Preliminary Repsonse to Technical Comment for the AEM NWB Water License 2AM-MEA0815 Renewal							
Authorities	**TC #**	**Reference to Comments**	**Proponent conclusion / statement**	**Authorities Comment / Rational**	**Authorities Technical Comment**	**AEM response to Technical Comments**	**Agree to TC**
EC	EC-01	Draft Water Licence Section E6		This clause needs rewording to reflect when an action plan would actually be implemented. 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.	Yes
EC	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.	Yes
EC	EC-03	Draft Water Licence Section E8		Deletion is acceptable with the amendments to E6 and E7			Yes
EC	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 paramters 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.	No
EC	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.	Yes
EC	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.	Yes
EC	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.	Yes
EC	EC-08	Draft Water Licence - Section F24b	No change proposed.	The MMER does 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.	Yes
EC	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.	Yes
EC	EC-10	Draft Water Licence Section J6			"if practicable" rather than "if possible".	AEM agrees with the change proposed by EC.	Yes
EC	EC-11	Draft Water Licence - Definitions		Update CCME guideline – delete "Freshwater"		AEM agrees with the change proposed by EC.	Yes
EC	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.	Yes
EC	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.	No
EC	EC-14	Draft Water Licence Schedule 1 Table 1 Group 2		Add WAD CN		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.	No
EC	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.	Yes
EC	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.	Yes
EC	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.	Yes
EC	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.	Yes
EC	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.	Yes
EC	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.	No
EC	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.	Yes

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EC	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.	Yes
EC	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.	Yes
EC	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.	Yes
EC	EC-25	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. This information will be in the Final Reclamation and Closure Plan on year prior of closure.	Yes
EC	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 licence limit and the CCME guideline are 16 and 0.86 mg N/L, respectively. Eventually, the contents of the reclaim pond will be transferred to the pits (beginning in 2015, according to the Water Quality Forecasting Update for 2013-2025). The Ammonia Management Plan describes pathways by which blasting residuals and product may be mobilized. The largest potential source of ammonia in mine water will be from explosive residue from blasting. From the description provided, it appears that ammonia mobilized from these sources will be captured either in an attenuation pond or in the TSF.	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.	No
EC	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.	Yes
EC	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 evaluated 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.	Yes
EC	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.	No
EC	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.	Yes
EC	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.	Yes

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EC	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.	No
EC	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.	Yes
EC	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.	Yes
EC	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.	Yes
EC	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.	Yes
AANDC	A1	Interim Mine Closure and Reclamation Plan Section 3.3.6.3	Section 3.3.6.3 of the Interim Closure and Reclamation Plan provides the planned reclamation approach and the associated activities. It has been stated that 'The Portage WRSF will be covered by a layer of NPAG rock to ensure geochemical stability by insulating PAG materials and keeping the waste rock frozen'.	AANDC is concerned that how rock cover can 'insulate' PAG with large voids in it. The potential ingress of air (oxygen) coupled with moisture (water) can oxidize sulphide minerals and instigate acid generation process. The freeze control strategy adopted by the proponent is principally dependent on the climate conditions. The potential temperature rise due to climate change and/or global warming may have adverse effects on frozen PAG materials. As a result, acid rock drainage (ARD) can be a source of water pollution issues for surface water bodies and ground water. The proposed approaches to prevent ingress of air (oxygen) and moisture (water) should be documented. The degree of effectiveness of the proposed cover system in terms of ARD control should be determined based on up-to-date scientific knowledge.	Proponent is requested to provide the details of the proposed strategies to prevent water pollution issues. In order to cope with potential water contamination, the degree of effectiveness of the proposed cover system in terms of ARD control should be determined based on up-to-date scientific knowledge. In addition to the thermal monitoring program, an action plan based on scientific analysis should be submitted to NWB.	AEM agrees with AANDC. In 2013, AEM began working with Research Institute in Mines and Environment (RIME - UQAT) and consultants to ensure that the design controls for ARD in the tailings storage facility and waste rock storage facility encapsulation project and freeze control strategies will be effective and use the most up to date scientific knowledge. This, alongside using the most up- to- date climate change models will ensure sources of water pollution are controlled to protect nearby waterbodies and groundwater. This details will be submitted in the final reclamation and closure plan one year prior to closure.	Yes
AANDC	A2	Interim Mine Closure and Reclamation Plan Section 3.3.6.3	Section 3.3.6.3 of the Interim Closure and Reclamation Plan states that 'Investigations and cover trials will be conducted to verify this thickness layer, and adjustments to the closure design will be made as appropriate.'	Proponent has planned to implement rock fill cover at (approximately 4 meter of thickness) the entire site. The rationale behind the assumed thicknesses' should be scientifically analyzed.	AANDC requests that the proponent provide a detailed analysis for waste rock layer thickness, since 4 m is an 'assumed thickness'. Additionally, the proponent is requested to document the variables used in 'cover trials' including thickness of layer, size distribution of rock fill material, environmental conditions, etc.	See AEM response to AANDC comment A.1	Yes
AANDC	A3	Interim Mine Closure and Reclamation Plan Section 3.3.6.3	Section 3.3.6.3 of the Interim Closure and Reclamation Plan states that 'Some of the Portage and Goose Pit waste rock will also be backfilled into a completed portion of the Portage Pit, to be flooded at closure.'	AANDC is concerned about the technical feasibility and design of the proposed water cover system. Water cover system design parameters (water depth analysis, wind erosion, particle re-suspension, etc.) and a maintenance plan should be analyzed in detail.	The proponent should provide a detailed analysis of the water cover system. Such systems also require maintaining a specified depth of water all the time over the PAG material. In addition to other technical considerations (e.g., main lake at closure), the proponent will also need some sort of mechanism to compensate the evaporation loss.	See AEM response to AANDC comment A.1	Yes
AANDC	A4	Interim Mine Closure and Reclamation Plan Section 3.3.7.3	Section 3.3.7.3 of the Interim Closure and Reclamation Plan states that 'Tailings management approach for long term stability and control of ARD involves encapsulation of tailings in permafrost. The tailings will be allowed to freeze after deposition and to remain frozen after closure. A closure cover will be placed to insulate the frozen tailings and to protect against erosion.'	In the absence of proponent's technical proposal regarding final cover system for tailings, such speculations are required to be justified. AANDC is concerned the possible temperature rise and/or climate change/global warming. Other tailings management approaches should also be considered for the selection of a technically feasible and environmentally acceptable approach.	AANDC requests that proponent provide a detailed design of the final cover system (s) to deal with potential acid generation processes due to possible temperature rise. Measures to control surface and underground water pollution due to potential precipitation and/or surface runoff should be documented. AANDC also requests that the proponent consider other tailings management approaches in conjunction with the proposed approach. A detailed comparison and analysis of different tailings management techniques is highly recommended.	See AEM response to AANDC comment A.1	Yes
AANDC	A5	Interim Mine Closure and Reclamation Plan Section 3.3.7.3	Section 3.3.7.3 of the Interim Closure and Reclamation Plan states that 'Closure will include the placement of an erosion barrier consisting of a 4 m thick layer of NPAG ultramafic waste rock over the tailings. The surface of the final cover will be graded to blend into the existing topography to allow for surface drainage.'	AANDC is concerned that no rock (being used) is totally NPAG. Surface runoff may dissolve metals and can contaminate underground water and surface water. AANDC is further concerned that how the surface of the final cover will be graded? If soil will be used then it must be tested for its physical properties including hydraulic conductivity in compacted state and load bearing capacity etc. Chemical properties of the proposed soil are also required to be documented to ensure compatibility of soil with metals, etc. The chemical interaction of the proposed soil (as cover material) with the rock material (being used) will dictate the technical feasibility of the proposed approach for tailings management.	AANDC requests that the proponent provide details on final cover system design and technical analysis of the surface drainage issues. AANDC request proponent to provide report on physical and chemical interaction of the proposed soil (as cover material) with rock material. Such analysis will dictate the technical feasibility of the proposed methodology for the tailings management. Pursuant to Part J, item 6 of the Licence, The Licensee shall implement progressive reclamation, including progressive covering of the tailings and revegetation (where feasible).	See AEM response to AANDC comment A.1. Furthermore, AEM has started progressive closure (including but not limited to the 4m NPAG capping of the portage waste rock storage facility, design of the north cell tailings capping and AEM will begin construction in 2015, and refloodng of Goose Pit will begin in 2015). All progressive closure activities are reported annually in the NWB Meadowbank Annual report.	Yes
AANDC	A6	Interim Mine Closure and Reclamation Plan Section 3.3.7.3	Section 3.3.7.3 of the Interim Closure and Reclamation Plan states that 'If water in the Reclaim Pond is not suitable for release, a water treatment plant may be necessary, this plant would be installed at the mill to treat the water prior to release in the Portage Pit Lake.'	AANDC is concerned about the water treatment technology being adopted at the site. Water treatment technology is required to be analyzed in terms of contaminant removal efficiency.	Pursuant to Part F of the Licence, the Licensee is required to comply with the discharge limits. AANDC request proponent to provide the details on water treatment system being adopted in terms of contaminant removal efficiency vs discharge limits.	AEM agrees with AANDC. 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. This will inform AEM what water treatment methods may be required prior to or during refloodng. This details will be submitted in the final reclamation and closure plan one year prior to closure.	Yes
AANDC	A7	Interim Mine Closure and Reclamation Plan Section 3.3.7.1	Section 3.3.7.1 of the Interim Closure and Reclamation Plan states that 'closure objectives include minimize wind migration of tailings dust'.	The statement needs explanation that how wind migration will be minimized. What steps will be taken to ensure dust suppression, etc.?	AANDC recommends that proponent provide details on strategies being adopted for dust suppression and control.	AEM is working with consultants to address dust control during closure. As per the Type A water license Part J condition 3 a final reclamation and closure plans will be provided at least 1 year prior to closure and will include steps to ensure dust is controlled.	Yes

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AANDC	A8	Interim Mine Closure and Reclamation Plan Section 3.4.1.2	Section 3.4.1.2 of the Interim Closure and Reclamation Plan states that 'Thermistors have been (and more are scheduled to be) installed within the Portage WRSF to monitor the rock cover freezing and performance. The results will be used to evaluate the predicted thermal response of the WRSF with the actual thermal response. Results to date from the thermistors indicate that freeze back is occurring in the WRSF structures'.	The Proponent has installed instrumentation for temperature measurement within the Portage WRSF. It has been confirmed that freeze back is occurring in the WRSF structures. The details on the planned control strategies to prevent migration of leachate from PAG rock storage areas and tailings storage areas in case of temperature rise have not been mentioned.	The proponent should provide management plans to deal with expected or un-expected temperature rise conditions. The proposed steps to prevent leaching of contaminants from WRSF structures are required to be documented.	See AEM response to AANDC comment A.1.	Yes
AANDC	B1	Report on Waste Rock Storage Facility (WRSF) Seepage	Golder Associate's report- Construction Summary Report Rock Storage Facility- Interim Till Plug	The report provides details for the construction of the Interim till plug located on the upstream side of the access road to the north cell ditches, between the waste Rock storage facility and the NP-2 lake. The till plug is constructed to block seepage coming from the RSF to go into NP-2 lake.	Pursuant to Part D, item 1, the Licensee is required to provide final design and construction drawings stamped and signed by a Professional Engineer. AANDC request proponent to provide the desired documents stamped by a professional Engineer.	AEM will provide stamped drawings to NWB in its' 2014 annual report submission.	Yes
AANDC	B2	Report on Waste Rock Storage Facility (WRSF) Seepage	The proponent states that 'The till plug is constructed of low permeability till material placed on a granular filter layer against the rockfill road. This structure is considered to be physically stable. In terms of seepage control, the performance of the til plug and the associated pumping keeping a low water level in the sump at the sampling station ST-16 appears to be effective in managing seepage to Lake NP-2.'	Pursuant to Part D, Item 1, the proposed design needs to be stamped by a Professional Engineer.	AANDC request proponent to provide detailed design stamped by a Professional Engineer. The adequacy of implemented approach (till plug) for the long-term is also required to be ascertained to protect water resource.	AEM will provide stamped drawings to NWB in its' 2014 annual report submission.	Yes
AANDC	C1	Mine Waste Rock and Management Plan	The Executive Summary of the Mine Waste Rock and Management Plan states that, 'Tailings are placed sub-aerially as slurry and water from the pond is reclaimed during operation. The tailings deposition strategy is to build beaches against the faces of the perimeter dikes to push the pond away, and ultimately produce a tailings surface that directs drainage towards the western abutment of the storm water dike.'	AANDC is concerned that the tailings surface will have significant potential of oxidation of sulphide minerals under 'no drainage' or 'low drainage' conditions. Low moisture content and oxygen ingress in tailings material can give rise to oxidation of sulphide minerals, resulting in an acid generation process. The potential release of metals and arsenic can impact surface and underground water (flow within active layer).	AANDC request proponent to consider the potential of acid drainage on the surface of sub-aerially as slurry under 'no drainage' or 'low drainage' conditions. Such conditions can jeopardize surface and underground water. The proposed approaches to prevent adverse environmental impacts are also required to be analyzed. These include but are not limited to monitoring of supernatant, ensuring isolation of closure cover, etc.	AEM agrees with AANDC. See AEM response to AANDC comment A.1.	Yes
AANDC	C2	Mine Waste Rock and Management Plan	The Executive Summary of the Mine Waste Rock and Management Plan states that 'A minimum 2-m thick cover of NPAG rock fill will be placed over the tailings as an insulating convective layer to confine the active layer within relatively inert materials.'	The exact types of NPAG rock fill in terms of % of acid generating potential are required to be mentioned and categorized. The cumulative effect of NPAG and ingress of moisture and oxygen through the cover can oxidize underneath PAG tailings. Furthermore, freeze control strategy need to be analyzed in light of thermal monitoring results.	AANDC request proponent to consider the thawing conditions due to temperature rise. What action plans are in place to deal with such thawing conditions?	AEM agrees with AANDC. See AEM response to AANDC comment A.1.	Yes
AANDC	D1	Water LIcence 2AM-MEA0815 Amendment Submission by Agnico-Eagle (issued on June 9, 2008) Part E, Item 8	Proponent has proposed a change in the Licence. It has been recommended that the following text be deleted. 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.	The proponent has reported that 'These proposed changes were discussed with NWB, KIA, AANDC and EC during a WebEx workshop held on November 28, 2013.'	AANDC requests confirmation of the history on this requested change. And, if the variations between predicted and measured water quality and quantity are maintained below 20 percent.	See AEM response to KIA concern for the historical request and refer to the November 28, 2014 meeting minutes and the presentation. AEM refers AANDC to Section 4.4 of the Meadowbank annual report which reports the variation of predicted to measured water quality and quantity within the pits. As is expected, water collected in the pit sumps (measured water quality and quantity) varies year to year. As an example, in 2014, water quantity in Portage Pit was -72% and Bay Goose was -121%, less than 20% predicted. In 2014, four parameters were identified to exceed the 20% relative percent difference of FEIS predicted versus measured water quality value, but the parameters vary by year, which reflects a natural variation. As discussed in the annual report, the water in these sumps is controlled onsite, sent to the reclaim pond and the data is used during the annual review of the water quality predictions to inform pit reflooding. As discussed on November 28th, this will assist AEM in determining water treatment requirements prior to or during reflooding.	Yes
AANDC	D2	Water LIcence 2AM-MEA0815 Amendment Submission by Agnico-Eagle (issued on June 9, 2008) Part F, Item 6 and Part F Item 23	Proponent has proposed a change in the Licence. It has been stated that, 'AEM is proposing to have consistent discharge limits required for discharge from fuel containment facilities to land – see Part F Item 23'	AANDC is concerned that such consistencies may alter the original spirit of the licence. Proponent has proposed to delete all the parameters in the table including Lead (ug/L). The proponent has further recommended change in units for 'Lead' from 1 ug/L to 0.1 mg/L in Part F, Item 23. AANDC has concerns as under, 1. 1ug/L is equal to 0.001 mg/L	AANDC request proponent to keep the original spirit of the licence items and correct the units and concentrations accordingly. If proponent wants consistency regarding units then 1ug/L is equal to 0.001 mg/L for Lead.	AEM refers AANDC to section 7 and 9 in AEM's application supporting document. Furthermore, AEM refers AANDC to Environment Canada technical comment EC-06. AEM proposes to remove Part F Item 6 related to fuel containment discharge to land and proposes to adopt Part F Item 23 for both the Baker Lake and Meadowbank fuel containment areas. AEM also proposes a consistent discharge to land effluent limit for lead (Pb) of 0.1 mg/L as all water from secondary containment areas are discharged to land. During the original license, discharge was planned to be collected and discharged directly into Baker Lake after being collected in a sump. However this design was not needed and therefore this limit is not relevant to the current operations.	No
AANDC	D3	Water LIcence 2AM-MEA0815 Amendment Submission by Agnico-Eagle (issued on June 9, 2008) Part H, Item 3	The licence states that, 'The Licensee shall prevent any chemicals, petroleum products or unauthorized wastes associated with the project from entering water.' The proponent has recommended a change in the licence as under, 'AEM proposes to remove this condition as it is stated in Part D, Item 29'.	AANDC is concerned about the deletion of this item since Part D of the licence is regarding 'conditions applying to new construction' and Part H is about 'conditions applying to Emergency response and contingency planning.	AANDC recommend not deleting the item.	AEM agrees with AANDC.	Yes
AANDC	D4	Water LIcence 2AM-MEA0815 Amendment Submission by Agnico-Eagle (issued on June 9, 2008) Schedule I –Conditions Applying to General and Aquatics Effects Monitoring Table 1- Monitoring Group	The proponent states that 'AEM proposes a slightly revised Group 1 list parameters to provide clarity and less redundancy in sampling parameters groups. Group 1 will apply to all mines items related to monitoring and has relevant long term contaminants identified in the original license and those identified in SNC 2014.'	AANDC is concerned since the original grouping was developed by the proponent based on the technical requirements at different zones at mine site. Now proponent has recommended several changes in original grouping. It is not understood that how the grounds are now changed based on which the original grouping was developed.	AANDC request proponent to elucidate the rationale behind the proposed changes in contaminant groups.	As stated in the supporting document Section 9, AEM is presenting monitoring groups that will reduce the numerous redundancies in the parameters list. As an example, in the original license, Group 1 encompasses the list of parameters listed in Group 2 (with the exception of TDS) and most of the parameters in Group 3 (with the exception of dissolved metals). Group 3 includes dissolved metals which are also included in Group 4 which is an even more extensive parameter list and is included in the new group proposed by AEM. AEM has proposed a parameter lists and groups that remains inclusive of all parameters as per the original grouping but reduces confusion and redundancy. AEM agrees the grounds for the original grouping and as a result AEM has not suggested deleting parameters, but rather grouping parameters based on their location to improve clarity and consistency.	Yes
AANDC	E1	Water Management Report and Plan 6. Rock Storage Seepage Water Management	The proponent states that 'AEM plans to develop a comprehensive plan to manage the seepage based on a combination of Golder's recommendations and AEM's internal Freshet Action Plan. Golder recommendations include: 1) AEM should continue to develop and maintain tailings beaches adjacent to RF1 and RF2 and to operate the Reclaim Pond towards the centre of the TSF. These are the key recommendations. 2) AEM should consider the installation of additional water management infrastructure which could take the form of a permanent collection and pumping system at the sampling station ST-16 current sump. Also, consideration should be given for contact water ditches and sumps in the surrounding areas of the RSF if additional seepages of contaminated water is observed in the future. 3) The seepage at station ST-16 should continue to be collected and redirected to the TSF and monitored (location, quantity, quality). Continued monitoring is strongly recommended during the winter for seepage water quantity monitoring and possible development of an ice plug in the RSF. The area at ST-16 should be kept clean of snow to allow visual observation and to ensure that water at ST-16 does not overflow over the till plug into Lake NP-2. 4) Regular inspections all around the RSF should be performed, particularly during freshet, to ensure that runoff or any observed seepage is controlled and monitored prior to being released into the environment if the analyses results meet the requirement. 5) AEM should continue to monitor the tailings and waste rock freeze back following the Thermistor Monitoring Plan in accordance with Part 1, Item 11 of the Type-A water license. 6) AEM should provide the results of the 2014 monitoring to Golder for review and comment.'	AANDC is concerned that the flow of tailings water through the RSF is complex to track without using an advanced technology. The recently installed thermistors in the RSF will allow monitoring of the ground temperatures only. Contaminant transport modeling can be conducted to determine the pathways of contaminants of concern (COC) or stressors of concern (SOC).	AANDC request proponent to develop an action plan to prevent possible water contamination as a result of thawing conditions. This will be in addition to temperature monitoring program.	See AEM response to AANDC comment A.1.	Yes
AANDC	F1	3.1.1 General Sampling and Analysis Program Table 3-1: Monitoring Program	The program prepared by the proponent indicates that the frequency water testing at ST-16 is 'monthly' during open water	In light of AANDC's inspector's report regarding ST-16, the frequency of testing is required to be increased. General monitoring program is no more valid for ST-16.	AANDC request proponent to revise their monitoring program for ST-16 in light of AANDC's Inspector's direction.	AEM has revised the monitoring plan in response to the ST-16 seepage by designing and implementing a Freshet Action Plan. AEM refers AANDC to the freshet action plan that outlines the revised monitoring program for ST-16.	Yes

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AANDC	BGC Eng. 5.1	Climat Annual Monitoring Report	The climate for a given year is not presented within the annual monitoring reports.	Climate data provide important input for interpreting site-specific geothermal aspects, such as the rate of mine waste freezeback and active layer thicknesses, for permafrost encapsulation of the mine wastes. In addition, the previous year's climate is useful for interpreting the hydrology and water balance for the site.	BGC recommends that the annual monitoring report summarize monthly climatic conditions at the Meadowbank site over a 12-month period. Data reported should include minimum/maximum air temperature, air thawing index, snowfall, and rainfall, including any intense, short-duration rainfall events. The monitoring report should discuss how the climate over the 12-month period compares to historical norms (e.g., relatively warm/average/cold or wet/dry). In the absence of long-term data at the mine site, comparisons can be inferred from nearby meteorological stations with a longer-term record, such as Environment Canada's station at Baker Lake.	AEM collects climate data since 2008. AEM will summarize monthly climate condition at Meadowbank site and include it in it's 2014 annual report	Yes
AANDC	BGC Eng. 5.2	TSF and RSF Freezeback Monitoring Annual Monitoring Reports; Mine Waste Rock and Tailings Management Plan	AEM's annual monitoring reports describe tailings freezing and capping thickness to satisfy the following requirements: -As required by NIRB Project Certificate No. 004, Condition 19… Report to NIRB's Monitoring Officer for the annual reporting of freezeback effectiveness, and -As required by Water Licence 2AM-MEA0815 Schedule B, Item 17: A summary of ongoing field trials to determine effective capping thickness for the Tailings Storage Facility and Waste Rock Storage Facilities for the purpose of long-term environmental protection. In the 2012 and 2013 annual monitoring reports, AEM provided interpretations of ground temperature measurements on Saddle Dam 1 and Saddle Dam 2 (thermistors installed in 2009 and 2010, respectively). The tailings were reported to be frozen, and the foundation soils and rock beneath the rockfill dike reportedly remained in a frozen state. Other thermistors have been installed more recently (since 2011) through the waste rock and tailings. The thermistor measurements are described in qualitative, factual terms, e.g., they are frozen or unfrozen (with 0°C as the marker for frozen/unfrozen).	The concept of permafrost encapsulation of mine wastes (PAG waste rock and tailings), which is being proposed for the Meadowbank Project, is technically feasible as a mitigative measure for managing ARD/ML in arctic mines, as discussed in INAC's 2007 *Mine Site Reclamation Guidelines for the Northwest Territories* . Current site conditions (climate and permafrost temperatures) are favourable for permafrost to aggrade into, and persist within, the proposed mine waste deposits. Further monitoring and analyses will be required to relate aspects of acid generation (oxidation potential), evaluate the potential effects of taliks within and below mine waste deposits, and assess the potential for cryo-concentration of solutes in tailings, including the collection and possible treatment of such impacted waters. Descriptions of the geothermal regime within the TSF and RSF in the annual monitoring reports and annual geotechnical inspections are merely factual, and are not described in the context of whether they met expected performance. BGC acknowledges that the water licence did not specify comparing measured versus predicted performance for the TSF or RSF. However, the Mine Waste Rock and Tailings Management Plan (specifically, Section 9: Thermal Monitoring Plan) describes that the thermal monitoring results in the TSF and RSF "… are and will continue to be used to evaluate the predicted thermal response of the facilities with the actual thermal response". As AEM readies to prepare its final closure and reclamation plan, AEM must demonstrate that permafrost encapsulation of the mine wastes is technically feasible, including considerations of future impacts from climate change or from exothermic heat potentially released by oxidation. Closure costs will be significantly influenced by the thickness (quantity) of NPAG cover that will be placed over the tailings and PAG waste dump to promote permafrost encapsulation of these mine wastes. Closure costs will also be impacted by the collection and treatment of tailings pore waters, and related monitoring, that may be expelled during tailings freezeback. AEM has collected and reported on over five years of temperature data that could be used to design the tailings and waste rock storage facilities, including cover thicknesses. Specific cover trials have yet to be initiated. To date, AEM has not assessed the available geothermal data, nor conducted geothermal analyses, to determine whether the measurements met expected performance or what the measurements tell us about the expected future permafrost conditions (i.e., distribution of permafrost temperatures, active layer thicknesses).	BGC recommends that the annual monitoring reports include the following: 1. A map showing the mean bathymetry of the reclaim pond over the monitoring year and the area(s) of the TSF and RSF in which complete freezeback has been confirmed by thermistor measurements, 2. Assessment of potential taliks under current water covers in tailings or thawed areas in waste rock relative to freezeback and cryo-concentration impacts, 3. Discussion of measured versus expected thermal performance and active layer thicknesses (related to seasonal ambient air temperatures), and 4. Interpretation of permafrost aggradation for all monitored instruments in the TSF and RSF (related to seasonal ambient air temperatures), including pore water pressure measurements within the TSF and RSF.	AEM request more clarification from AANDC.	No
AANDC	BGC Eng. 5.3	Permafrost Encapsulation of TSF and RSF Mine Waste Rock and Tailings Management Plan (Section 7.3.2, p. 48)	The management plan states that, "*If, during monitoring, it is found that the freezeback of the dike and tailings deposit are occurring at a rate less than predicted, then enhancement by artificial freezing methods may be considered*."	Neither the rate or extent of permafrost aggradation into the tailings or waste rock storage facilities that is required, or even expected, for design, are explicitly described in the renewal application. Artificial freezing of mine wastes may be a very expensive, and even impractical, undertaking, particularly during closure. Such contingency costs were not explicitly included in the 2014 closure and reclamation cost estimate.	BGC recommends that AEM clarify the design intent of permafrost encapsulation as a mine waste management strategy for the TSF and RSF. AEM must also clearly describe the benchmarks (e.g., rate and extent of freezeback, temperature of mine waste) that would trigger AEM to implement artificial freezing methods.	See AEM response to AANDC comment A.1.	Yes
AANDC	BGC Eng. 5.4	RSF Seepage 2013 Water Management Report and Plan (Appendix C: Rock Storage Facility Seepage)	The Summer 2013 RSF seepage incident indicated that water from the TSF flowed through the RSF and ultimately, into Lake NP-2.	BGC is of the opinion that the measures implemented by AEM in response to this event were appropriate for the short term. However, the incident showed that there were zones within the RSF that were either unfrozen, or if they were frozen, they were initially porous, with many air filled voids that did not prevent the flow of tailings seepage waters through the rockfill mass. Thus, it is possible that precipitation waters infiltrating the PAG stockpile may ultimately become released to the environment because the pore spaces are unfrozen and/or not ice filled.	BGC recommends that AEM carry out the following: 1. Install piezometers within the RSF, including for cover trials, to show the possible presence or levels of liquid water within the RSF. The measurements should be described and assessed in the annual monitoring reports as part of discussions on freezeback effectiveness, and 2. For the final closure and reclamation plan, conduct a water balance of the RSF, in terms of closure quantity and water quality, to determine closure water collection and treatment requirements. These items should be accounted for within the water balance and water treatment costs during closure.	See AEM response to AANDC comment A.1.	Yes
AANDC	BGC Eng. 5.5	Geochemistry/Oxidation Interim Closure and Reclamation Plan, Section 2.3.4.5, p. 24.	Mine tailings have both high potential for ARD and metals leaching (ML). Some of the pit rock have high potential for ARD, ML, or both.	Oxidation of mine wastes may cause exothermic reactions that could impact the rate of freezeback of the tailings and PAG waste rock or prevent full encapsulation of PAG materials in permafrost.	BGC recommends that studies be conducted, and/or thermistors be installed, in the TSF or PAG areas of the RSF to assess if oxidation reactions of PAG waste rock or tailings are impacting the rate of freezeback. Such studies should form part of the cover trials that are being planned.	See AEM response to AANDC comment A.1.	Yes

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AANDC	BGC Eng. 5.6	TSF and RSF Diversion Ditches at Closure Freshet Action Plan, Section 2.2.1: North Cell Tailings Storage Facility, pp. 11-19.	A number of diversion ditches have been constructed around the TSF and RSF to "*maintain their integrity and prevent any adverse environmental impacts* ".	Currently, portions of the diversion ditches are susceptible to ponding or erosion due to blockages from snow or ice, and require manual removal of the snow or ice with an excavator. It is unclear how the diversion ditches were sized and whether they are required during closure.	BGC requests clarification from AEM with respect to the requirement of water management structures around the TSF and RSF for closure. Design details, including hydrologic events for sizing of the channel and erosion protection requirements, should be included in the final closure and reclamation plan. Should snow and ice blockages need to be actively managed during closure, then those costs need to be specifically reflected in the closure cost estimate.	Design details will be submitted in the final reclamation and closure plan one year prior to closure.	Yes
AANDC	BGC Eng. 5.7	ST-16 RSF Seepage Management at Closure Freshet Action Plan, Section 2.4 RSF Seepage, pp. 20-21.	It is understood that a permanent pumping system was installed at sampling location ST-16 to minimize migration of RSF seepage across this area and into Lake NP-2. The till plug, installed against the rockfill road, was only designed and constructed as an interim measure to minimize RSF seepage through the rockfill road.	RSF seepage management measures for this area at closure are unclear.	As part of the final closure and reclamation plan, water management plans for this area should be clarified. If specific measures or monitoring are to be included, then they should be explicitly stated in the closure cost estimate.	Specific measures and monitoring for RSF seeapge will be submitted in the final reclamation and closure plan one year prior to closure.	Yes
AANDC	BGC Eng. 5.8	Closure Contingencies Interim Closure and Reclamation Plan, Section 3.5 Closure Contingency Activities, pp. 80-81; Meadowbank Gold Project – Update to 2014 Interim Closure and Reclamation Plan Cost Estimate Using Reclaim 7.0.	The Type-A Water Licence 2AM-MEA0815, Part J – Conditions Applying to Abandonment, Reclamation, and Closure, Item 1, requires that the interim closure and reclamation plan include contingency measures for all reclamation components, including action thresholds that are linked to the monitoring programs.	The contingency measures described in the interim closure and reclamation plan are general and not detailed, particularly with respect to action thresholds linked to the monitoring programs. Therefore, it is difficult to assess whether the possible contingency measures have been adequately costed or validated against the 15% contingency allowance provided in the reclamation plan cost estimate.	As part of the final closure and reclamation plan, action thresholds and performance measures should be clarified. Scoping-level costs associated with implementing these contingency measures should be worked out to validate that the contingency costs are adequately covered in the reclamation plan cost estimate.	AEM agrees.	Yes
AANDC	BGC Eng. 5.9	Site Specific Closure Criteria Interim Closure and Reclamation Plan	INAC's 2007 *Mine Site Reclamation Guidelines for the Northwest Territories* recommends that the Interim Closure and Reclamation Plan include specific closure criteria regarding reclamation components.	Many aspects of site-specific closure criteria have not been discussed in detail, such as: design hydrologic events for the design of water management structures; how climate change will be incorporated in the closure plan; design maximum credible earthquake for assessing structure stability; etc. Site-specific closure criteria will have a significant impact on engineered structures regarding both construction quantities and related costs. Following from this, it is likely that the costs developed for the final closure and reclamation plan will increase.	BGC recommends that the final closure and reclamation plan explicitly describe the design criteria for which structures are being designed for closure and reclamation.	AEM agrees.	Yes
AANDC	BGC Eng. 5.10	Interim Closure and Reclamation Plan, Other Deficiencies Interim Closure and Reclamation Plan	The 2014 Interim Closure and Reclamation Plan was reviewed relative to the content guidelines presented in INAC's 2007 *Mine Site Reclamation Guidelines for the Northwest Territories* .	The 2007 *Mine Site Reclamation Guidelines for the Northwest Territories* suggested that the following elements be included in the Interim Closure and Reclamation Plan: -Updated reclamation research plan, and -Renewed or updated descriptions of the likely post-reclamation risks to human and wildlife health and the environment relevant to the information available (Risk Assessments). These two elements were not presented in detail in the interim closure and reclamation plan.	BGC recommends that these elements be included in the final closure and reclamation plan.	AEM agrees.	Yes
AANDC	GC Eng. 5.11	Reclamation Plan Cost Estimate 2014 Updated Reclamation Plan Cost Estimate	Indirect costs for engineering and project management were each assumed to be 5% of direct costs. Indirect costs for contingency were assumed to be 15% of direct costs. The mobilization/demobilization (mob/demob) cost line item was estimated to be $4.8M, based on some barge access and camp accommodation costs only.	The basis for developing the indirect costs was not explicitly described and so cannot be audited. As mentioned in Section 5.8, contingency measures were not described in detail in the interim closure and reclamation plan. Mob/demob cost line items typically include many more aspects, such as equipment, staff and materials transport, and these costs can be significant for a remote northern mine site. Based on preliminary review, these costs appear low for a remote site such as the Meadowbank Project, where goods, equipment, and labour will likely need to be brought in from distant sources.	For the final closure and reclamation plan, all indirect costs need to be detailed relative to a formal construction plan and rational construction schedule. Based on development of this plan and schedule, all indirect costs, including mob/demob, project management, engineering (including construction monitoring and field engineering), and contingency costs should be developed from actual requirements rather than by applying assumed percentages.	AEM agrees	Yes
KIA	KIA-01	Main Supporting Document - Change in obtainable freshwater limit		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". AEM apparently opted to process ore at a higher than anticipated rate 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 and increased usage at the mill . 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. 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.	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. The KIA looks forward to the Proponent's discussion. We wish to offer the following clarification of the original. Our initial concern stems from AEMs historic failure to adhere to their water license freshwater withdrawal limits. AEM has already provided estimates of their yearly requirements in Table 6-1 (included in the initial comment). The KIA wish to encourage water conservation to minimize changes to water quality, quantity and flow and therefore request that the NWB authorize a staged water license reflective of the mines required freshwater. Stage 1 should reflect operations of the mine, permitting up to 2,350,000 m3/year. This reflects the maximum required freshwater required for the period up to 2017 at Meadowbank. Stage 2 should reflect closure and reclamation activities indicated for 2018 onward. This stage should permit up to 9,119,652 m3/year as per AEM's requested amendment of the current water license. We further request that AEM's annual report to the NWB outline the annual freshwater usage and anticipate usage for the following year. Should AEM anticipate a greater volume of freshwater will be required in the coming year than is currently permitted under the water license, we request AEM apply in advance for an amendment to the water license. The KIA encourages AEM to be proactive rather than reactive in their water management with respect to meeting water license conditions freshwater withdrawal.	AEM agrees with the KIA response.	Yes
KIA	KIA-01-B	Main Supporting Document - Change in obtainable freshwater limit (p.22)		AEM has proposed an increase in annual water takings from Third Portage Lake and state that no significant impacts to the local aquatic ecosystem are anticipated as a result of the requested increase in fresh water use, because the total volume withdrawn for mining under maximum use for 2010 – 2018 would be less than 2.5% of the volume of Third Portage Lake. Withdrawal of 2.5% of the lake volume annually will represent a consumptive use of water until the pits are refilled and the rate of withdrawal needs to be considered against the annual inflow to the lake to determine its significance.	Please provide a comparison of the projected increase in water volume taking against the annual volume of inflow to Third Portage Lake. The KIA appreciates the Proponent's response. The KIA will address this issue further in our response to KIA-IR-23.	To ensure water levels in Third Portage Lake will not be affected during pit flooding, in Section 4.6 of Golder (2009) Doc 833 0717_09 RTP-Updated Water Management Plan specifies that the maximum allowable drawdown of Third Portage Lakes has been assumed to correspond to the water level necessary to maintain a minimum flow equal to the average annual (1:2-year return period) 60-day low flow at the outlet of the lakes over the four summer months (June through September). The low flow rates were computed based on regression curves developed by AMEC (2003) and presented in the original licensing hearings.	Yes
KIA	KIA-02	Water Licence Renewal Application pp. 23-28		AEM has concluded that the overall analysis of water quality is adequate based on internal monitoring stations and limits that are adequately protecting the receiving water environment. However, there have been a few periodic exceedances. The KIA is concerned that the assessment of impacts to receiving waters begins by comparison of monitoring results to Water License Limits. This presupposes that the Water License limits represent adequate protection of the receiving waters.	We thank you for this response and see it as a clarification of our concern as follows: 1. The AEM uses the CREMP to monitor the receiving environment and that forms their conclusion as to whether or not the Water Licence limits are protective, 2. In addition, "in the occasional case where licensed limits for these onsite stations were exceeded, water quality data from the closest offsite station was reviewed (based on CREMP 2013) to determine whether any offsite impacts or receiving water trends could be identified." This step would assess the implications of exceeding the onsite limits. The KIA request a map with the resolution provided in Appendix B2 Figure 1-A showing labeled locations of internal monitoring stations and CREMP environmental monitoring stations together. Our comparison of trends reported at internal monitoring stations indicated in Section 7 of the Main Supporting Document with results provided in Appendix D, Table 3.3-1 indicate that AEM's current assessment approach has not put the environment at unnecessary risk. However, the requested map would help clarify which CREMP stations are proximal to each internal monitoring station for future comparisons. The KIA considers this issue resolved if the requested map is provided and included in future annual monitoring reports.	AEM will include a revised map in it's annual report submission. Please refer to AEM answer in the "NWB 2AM MEA0815: Response to NWB completeness reviews of the Type A water license renewal application." sent on October 14th, 2014.	Yes
KIA	KIA-03	Main Supporting Document - Altered License Condition - Water License Part D, Item 11		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.	We request that AEM continue to name specific lakes they shall monitor to increase accountability in the AEMP. The KIA considers this issue resolved.	AEM agrees with the KIA recommendation and will continue to name the lakes by their specific names.	Yes

Authorities	TC #	Reference to Comments	Proponent conclusion / statement	Authorities Comment / Rational	Authorities Technical Comment	AEM response to Technical Comments	Agree to TC
KIA	KIA-04	Main Supporting Document - Altered License Condition - Water License Part E, Item 8		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	The KIA presumes AEM has referred to the subsection of Appendix D entitled "Discussion of Water Quality Modeling". We appreciate that AEM will continue to monitor pit water quality and that this was agreed to by the KIA and other stakeholders during the November 28, 2013 meeting, as shown in the section of the minutes entitled: Discussion of Water Quality Modeling. We note, however, the following, as taken from the Nov. 28. 2013 minutes in the section entitled: Water Balance and Water Quality Modelling Reports – Discussion and AEM responses to AANDC Issues AANDC-requested that during the water license renewal the annual reporting conditions is clarified. **AEM agreed to discuss these issues during the water license renewal. AEM requested clarification on what predictions AANDC want AEM to compare to. AANDC asked to compare with the original model and give explanation in the difference between the two models.** **KIA needs a comparison and summary table that states why there are differences. This will assist KIA in making a comparison.** **AEM will include this information in our 2013 Annual Report – a comparison of results vs. predicted and offer explanations for significant changes.** The minutes show a) a discussion of the water quality /water balance reporting and comparison and agreement that this would be discussed during the renewal and b) a water quality model for pit water at closure which is what AEM refer to in their response above We are therefore concerned that 1. The AEM response appears to refer to the pit refilling and meeting CCME guidelines for aquatic life after closure, and not to the need to manage the site water balance and contaminants during operations. 2. AEM no longer propose to compare monitored pit quality and quantity to the model, and to update the model as warranted, especially given the underestimate of water needs that was seen in the first licence and this amendment. Detailed, and regular quantitative review of predictions vs. observations will inform adaptive management and provide early notice of irregularities in the water and contaminant balances. The mine is operating as presented in the project description (with warranted alterations) which included predictions of water quality throughout mine life. Annual comparison between measured and predicted pit water quality indicates how closely the project is operating as planned. Significant divergence between predicted and measured water quality may indicate a need for adaptive management to ensure the Project does not exceed the accepted environmental impacts of operation. This assessment is made by continuing to compare predicted water quality with measured. The KIA therefore recommend that the current schedule of annual comparisons of predicted water quality and quantity within the pits to measured water	AEM will continue to model predicted water quality and are dedicated to monitoring pit water quality (as per the license). It is important to understand that all relevant measured data (lake seepage, rain water, lake water quality and TSF water quantity and quality) are used to inform model predictions. In follow-up to the November 28th discussion, the updated license attempts to improve clarity for Part E Item 6 and 7; AEM will continue to collect pit sump data (as per the license), use the data to update the predictive water quality, make comparisons of predicted water quality and quantity within the pits to originally predicted water quality data and ultimately use updated measured water quality and quantity to ensure pit water quality will meet CCME limits to be protective of aquatic biota. This information is very important as it will inform AEM if water treatment is necessary forpit reflooding during closure.	Yes
KIA	KIA-05	Main Supporting Document - Altered License Condition - Water License Part F, Item 2 and 3		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.	AEM has committed to monitoring free cyanide in their response to KIA-IR-21. The KIA asserts MMER requirements are protective of the environment when implemented alongside the EEM program (which determines if the MMER are protective on a site specific basis) and other criteria, i.e.: the CCME water quality guidelines for the protection of aquatic life. Commitment to implement parallel but individually significant free cyanide CCME water quality guideline along with MMER criteria for total cyanide provides a higher standard of environmental protection the KIA, as stewards of the land, request. The KIA reasserts the initial IR and requests AEM include free cyanide in Water License conditions Part F Item 2 and Part F Item 3.	AEM does not agree with KIA and will discuss this with the KIA during the Technical hearing. AEM's strategy for cyanide includes complementary monitoring of both the receiving environment and effluent. As proposed in the renewal, AEM will continue to monitor cyanide in the receiving environment as part of the CREMP. Our approach is consistent with KIA'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 that KIA's recommended addition stated above is not necessary.	No
KIA	KIA-06	Main Supporting Document - Altered License Condition - Water License Part F, Item 3 and 23		AEM has removed Part F Item 3 stating 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.	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). The KIA considers this issue resolved.	AEM has removed Part F Item 6 (effluent from fuel containment facilities that require discharge to land) and not Part F Item 3 which is the list of parameters for discharge from the Vault Attenuation Pond. All the parameters deleted from Part F, Item 6 were included in Part F, Item 23. The discharge limits are the same for benzene, toluene and ethylbenzene and more stringent for oil and grease. The only change from Part F Item 6 to Part F Item 23 is the limit of Lead for which we ask a limit of 0.1mg/L instead of 0.001 mg/L. The rationale behind this request is that during the original license, water was planned to be centrally collected by a series of ditches and sumps and ultimately discharged directly into Baker Lake. However, this is not occurring, rather all of the secondary containment berms are discharged to land, which is an improvement in the practices originally proposed, thus avoiding direct discharge into Baker Lake. As proposed in the Type A renewal, AEM will continue to monitor discharge from fuel containment for ammonia. AEM agrees with the KIA and will include the proposed introductory text as it relates to secondary containment discharge to land in Baker Lake Bulk Fuel Storage Facility and the Meadowbank Fuel Storage Facility (ST-37 through ST40).	Yes
KIA	KIA-07	Main Supporting Document - Altered License Condition - Water License Part I, Item 7		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.	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. The KIA considers this issue resolved.	AEM is in agreement with KIA recommendations. All stations are currently approved by the inspector and it is for this reason that AEM removed this statement. In the case that future station are added, AEM will confirm the stations location with the Inspector.	Yes
KIA	KIA-28	Main Supporting Document - Altered License Condition - Water License Part H, Item 3		AEM has proposed to remove Part H, item 3 of the water license renewal application as they feel it is covered off by Part D, item 29. In item 29 the word "fuel" is used while in item 3 the words 'petroleum products" are used. The words "petroleum products" are preferred as they are more inclusive (i.e. hydraulic fluid, motor oil, etc.) than the word "fuel".	The KIA requests that words "petroleum products" be included along with the word "fuel" in Part D, item 29. The KIA considers this issue resolved.	AEM agrees with the KIA recommendation.	Yes
KIA	KIA-08	Main Supporting Document - Altered License Condition - Water License Part I, Item 18		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.	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. The KIA considers this issue resolved.	AEM agrees with the KIA recommendation.	Yes
KIA	KIA-29	Main Supporting Document - Altered License Condition - Water License Part J, Item 6		AEM has proposed to add the words "if possible" to Part J, item 6. A significant effort should be put into re-vegetation of the tailings	The KIA requests that words "if possible" be removed as a significant effort should be put into re-vegetation of the tailings. As long as AEM will put significant effort into the re-vegetation of the site the KIA will tentatively agree that this issue is resolved. The KIA does recommend that AEM's efforts at re-vegetation of waste rock piles and capped areas be documented in the Annual Report to the NIRB and NWB.	Please refer to EC-10 comments.	Yes

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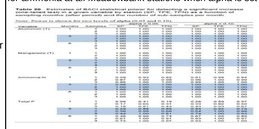
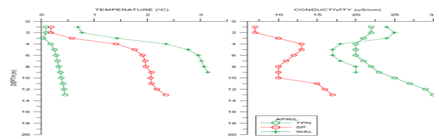
KIA	KIA-09	Main Supporting Document - Trend of Increasing Parameter Concentrations in Near Field sites (Review Freshwater Aquatic Environment between 2010 and 2013).		Several parameters of concern were identified as part of the water quality results review between 2010 and 2013. Sites in which water 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. Although surface water guidelines criteria may not be directly applicable as these discharges do not directly reach surface water. 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.	The KIA appreciates the CREMP overview AEM provided and understand assessment and mitigation are dual components of the program. We express continued concern with AEM's opinion that mine changes in line with EIS predictions do not warrant mitigation. The KIA feels mitigation of these trends discovered in the near field sites through assessment prior to impediment of the aquatic environment is the precautionary approach. The KIA have conducted independent comparison of FEIS predictions and monitoring results presented in the CREMP to verify AEM's claim that "data to date suggest that the observed changes are generally consistent with those predicted in the EIS". Our review has identified several inconsistencies between water quality predictions for Second Portage and Third Portage lakes. We have summarized these results below and appended our full analysis in Appendix A.  AEM had noted a trend of increasing TDS in Third Portage and Second Portage lakes. TDS was not modeled in the FEIS but total alkalinity and sulphate exceeded FEIS predicted water concentrations in both water bodies. We also express concern with concentrations of total aluminum, calcium, iron, magnesium, nickel, silicon and strontium measured as part of CREMP monitoring. Concentrations at various stations in Third Portage and Second Portage lakes exceed modeled maximum water quality concentrations presented in the FEIS. This indicates either 1) Meadowbank is not operating as designed or 2) the water license discharge criteria are not sufficiently stringent to maintain water quality in the receiving environment within predicted levels. The KIA recognizes these concentrations have not exceeded CCME water quality guidelines but are still a source of significant concern. Our findings indicate that the EIA predictions are invalid and may be grounds for additional compensation under the NLCA. We recommend implementation of mitigation measures through adaptive management in light of these divergences from the FEIS prediction. AEM should provide a discussion of what mitigation measures will be implemented and how it will address these identified water quality issues. This discussion should be reflect the KIA's right to minimized changes to the environment and the NWB's mandate seeking to protect, manage and regulate freshwaters in Nunavut in a manner that will provide the optimum benefits for the residents of the territory in particular and Canadians in general. We also express concern that total phosphorus (in addition to a metal scan using low level detection limits), fluoride, cyanide (total and free), cobalt and silver were not included in the 2013 CREMP suite after being modeled in the FEIS. Total phosphorus and cyanide (total and free) will be added to Schedule 1, Group 2 under AEM's proposed changes to the water license. The KIA requests the addition of cobalt, silver and fluoride to this list, allowing comparison with the FEIS predictions. We further specify the following detection limits to allow comparison with the applicable CCME long-term guidelines: **Parameter** / **DL (mg/L)** / **CCME Guideline (mg/L)** Fluoride — 0.02 — 0.120 Total Phosphorus — 0.002 — Trophic Status Total Silver — 0.00002 — 0.0001 Total Mercury — 0.000002 — 0.000026	AEM will provide additionnal informations during the technical hearings t oaddress the KIA's concerns.	No
KIA	KIA-10	Main Supporting Document - Wally Lake Reference Site (Main Supporting Document, CREMP Stations and Control/Impact Designations)		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.	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. The KIA considers this issue resolved.	The CREMP design document (2012) does state that "further evaluation of the advantages and disadvantages of establishing a separate reference station (versus using existing reference stations) is needed…" While not formally documented, AEM chose to rely on the existing reference stations for Wally Lake. The primary reason for this decision is that there are varying degrees of differences among the lakes surrounding the mine and that the before-after-control-impact (BACI) approach does not rely on the assumption that control (reference) and impact (near field) stations are the same, only that they respond in a similar way to broader natural changes (e.g., climate-induced changes affecting the region). The BACI takes baseline differences into account when testing for temporal changes related to mining. Given that monitoring continued at Wally Lake in the absence of local mining activity, there are many more years of "before" data available for this lake, making the design more robust for this lake. Furthermore, Wally Lake is the only sampling area where the second reference area (Pipedream Lake, which was added in 2009) can formally be used within the BACI framework. The addition of a new reference area for Wally Lake would preclude the use of BACI and force a reliance on control-impact (CI) type designs whose foundation is the assumption that the control and impact sites are inherently the same. Our experience with the Meadowbank lakes since the mid-1990s is not consistent with this assumption. Thus, the establishment of a unique reference area for Wally Lake is unwarranted.	Yes
KIA	KIA-11	Main Supporting Document - Data Quality Objectives (CREMP QA/QC, Appendix B5 - QA/QC plan)		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. 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	The KIA appreciates AEM's partnership with ALS to achieve appropriate detection limits for each parameter. We are still concerned with the "CREMPs proven ability to identify mine-related changes over time" despite the overall robustness of the program. Statistical conclusions pertaining to mine-related trends may be obscured by greater variability in the dataset permitted by less stringent DQOs. The KIA therefore feels use of more stringent DQOs is appropriate to ensure smaller effect size yet significant water quality impediments are identified. DQOs are in place to ensure data accurately represents the environment rather than to "serve the program". The KIA has conducted an independent Quality Assurance / Quality Control (QA/QC) review of AEM's 2013 CREMP field duplicates using the USEPA criteria. Samples exceeding the USEPA DQO were those >20% RPD when >5x MDL. Full results of this analysis are available as Appendix B. AEM identified 17 instances where their DQOs were not met in the water quality field data representing 2.4% of the 696 analysis conducted. The KIA identified an additional 14 instances for a total of 31 representing 4.5% of the 696 analysis conducted. We note that this does not increase the total DQO failure above 5% of the total analysis indicating the criteria employed by AEM, while not as sensitive as it could be, is sufficient for this dataset. The KIA consider this issues resolved.	The CREMP is a comprehensive monitoring program that results in the generation of substantial data in any given year. CREMP DQOs for duplicate samples and field duplicates were set in consideration of the realities of analytical laboratory performance and receiving environment heterogeneity (field duplicates). We have worked closely with the main laboratory (ALS) to understand their capabilities regarding replication of laboratory results and feel that the DQOs are appropriate for this program. AEM feels that understanding the inherent limitations in analytical methods is important in setting realistic DQOs and that blind application of more stringent criteria would not serve the program. To that end, we have also worked with ALS to ensure that detection limits are appropriate for each parameter. The success of this approach is exemplified by the CREMPs proven ability to identify mine-related changes over time, which is founded on the integrated interpretations CREMP data accumulated over the years. That said, AEM continues to work on improving overall data quality.	Yes
KIA	KIA-12	Main Supporting Document - Hold Times (CREMP QA/QC)		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.	The KIA applauds AEMs work to address issues with hold times and other transport issues. We recognize metals analysis have longer hold times and accept continued use of ALS laboratories to achieve requisite low-level analysis. Use of Multilab for time sensitive analysis is a positive step in addressing data quality issues. However, some of Multilab's cited detection limits in Appendix E are not appropriate for use in this environmental monitoring program. The KIA highlight the following parameters with insufficient detection limits: **Parameter** / **Multilab DL (mg/L)** / **Required DL (mg/L)** Ortho-Phosphate — 0.01 — 0.002 Total Phosphorus — 0.01 — 0.002 Dissolved Phosphorus — 0.01 — 0.002 Total Cyanide — 0.005 — 0.001 Free Cyanide — 0.005 — 0.001 Required detection limits for ortho-phosphate, total phosphorus and dissolved phosphorus are required to detect changes to trophic status as indicated through the CCME Phosphorus guidance framework for the management of freshwater systems. Our experience indicates these detection limits are available from ALS. If Multilab can meet these low level detection limits and the AEM can successfully deliver samples to the laboratory within the applicable hold time, the KIA will consider this issue resolved.	AEM agrees and will work with Multilab to meet these low detection limits within the applicable holding times.	Yes

Authorities	TC #	Reference to Comments	Proponent conclusion / statement	Authorities Comment / Rational	Authorities Technical Comment	AEM response to Technical Comments	Agree to TC
KIA	KIA-13	Main Supporting Document - Decision Making Criteria (CREMP Data Evaluation Criteria)		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.	The KIA understands that a AEM's power analysis indicated single events yielded "low power" to identify changes while 5-6 events provided "good power". <u>The KIA would like AEM to provide the power analysis results and their working definition of "low" and "good" power.</u> This definition was not expressly provided in Appendix 2B – The CREMP Design Document. Further to this point, the KIA notes yearly water quality sampling frequency was 2 to 5 for Meadowbank sites and 2 to 3 for Baker Lake sites. Logically, the CREMP is unable to detect changes over the course of a single year using the BACI approach if sufficient statistical power is only achieved after 5-6 samples. This understanding leads the KIA to assume only conclusions based on multiple years of data will have sufficient power to detect mine-related environmental changes following the current sampling frequency. We have reviewed Appendix 2B, sub-appendix A and note limited power analysis results were presented. The appendix presents one tailed power analysis for aluminum, manganese, ammonia and total phosphorus, and a two tailed power analysis for pH. These results indicate 100% power is achieved over a 1 month period with 1 sample for aluminum and manganese for all Meadowbank stations, and near 100% power over a 3 month period for ammonia at all Meadowbank stations when alpha is set to 0.05. This logic is counter to the above assertion from AEM.  The KIA notes poor power for detecting changes in total phosphorus and the lower bound for pH. The KIA is willing to accept an alpha of 0.1 for environmental monitoring data yet this does not sufficiently improve power for those parameters. These are key parameters in the receiving environment requiring greater power than the current sample protocol provides. It appears decreased power to detect changes in Second Portage Lake total phosphorus concentrations is likely due to natural variability in the waterbody. The KIA accepts formal BACI application accounts for seasonal variation but requests AEM provide a discussion of how short-term changes are detected using the current monitoring framework. We request sufficient power to detect seasonal changes from year to year. For example, winter or summer changes from year to year. This should be bolstered by presentation of power analysis results for each parameter which was modeled in the FEIS (FEIS Appendix E) and each parameter for which a CCME water quality guideline exists. Further discussion of power analysis is made in KIA-IR-19.	AEM will provide additional information during the technical hearings to address the KIA's concerns.	No
KIA	KIA-14	Main Supporting Document - Water Chemistry Discussion Criteria (CREMP Water Chemistry Discussion)		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.	The KIA acknowledge the three decision rules for reporting AEM has imposed to "make the CREMP a more user-friendly document while maintaining transparency". Rules one and two are appropriate. Rule three is well intentioned but relies on the professional opinion of the document author rather than an objective decision rule available for third party evaluation. We encourage AEM to provide a discussion outlining the kind of comparisons that will be made to assist CREMP authors in bringing forward "apparent pattern[s] in detected values match[ing] mining activity" to the body of the report. The KIA are concerned anomalous readings >5x MDL but <10% detection frequency may be overlooked or that trends could occur within the range of these criteria that could be addressed at an early stage. Such isolated results may not elevate the yearly mean sufficiently to warrant inclusion in the CREMP text as indicated by AEM through decision rule two. Short-term elevations may potentially impede water quality and should be discussed in the text. The KIA therefore requests AEM, as in the original IR, discuss parameters that are detected in <10% of samples but are >5x MDL. We are cognisant that this may add some unnecessary text to the CREMP report and invite AEM to provide an alternative decision rule to bring such detections forward.	AEM will discuss these recommendations and comments during the technical hearings.	No
KIA	KIA-15	Main Supporting Document - Elevated Sediment Concentrations: Zinc and Lead (CREMP Sediment Chemistry Discussion, Table 3.4-1)		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.	The KIA looks forward to the Proponent's discussion and recommends "a-priori" development of triggers and initial responses so that management action can be initiated promptly. AEM has provided the following methods for trigger development: "1. When a threshold (e.g., CCME guideline) is 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 is not established, the trigger was set equal to the 95th percentile of the baseline data ("Method B"), except in cases where less than 5% of the data exceeded the current detection limit (DL) – in the latter case, the trigger was set equal to two times the DL ("Method C")." AEM further states "For each sediment chemistry parameter, 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")." Sediment samples are proposed to be collected "approximately every three years". We propose use of this time scale for application of management actions. We request the following requirement is added to the water license conditions: AEM shall implement adaptive management to mitigate changes to sediment quality if the threshold for a given parameter (as established through Method A, B or C as per Appendix B2 Section 3.2.1) presented in December 2012 CREMP Design Document in Tables 8, 9 10 for water quality and in Tables 12 for sediment quality.	AEM does not agree with this recommendation and will discuss this during the technical meetings.	No
KIA	KIA-16	Main Supporting Document - Elevated Sediment Concentrations: chromium (CREMP Sediment Chemistry Discussion)		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.	The CREMP recommends management action to follow up 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 trigger value. We initially suggest more stringent discharge criteria for chromium. We invite AEM to provide other management options. The KIA looks forward to the Proponent's discussion	AEM does not agrees to add strnigent discharge criteria for chromium. The discharge in Thrid Portage Lake was stop in July 2014. No more discharge will occur in Third Portage Lake in the future. We consider this as a mitigation action to the increase of chromium concentration in Third Portage Lake.	No
KIA	KIA-17	Main Supporting Document - Zooplankton Sampling (Appendix B2, Sampling Frequency)		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	The KIA understands AEM's concern regarding power as noted in our response to KIA-IR-13. The KIA feels that zooplankton results are applicable beyond toxicity testing and warrant inclusion in the CREMP. Statistical discussion of zooplankton results should span several years and examine long-term trends rather than year-to-year variation from control lakes or baseline conditions. This would account for the low statistical power detecting "20% (over any number of years) or 50% changes in zooplankton metrics in a single year." The KIA requests AEM provide a discussion regarding statistically detectable effect size over different timeframes. AEM should then select a reasonable effect size and timeframe to discuss zooplankton and periphyton results in the CREMP. Zooplankton collection should be continued as per the original IR. We stress the importance of detecting changes to total biomass which has been included as one of AEM's specific zooplankton metrics in the CREMP Design Document. The KIA has reconsidered our request for AEM to continue monitoring periphyton. We endeavour to stay abreast of emerging science and have become aware of critical issues regarding analysis of periphyton samples and the endpoints to be reported. To quote the work of Minnow Environmental (2014): "Seven periphyton samples were homogenized, split in quarters and sent to each of four commercial laboratories for taxonomic identification and enumeration. Even after standardizing for differences in algal taxonomy reported by each of the labs, results indicated substantial differences in community composition in each sample. Rarely was the same species identified by all four laboratories in the same sample. The proportions of species identified by one laboratory that were also identified in the same sample by at least one other laboratory never exceeded 58%, meaning at least 42% of all species identified in a given sample were unique to a specific laboratory." "Two overarching issues were identified that currently undermine the utility of periphyton community as an aquatic environmental monitoring tool: (1) lack of standardized methods for laboratory sample handling, analysis and QA/QC, and (2) no formal program for independent verification of taxonomic identifications (e.g., a program for taxonomist certification and/or laboratory performance testing)." "With so little agreement of results among the four laboratories tested, it was not possible to infer which of the laboratories, or associated procedures, provided the most accurate results." Our updated understanding of laboratory variability introduces too much uncertainty into year to year periphyton data interpretation rendering little utility of the analysis.	AEM will discuss these recommendations and comments during the technical hearings. The potential inclusion of zooplankton was studied in detail in the CREMP Design Report (2012). Despite early discussions during the aforementioned workshops to drop zooplankton from further consideration, AEM decided to conduct further sampling to reassess the situation. Samples were collected in 2010 and 2011; these data were assessed for power using the BACI statistical framework. There was low power for detecting 20% (over any number of years) or 50% changes in zooplankton metrics in a single year. Power improved only when trying to detect a 50% change with two to three years of after data. Consequently, it was removed as a monitoring component of the CREMP. That said, it was acknowledged that zooplankton studies may still be appropriate for more intensive spatial gradient designs as those employed for targeted studies (i.e. TSS Effects Assessment Studies (EAS)) where they might also be coupled with zooplankton-based toxicity testing. Considering the comprehensive and conservative approach applied to water in the CREMP, AEM does not feel that this decision detracts from the CREMPs ability to detect mine related changes in the receiving environment (i.e., as the assessment phase of the Management Response Plan would address the ecological significance of changes to water quality [e.g., as described for the EAS case above).	No

Authorities	TC #	Reference to Comments	Proponent conclusion / statement	Authorities Comment / Rational	Authorities Technical Comment	AEM response to Technical Comments	Agree to TC
KIA	KIA-18	Main Supporting Document - Depth Samples (Appendix B2, Experimental Design)		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.	The KIA agrees with AEM that surface samples are adequate if the lake is well mixed. We are concerned AEM only cites conductivity as the profile criteria for when depth sampling is required. This concern is highlighted through profiles displayed in the CREMP. Depth samples were not collected in April, 2013 despite evidence of inverse stratification (Figure 3.2-1). Here conductivity does not indicate stratification while temperature in both second and third portage lakes indicates inverse stratification under ice. This thermal mixing barrier may result in differing water quality between the lake surface and bottom. The CREMP indicates only surface samples were collected at this sampling date.  As per the initial IR, we recommend that samples at depth be taken where field profiles of conductivity, temperature, dissolved oxygen or turbidity indicate poorly mixed or stratified conditions. This may be either stratification during the open water season or inverse stratification under ice. We further stipulate that depth samples should be collected when a waterbody exceeds a depth of 15m.	AEM will discuss the responses, recommendations and comments during the technical hearings. Based on baseline limnological data, the Meadowbank lakes are generally considered to be well mixed. This assumption was formally tested in the CREMP Design Report (2012) to determine if a routinely collecting depth sample was warranted in the CREMP; the conclusion was that surface samples adequately characterized the water column. That said, it is recognized that stratification may occur and that sampling at depth may be appropriate. This has been incorporated into the CREMP by instructing field teams to take samples at depth when vertical profiling suggests the presence of stratification (e.g., abnormally high conductivity measurements).	No
KIA	KIA-19	Main Supporting Document - Statistical comparison of Biological Monitors (Appendix B2, Experimental Design)		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.	The KIA directs AEM to our response in KIA-IR-17. We further assert that the zooplankton are not only useful as part of toxicity testing or more intensive spatial-gradient sampling designs. The KIA agrees with AEM that zooplankton studies do not have sufficient power in this context to detect year-to-year changes. It is for this reason we request AEM use multiple statistical measurements to assess this biological data. Weight of evidence provided through multiple analyses (parallelism and BACI) over several years of data will better inform discussions regarding community composition shifts related to mine activity. The full quote from Underwood (1994) cited by Wiens and Parker is: "When natural variation in time and space is great, the only effects of human disturbance that are likely to matter (or that can be reasonably detected) are very large ones." The KIA feels that the omitted bracketed text indicates the problem over the short-term is lack of statistical power. This can be overcome by assessing changes to zooplankton over an extended period of record. The KIA offers an alternative to multiple analyses types. AEM has not presented the alpha used in the BACI assessment of biological indicators. We note this oversight in the CREMP report (Appendix D) and the CREMP Design Document (Appendix B2). The KIA recommends use of a less stringent alpha if AEM currently employs the standard 0.05 or a less stringent 0.1. AEM should assess biological indicators using an alpha of 0.02 which will increase the chance of detecting changes in the biological community at AEM's selected 20% and 50% effect sizes. We acknowledge use of a larger alpha increases the chance of a false positive (detecting a statistically significant change in the biological community when none has occurred) but assert this is balanced by the relatively large effect size selected by AEM. As stewards of the land, the KIA prefer to err on the side of caution and increase the chance of detecting a mine related change in the environment. The KIA request that an alpha of 0.02 is used for both BACI and parallelism analysis.	AEM will discuss these recommendations and comments during the technical hearings.	No
KIA	KIA-20	Lack of Event Monitoring Discussion (Appendix B6, Event Monitoring, Appendix B7 and Appendix B9)		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.	AEM should include the event monitoring requirements in Appendix B7 and Appendix B9 as discussed in Appendix B6. The KIA considers this issue resolved.	AEM agrees and will make a clearly reference to the event monitoring requirements in the next revision of the Spill Contingency Plan (SCP) as discussed in the Water Quality and Flow Monitoring Plan. The Emergency Response Plan (EMR) is a consolidated source of information for employees, contractors, and site visitors to respond quickly and efficiently to any foreseeable emergency (for example major spill) that would likely occur at the Meadowbank project site and do not provide information on monitoring after response. Emergency Response Plan (ERP) already refers to the Spill Contingency Plan in which event monitoring requirement will be clarify. Both plan (SCP and ERP) are considered to be implement in the case of an event monitoring depending of the magnitude of the event.	Yes
KIA	KIA-21	Monitoring Parameters (Appendix B6, Event Monitoring Water License, Schedule I, Monitoring Group)		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.	The KIA directs AEM to our response to KIA-IR-12. We reiterate the required detection limits and once again cite the CCME: **Parameter** / **Multilab DL (mg/L)** / **ALS DL (mg/L)** / **Minimum Required DL (mg/L)** Ortho-Phosphate: **0.01** / 0.001 / 0.002 Total Phosphorus: **0.01** / 0.002 / 0.002 Dissolved Phosphorus: **0.01** / 0.002 / 0.002 Total Cyanide: **0.005** / **0.0050** / 0.001 Free Cyanide: **0.005** / **0.0050** / 0.001 Bolded detection limits do not meet the required minimum standard. We request AEM work with their chosen laboratories to reach the required detection limits while still adhering to specified hold times and the highest standard of sample transportation. We note that the minimum detection limits are available from commercial laboratories.	AEM agress. As per KIA IR -12 response, AEM will work with Multilab to meet these low detection limits within the applicable holding times.	Yes
KIA	KIA-22	Iseepage not included under spill contingency plan (Appendix B9, What is a Spill?, Appendix B9, Materials and reportable (to regulatory authorities) spills		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** **Transportation Class** / **Type of Substance** / **Compulsory Reporting Amount** 1 / Explosives / Any amount 2.1 / Compressed gas (flammable) / Any amount of gas from containers with a capacity exceeding 100 L 2.2 / Compressed gas (non-corrosive, non- flammable) / Any amount from containers with a capacity exceeding 100 L 2.3 / Compressed gas / Any amount 2.4 / Compressed gas (corrosive) / Any amount 3.1, 3.2, 3.3 / Flammable liquid / 100 L 4.1 / Flammable solid / 25 kg 4.2 / Spontaneously combustible solid / 25 kg 4.3 / Water reactant solids / 25 kg 5.1 / Oxidizing substances / 50 L or 50 kg 5.2 / Organic peroxides / 1 L or 1 kg 6.1 / Poisonous substances / Any amount 7 / Radioactive substances / Any amount 8 / Corrosive substances / 5 L or 5 kg 9.1 (in part) / Miscellaneous substances / 50 L or 50 kg 9.2 / Environmentally hazardous / 1 L or 1 kg 9.3 / Dangerous wastes / 5L or 5 kg 9.1 (in part) / PCB mixtures of 5 ppm or more / 0.5 L or 0.5 kg 9.1 (in part) / PCB mixtures of 50 ppm or more / 0.5 L or 100 kg *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.	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." The KIA considers this issue resolved.	AEM agrees with KIA recommendation and will add a section in the updated version of the Spill Contingency Plan that will include unanticipated seepage that can occur on the mine site.	Yes

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KIA	KIA-30	RSF Design (Appendix B10 section 2.3, page 4)		AEM has indicated that the Vault RSF is not expected to require capping, as the bulk of the material from this deposit is expected to be NPAG (Golder, 2005a).	The KIA requests that AEM report on and monitor the amount of PAG versus NPAG material in the Vault RSF in order to ensure that, if required, the RSF is capped with an appropriate amount of material to ensure that freezeback of the RSF occurs upon closure. The KIA considers this issue resolved.	AEM takes note of the request from KIA and will update the requested information in the Annual report. The quantity of PAG vs NPAG material is monitored and updated on a routine basis and geochemical testing on rock are conducted to ensure the ratio is still valid. From the prediction that are into the Updated Mine Waste Rock and Tailings Management Plan - 2013, AEM will mine from 2014 to 2017 43.1 Mt of waste rock from which approximately 95% will be NPAG and 5% will be PAG. This ratio will ensure no future ARD from the Vault Waste Rock Pile.	Yes
KIA	KIA-31	Waste Rock Storage Facilities (Appendix B14 section 3.3.6.3, page 61)		AEM has indicated that runoff water quality and water volume from the Portage and Vault Waste Rock Storage Facilities will be monitored throughout the mine life, including operations, closure and post-closure. Given that the height and crest elevation of these facilities is 13% to 17% higher than the surrounding topography will fugitive dust emissions also be monitored, in particular, during closure and post-closure	The KIA requests that AEM include fugitive dust as part of closure and post-closure monitoring. The KIA considers this issue resolved.	AEM agrees with the KIA recommendation and will continue to monitor fugitive dust as part of the closure and post-closure monitoring.	Yes
KIA	KIA-23	Impact of violating obtainable freshwater limit (Appendix B17, 3.2.1 Water Management Plan and Water Balance)		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 700,000m3/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.	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. AEM has referred to the Golder report written in 2009. We do not doubt that these predictions were accurate for fresh water usage permitted under the original water license. Our comment seeks to elucidate impacts on Third Portage Lake during mine operation resulting from additional fresh water usage. Our secondary IR regarding the TSF also focusses on impacts during mine operation rather than closure. The KIA looks forward to AEM's discussion of conceptual plans to close the TSF during the technical meetings. We reiterate the original IR, requesting AEM provide discussions regarding impacts of additional fresh water usage during operation rather than closure. We understand this concern may be addressed through AEM's discussion of conceptual plans to close the TSF.	AEM refers the KIA to previous responses to DFO comments and recommendations related to pit reflooding and closure planning. To ensure water levels in Third Portage Lake will not be affected during pit flooding, in Section 4.6 of Golder (2009) Doc 833 0717_09 RTP-Updated Water Management Plan specifies that the maximum allowable drawdown of Third Portage Lakes has been assumed to correspond to the water level necessary to maintain a minimum flow equal to the average annual (1:2-year return period) 60-day low flow at the outlet of the lakes over the four summer months (June through September). The low flow rates were computed based on regression curves developed by AMEC (2003) and presented in the original licensing hearings. In response to the final point of this recommendation, it is important to note that as per the NWB Water License Part J, Item 3, AEM will submit the Final Closure and Reclamation Plan at least twelve (12) months prior to the expected end of mining (targeted date of Q3 2016). However, during the technical meetings, AEM will discuss conceptual plans to close the TSF.	Yes
KIA	KIA-24	Modeling Results and Mitigation (Appendix B17, Water Quality Modeling Report, Appendix D – Water Quality Report)		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. ***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 | CCME (mg/L) | Portage Pit: Original Prediction: Probable | Portage Pit: Original Prediction: Possible Poor and Good Scenario | Portage Pit: SNC, 2014: Aug 2017 | Portage Pit: SNC, 2014: Dec 2025 | Goose Pit: Original Prediction: Probable | Goose Pit: Original Prediction: Possible Poor and Good Scenario | Goose Pit: SNC, 2014: July 2015 | Goose Pit: SNC, 2014: 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 | 0.00 | 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) | 2.50 | 4.40 | 0.00 | 0.28 | 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 exceedance 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.	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. The KIA looks forward to the Proponent's discussion	This information will be submitted in the final reclamation and closure plan one year prior to closure.	Yes
KIA	KIA-25	Seepage at ST-16 and Lake NP2 (Appendix 17, Appendix D – Water Quality Report)		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.	As indicated in HESL 20144, 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. The KIA looks forward to reviewing 2014 monitoring results.	No response required.	Yes
KIA	KIA-26	Depth sample collection for Dike Monitoring (Appendix B19)		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) 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.	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 m3/day and/or turbidity in seepage water. Bay Goose Dike at toe: seepage of > 300 m3/day and/or turbidity in seepage water Bay Goose Dike at North Channel Area: seepage of > 150 m3/day and/or turbidity in seepage water South Camp Dike: seepage of > 300 m3/day and/or turbidity in seepage water Vault Dike: seepage of > 300 m3/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. The KIA consider this issue resolved.	No response required. Please refer to AEM answer in the "NWB 2AM MEA0815: Response to NWB completeness reviews of the Type A water license renewal application." sent on October 14th, 2014.	Yes
KIA	KIA-27	Anomalous Thermistor or Piezometer Reading Response (Appendix B20, 6.2.2 Anomalous Readings)		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.	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. The KIA looks forward to the Proponent's discussion.	Instrumentation is installed to monitor the stability and deformation of the perimeter containment structures of the Tailings Storage Facility (TSF), ground temperature, seepage, water quality and to monitor operational performance. Instrumentation is to be maintained, replaced, added, extended and relocated during the development of the TSF. Current geotechnical instrumentation for the TSF includes thermistors in the North and South Cell and piezometers are installed at Central Dike. Survey of the water and tailings elevation are also taken at different location in the TSF. Geotechnical instrumentation is to be monitored by the responsible party and at the approximate frequency of once a week during winter and every three (3) days during the summer, and at any other periods of extended rainfall or run-off. Immediate readings of all instrumentation shall be carried out following a significant seismic or climatic event.	Yes

AEM will invit authorities to refer to the document "NWB 2AM MEA0815: Response to NWB completeness reviews of the Type A water license renewal application" sent on October 14th, 2014 for the KIA completeness review comments and the AEM responses to these comments.