Storage facility, however, it unclear from the figure that if similar monitoring strategy is to be undertaken for the Vault Waste Rock Storage Facility.		EC recommends that seepage and runoff from the Vault Waste Rock Storage Facility be collected and monitored if not already being done.	AEM agrees and is monitoring runoff from the Vault Waste Rock Storage facility.	***Resolved***
EC-24	Appendix B6 Water Quality and Flow Monitoring Plan 3.3.2.1 CREMP Threshold and Trigger Levels	A brief overview of how both threshold and trigger levels were developed is provided in the report.	It would be helpful to include the list of the final values that were developed for these triggers and thresholds.	EC recommends inclusion of the specific threshold and trigger levels in the report as these don't appear to be included in either the AEMP or the Water Management Plan.	AEM agrees and will update the CREMP design document and submit within 60 days of issuance of the License.	***Resolved***

EC-25	(Duplicated in EC-30)					

EC-26	B18 Ammonia Management Plan Section 1	Section 1.0, Introduction, identifies two sources of ammonia at the mine site that can contribute to the mobilization of ammonia in the groundwater or surface runoff: (i) Blasting of ammonium-nitrate (AN) explosives, and (ii) Cyanidation process used in gold mining operations. Section 3.2, Ammonia Pathway, describes a closed loop system during the operation of the Tailings Storage Facility (TSF) in which the mill effluent provides an ammonia loading to the TSF reclaim water, which is then pumped to the mill for re-use. The plan states that there will be no discharge of reclaim water to the environment during this period. The ammonia concentration is expected to gradually increase in the TSF reclaim pond over time. It is forecast to increase to 111 mg N/L in the North Cell by 2016 and 119 mg N/L in the South Cell by 2018. By comparison, the water	Estimating the total loading of ammonia/nitrogen to the receiving environment is an important component of an ammonia management plan. EC notes that the Ammonia Management Plan for this project is lacking estimates of ammonia/nitrogen loading. Such loading estimates should be calculated for both project infrastructure and the receiving environment. Further, EC notes that, in addition to the two sources of ammonia identified in the Ammonia Management Plan (i.e. AN explosives and cyanidation process), a third potential source of ammonia for this project is sewage.	EC recommends that the *Ammonia Management Plan* be updated to include the following additional information: • Estimate of ammonia/nitrogen loading to all mining infrastructure designed to contain mine water and mine waste. These estimates should include consideration of the cyanidation process, the use and management of explosives, and sewage management. • Estimate of ammonia/nitrogen loading to the receiving environment in relation to this project. Loading calculations should account for deposits to receiving water bodies, as well as any seepage or runoff associated with project activities.	AEM not agrees to update the Ammonia Management Plan as estimated of ammonia loading are made in the water quality model include in the Appendix B17 - 2013 Water Management Plan and Report.	***Resolved*** AEM agrees to provide a revised Ammonia Management Plan which outlines ammonia tracking practices (i.e. sump and effluent monitoring) and includes a section that details a regular inspection program. The inspection will be conducted in blasting areas and explosives product storage facilities (to ensure that explosives products are stored in sealed container and there is no spillage). The revision will also reference regular review of analysis results.

EC-27	Appendix B10 - Operational ARD/ML Testing And Sampling Plan Version 2 (Nov.2013) 2.3: RSF Design	The Proponent states that "*RSFs are designed to minimize the potential for ARD and ML. The Portage RSF is constructed to encapsulate PAG waste rock inside a layer NPAG material as a control measure for ARD.*	If the PAG material is not far inside the NPAG material, it may not provide effective encapsulation for the PAG material.	EC recommends that the proponent state how far inside or the thickness of the NPAG that will provide encapsulation for the PAG material. Also, EC recommends that the proponent state the final height of the RSF above ground.	Currently the waste rock storage facility has 4 meters of NPAG capping. AEM is currently working with RIME and consultants to ensure that the design controls for ARD in the tailings storage facility and waste rock storage facility encapsulation projects and freeze control strategies are effective. As per the Type A water license, final reclamation and closure plans will be provided 1 year prior to closure. Currently the final height of the Portage Waste Rock Storage Facility is between 95 – 105 m above ground level.	***Resolved***
EC-28	Appendix B10 - Operational ARD/ML Testing And Sampling Plan Version 2 (Nov.2013) 3.1.2 QA/QC (Page 12)	The Proponent states that there will be "…quarterly analysis of a minimum of 75 duplicate samples by an accredited external lab for full ABA to verify the onsite lab's accuracy with these determinations and confirm correlations. This includes samples of Iron Formation (IF), Intermediate Volcanic (IV) and Ultramafic (UM) rock types."	Table 2-1 lists the anticipated ARD/ML potential of waste rock types at Meadowbank Mine with "All pits tailings", "Portage and Goose IF and QZ" showing high potential to generate ARD; however no samples from the Quartzite (QZ) unit were selected for analysis in external Lab full ABA for verification.	EC recommends that the proponent provide its rationale for not selecting Quartzite (QZ) samples for external lab full ABA when it was shown that it has a high potential to generate ARD.	Pit samples are collected for every 4 holes and we evaluate the carbon and sulfur content onsite. This allows us to immediately evaluate the ARD potential, segregate the rock accordingly (PAG versus NPAG Waste Rock Facility) and then the onsite samples are checked against the 75 samples submitted to the accredited lab per year. Quartizite rock no longer occurs (as it was primarily located in the central portage pit) or if so, it is very rarely encountered. It is for this reason that AEM did not record samples of quartzite (QZ) in table 2-1 for external lab analysis.	***Resolved***

EC-29	Appendix B10 - Operational ARD/ML Testing And Sampling Plan Version 2 (Nov.2013) 3.3.1 Waste Rock Sampling (page 14)	The Proponent states "*Composite samples are not to be used because they confuse the data and render it more difficult for use in model creation or comparison."* TABLE A.1: shows the Summary of ARD/ML Potentials of Meadowbank Waste Types	In Table A.1 it is not readily clear why there were no metal leaching (ML) tests (Not Analyzed (N/A)) for the Lake Sediment and Q waste types when the percentage of PAG is 73 and 86 respectively. Using MMER metal exceedance as a yardstick to interpret kinetic test leachate results may not be appropriate because the kinetic test is defined as an analysis to determine change and rate of metal leaching. It is likely that over time the concentration of metals in the leachate will increase therefore using MMER exceedance at the time of test to determine metal leaching may underestimate the ability of the waste type to leach metals. AEM stated earlier (3.3 FIELD METHODS; 3.3.1 Waste Rock Sampling page 14) that "Composite samples are not to be used because they confuse the data and render it more difficult for use in model creation or comparison". However, the proponent used composite samples for the Vault and Portage/Goose IV samples	EC recommends that the proponent provide an explanation why composite samples were used for the kinetic tests when the proponent has earlier said that composite samples will not be used because it would confuse the data.	AEM requests clarification on EC's recommendation. The composite kinetic testing was done for baseline characterization based on rock type and was used assist in the ARD determination and planning. As stated in the plan, all samples submitted for ARD are discrete from blast pattern drill cuttings using ABA analysis. Composite samples are not used for operational segregation of PAG or NPAG but for verification purpose only.	***Resolved***

EC-30	Appendix B17 – 2013 Water Management Report and Plan 3.3 – Pit Reflooding Operation	Once the south cell of the tailings storage facility becomes operations and ceases use as an attenuation pond the Goose pit will serve as the attenuation pond for water originating in the Portage Pits. This water will start the reflooding process for the Goose Pit and once flooding is complete for both the Goose Pit and the Portage Pit, the dikes will be breached to Third Portage Lake.	Although the report indicates that the dikes will not be breached until water quality meets the CCME criteria, the potential water quality in the Goose Pit is of concern. Contingency and potential treatment measures should be thoroughly evaluated as the water quality is expected to be above CCME criteria.	EC recommends that water chemistry and hydrologic dynamics of the Goose Pit attenuation pond be closely monitored and that contingency measures, and potential treatment options be evaluated, such as treatment of water prior to deposition in Goose Pit	AEM agrees and will continue to monitor the pit water quality and model on an annual basis to ensure that pit water quality will meet CCME limits and ultimately protect aquatic biota, prior to breaching the dikes. This will inform AEM prior to breaching and deposition in Goose Pit what water treatment methods may be required.	***Resolved***

EC-31	Appendix B17 Water Management Report and Plan, Version 1; March 2014 Table 4.1: Comparison of originally predicted pit water quality versus SNC (2014) modelled water quality	As per Table 4.1, Comparison of Originally Predicted Pit Water Quality Versus SNC (2014) Modelled Water Quality, water quality forecasting indicates that both Portage Pit and Goose Pit will exceed the CCME guidelines for ammonia by 2025. Based on current water quality and the 2013 water balance, the report identifies that ammonia and copper may require removal treatment in order for the pit water quality to meet CCME criteria in 2025. The report identifies several recommendations.	It is not clear from Table 4.1 whether forecasting was done for the interval between 2015 and 2025. Another time point forecast would help to assess the various recommendations. In addition, the Proponent should comment on whether they expect the pits to stratify and stay stratified after closure.	In order to better understand how pit water quality will change over time, EC recommends conducting additional water quality forecasting for the interval between 2015 and 2025. EC also recommends including a discussion regarding whether pit stratification is expected and, if so, for what duration.	AEM agrees. AEM will continue to monitor the pit water quality and model on an annual basis to ensure that pit water quality will meet CCME limits and ultimately protect aquatic biota, prior to breaching the dikes. In 2015, AEM will evaluate if stratification of the pit is expected, this evaluation will be submitted to the NWB in the final closure plan i.e. one year prior to closure.	***Resolved***

EC-32	Appendix B18 Ammonia Management Plan, Version 1; Feb. 2013 Section 2.1.1 Explosive Storage	Section 2.1.1, Explosive Storage, states "*Storage of explosive products will be located at the mine site emulsion plant area. The explosive products arrive by barge at the Baker Lake marshalling area. They are then transported by ground to the emulsion plant located at the Meadowbank mine site.* *The emulsion plant area is located approximately four kilometers north of the mine plant and camp site, and is accessible from the All Weather Private Access Road (AWPAR). This area consists of an emulsion plant for the preparation of bulk emulsion explosives, two buildings for the storage of AN, and four explosive magazines along the access road to the plant.* *Explosive products at the storage facilities are packed in sea containers, which limit the possibility of spillage. The products are only removed from these containers at the mine site emulsion plant area. Surface areas are graded to collect water runoff within the storage facilities."*		EC recommends this plan is updated to include a discussion on the use of secondary containment to minimize the loss of ammonia during use, storage, transport, and handling of explosives for this project.	AEM believes the actions currently taken to control and minimize the loss of ammonia during use, storage and transport is adequate.	***Resolved*** Please refer to EC-26 comment.

EC-33	Ammonia Management Plan, Version 1; Feb 2013 Section 3.3: Monitoring	Section 3.3, Monitoring, states that "*Concentrations of ammonia, nitrate and nitrite are parameters that are monitored on a monthly basis as part of this sampling campaign of the TSF reclaim water at station ST-21.* *In the Water Quality Forecasting for the Portage Area 2012-2025 Report (610756-0000-4OER-0002), a maximum ammonia concentration in the TSF reclaim water is evaluated in order to meet the CCME guidelines for the Protection of Aquatic Life in the Portage and Goose Island Pits once flooding activities are completed. If this concentration is exceeded before the end of the flooding operation, measures could be undertaken to lower the ammonia concentration, as well as nitrate and nitrite if required, in the TSF reclaim pond prior to the transfer of TSF reclaim water to the pits.* *Ammonia treatment technologies that could be further investigated if the need arises, include: i) Biological nitrification / denitrification during the summer months. ii) In-situ volatilization of ammonia during the summer months. iii) Ammonia removal by snow making."*	Given the problems with trying to do snowmaking at Ekati's Misery site, EC has concerns with attempting ammonia removal by snow making. In addition, the in-situ volatilization of ammonia during the summer months could result in air quality issues.	EC recommends that further ammonia treatment options are explored.	AEM will provide assessment for alternatives ammonia treatment in the final closure plan i.e. one year prior to closure.	***Resolved***

EC-34	Appendix B20 - Tailings Storage Facility: Operation, Maintenance and Surveillance Manual, Version 3 (Sept. 2013) 6.2.3 Seepage Monitoring (page 42)	The proponent states "*If the anomalous seepage measurement is confirmed, a detailed review of the effects of the increased seepage should be carried out based on the specific inspection and design or remedial actions should be implemented if determined necessary by the Engineering Superintendent also an increased monitoring frequency to assess progression of anomaly.*"	Please note that seepage is defined under MMER as effluent, and as such whenever seepage is detected during inspection it will need to be managed as effluent from the mine site that should be discharged through a final discharge point (FDP).	EC recommends that the manual should include how seepages would be managed by collecting the seepage, pumped to a treatment facility, treated if necessary and discharged through a designated FDP, given that it is an effluent from the mine site.	AEM will update the Tailings Storage Facility Operation, Maintenance and Surveillance Manual to include these recommendations within 60 days of issuance of the License.	***Resolved***
EC-35	Appendix B21 - Mine Waste Rock And Tailings Management Plan, Version 1 (March 2014). Updated Mine Waste Rock And Tailings Management Plan 2013 6.2 Waste Rock Facility Management (page 47)	The Proponent states **"***the cover material would be coarse to allow the development of convective cooling during winter, and insulation through trapped air within voids during summer. Given the high evaporation rate and low annual average precipitation at the site, the average annual infiltration into the pile is expected to be low".*	1. If the coarse nature of the cover material allows convective cooling air to flow through during winter to encourage freezing as noted by the proponent, it should be noted though that the oxidation of sulphide is an exothermic reaction that may generate enough heat to thaw out the zone of the pathway which the convective air flows through and as such may not stay frozen hence potential initiation of ARD. In addition, it is arguable that the same porous nature that allowed convective air during the winter will also allow convective air during the summer that will provide the oxygen necessary for the oxidation of sulphide once there is enough moisture present. 2. The Proponent further states that Most of the waste rock (90%) from the Vault deposit is NAG and water quality modeling concluded that the Vault RSF is not expected to require capping. As a precautionary measure, any PAG material encountered at Vault will be capped with NAG waste rock as dumping proceeds.	1. EC requests further detail on the predicted thermal behavior of the waste rock pile, with supporting information from other such facilities in the North. 2. EC requests clarification on how the PAG material will be capped within the Vault RSF to be able to isolate the PAG material such that any infiltration through the uncapped part of the RSF will not migrate and access the PAG material under the cap.	AEM agrees and is currently working with Research Institute in Mines and Environment (RIME UQAT) and consultants to ensure that the design controls and plans for ARD in the tailings storage facility and waste rock storage facility encapsulation projects and freeze control strategies are effective. AEM will provide details in the final reclamation and closure plans i.e. 1 year prior to closure.	***Resolved***

EC-36	Appendix B22 Operation and Maintenance Manual: Sewage Treatment Plant, Version 4; April 2013 Section 3.4: Normal Operational and Maintenance Procedures	Section 3.4, Normal Operational and Maintenance Procedures, states that "*Food and other kitchen grease are removed from the sewage in the kitchen via a grease trap. The grease trap is manually cleaned to keep this material out of the sewage treatment plant influent and the recovered grease co-disposed with the mill tailings (TSF) or placed in the camp incinerator.*	EC notes that manufacturers warn against the incineration of kitchen grease because it leads to destruction of the refractory insulation and shortens the life expectancy of the equipment. In addition, the grease contributes a high level of energy to the incineration system which could lead to incomplete combustion of material. Incomplete combustion is linked to the generation of pollutants, including dioxins and furans.	EC recommends that the Proponent revise this plan to remove the option of incinerating grease.	AEM does not incinerate food and other kitchen grease. The grease from the grease trap is co-disposed with the mill tailings in the Tailings Storage Facility. AEM will update the Operation and Maintenance Manual; Sewage Treatment plant to reflect the current practices onsite and will include these recommendations within 60 days of the issuance of the License.	***Resolved***