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Richard Dwyer

Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, Nunavut
X0B 1J0

June 17th, 2022

Re: Review of AEM's 2021 Annual Geotechnical Inspection Report for the Hope Bay Project.

Dear Richard Dwyer, the KIA had reviewed AEM's 2021 Annual Geotechnical Inspection Report for the TIA, the Doris, Madrid, and Boston mine sites.

Enclosed are our geotechnical engineering consultant's comments on AEM's 2021 Annual Geotechnical Inspection reports. These comments will also be included in KIA's response to the Hope Bay 2021 Annual Reports to the NWB and the NIRB that are due in July.

The NWB is free to re-provide these comments again to Agnico Eagle Mines Limited for inclusion in the response to their 2021 Annual Report.

Thank you

John Roesch

John Roesch, P.Eng.

Senior Hope Bay Project Officer
Kitikmeot Inuit Association, Department of Lands and Environment

Cc Geoff Clark, Director, KIA, Department of Lands and E

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2021 Annual Geotechnical Inspection TIA

KIA-NWB-1

Review Comment Number	KIA-NWB-1
Subject/Topic	2021 Annual Geotechnical Inspection – Doris Tailings Impoundment Area, Hope Bay Mine, Nunavut, March 2022 and associated Table 1 Tailings Impoundment Area Annual Geotechnical Inspection Report, Recommendations and Agnico Response
References	2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Table 3, pages 6 and 7, Section 2.4.4, page 8 and Table 10, page 14.
Summary	• A spillway was not planned (or constructed) for the Doris Tailings Impoundment Area (TIA). • The total actual freeboard (crest to Full Supply Level (FSL)) is 4.0 m and the total actual minimum freeboard (core/GCL to FSL) is 1.5 m for the North Dam. • Inflow Design Flood (IDF) Freeboard = 2.1 m (at end of mine life when Reclaim Pond is at its minimum size) • The existing North and South Dams are classified as "High Consequence" classification according to the dam classification guidelines in the Canadian Dam Association (CDA) dam safety guidelines (CDA 2013). • (CDA) (2013)[1] notes that High consequence dams should be designed for Annual Exceedance Probability (AEP) of 1/3 between 1/1000 and PMF (Table 6-1b in CDA 2013[1]).
Detailed Review Comment	Dams with no spillways must retain all water inputs during flood events and CDA (2013) provides criteria to be used for the sizing of the IDF. Information provided by SRK indicates that the IDF freeboard is less that the total actual freeboard, but greater that the total minimum freeboard, meaning that IDF-related water levels higher than the water retaining element (core/GCL) are possible at the end of mine life when the Reclaim Pond is at its minimum size. As such, these higher water levels would be only retained by Run of Quarry (ROQ) material for the North Dam, which is permeable. Therefore, tailings pond water could escape from the dam and/or possibly erode the crest material, dependent upon

[1] CDA, 2013. Dam Safety Guidelines 2007. 2013 edition, 82 pages.

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	the design intent of that material. Erosion of the crest material during IDF flooding near the end of mine life could lead to overtopping failure of the North Dam.
Recommendation/Request	More detail on this specific design aspect, associated risks and related consequences is needed. The following questions should be addressed: • Can AE/SRK confirm BGC's understanding of the IDF outlined above? • During Care and Maintenance (C&M) period what rise in water level would be expected in response to an IDF event being experienced? And what measures will be implemented to maintain the water level below the FSL during C&M. • What measures does AE propose to take to manage the water level in the TIA towards the end of mine life to prevent water levels exceeding of the core/GCL? Will the FSL be revisited towards the advanced stages of the life of the facility?
Importance	High

KIA-NWB-2

Review Comment Number	KIA-NWB-2
Subject/Topic	2021 Annual Geotechnical Inspection – Doris Tailings Impoundment Area, Hope Bay Mine, Nunavut, March 2022 and associated Table 1 Tailings Impoundment Area Annual Geotechnical Inspection Report, Recommendations and Agnico Response
References	2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Sections 2.4.4, 2.4.7, 2.6.1 and 4.8.
Summary	• No spillway exists for the TIA as of 2021 but a spillway maybe required prior to the end of mine life. • Reclaim water is drawn from the TIA Reclaim Pond for re-use in the Process Plant (stated volumes ranged from 3.3Mm^3 to 4.2Mm^3 per month) • Water from the Doris TIA is discharged to the Roberts Bay Discharge System (RBDS). • The TIA is used as the overall collector for all site contact water.

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	• The operational water level range target for 2022 is 31.5 masl or less. • Agnico Eagle and SRK are in the process of reviewing options for future water management in the TIA. Changes to the operational water and load balance and level targets will be reported on in future reports
Detailed Review Comment	Agnico Eagle announced its decision on February 18, 2022 to place the Doris Mill into C&M and suspend production on the Project. On March 30, 2022, Agnico Eagle provided the NWB with a formal written notice of C&M for the Doris-Madrid operations. C&M activities are planned to the end of 2024. The water management plan is critical for the safe operation of the TIA, especially during a C&M phase and considering updated constraints including MDMER discharge criteria and RBDS schedule. Operational and monitoring requirements from a revised water management plan should be reflected within the current OMS Manual for the TIA.
Recommendation/Request	In general, more detail on the revised water management plan is needed. The following questions should be addressed; • When will a revised water management plan be delivered? • Will the revised plan consider all new site constraints including the care and maintenance stage of the mine site, including an updated water balance for the TIA pond? • Will risks to the water levels be outlined and contingency plans be provided for TIA water management and associated monitoring? • Will the need for an emergency spillway be considered within an updated water management plan? • The September 2021 TIA pond level was noted as 32.2 masl; will the pond be dropped to meet the noted operational level of 31.5 masl noted previously?
Importance	High

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KIA-NWB-3

Review Comment Number	KIA-NWB-3
Subject/Topic	2021 Annual Geotechnical Inspection – Doris Tailings Impoundment Area, Hope Bay Mine, Nunavut, March 2022 and associated Table 1 Tailings Impoundment Area Annual Geotechnical Inspection Report, Recommendations and Agnico Response
References	2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Section 3.1.
Summary	A DSR provides a detailed independent assessment of dam safety, which results in a statement of the current dam safety condition(s) along with summary of associated deficiencies and non-conformances, usually with some associated ranking of associated importance. It is requirement under CDA (2013), and conclusions are important for relevant stakeholders.
Detailed Review Comment	A DSR provides a detailed independent assessment of dam safety, which results in a statement of the current dam safety condition(s) along with summary of associated deficiencies and non-conformances, usually with some associated ranking of associated importance. It is requirement under CDA (2013), and conclusions are important for relevant stakeholders.
Recommendation/Request	Assuming that the DSR is now completed and has been accepted by AE, the following questions should be addressed; • Can the DSR dam safety statements, and associated summary of deficiencies and non-conformances be provided to the KIA? • Has AE agreed to all recommendations regarding deficiencies and non-conformances in the DSR and will all recommendations be addressed? If so, what documentation exist to confirm this? • Has the Engineer of Record (EOR) reviewed the DSR report and agreed with the noted deficiencies and non-conformances and associated importance ratings? If so, what documentation exist to confirm this?
Importance	Low

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KIA-NWB-4

Review Comment Number	KIA-NWB-4
Subject/Topic	2021 Annual Geotechnical Inspection – Doris Tailings Impoundment Area, Hope Bay Mine, Nunavut, March 2022 and associated Table 1 Tailings Impoundment Area Annual Geotechnical Inspection Report, Recommendations and Agnico Response
References	2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Section 4.1, Tables 11, and 12, Section 4.2.7, and Section 4.3.3.
Summary	• For the North Dam, 34 weekly visual inspections by site staff conducted during this monitoring year. The inspection rate is below the target (52 inspections). • For the South Dam, 29 weekly visual inspections by site staff conducted during this monitoring year. The inspection rate is below the target (52 inspections). • The number of visual inspections has improved in 2021, however additional inspections are required to follow the specified frequency. • Increase the completion of weekly visual inspections at the South Dam in accordance with the required weekly frequency.
Detailed Review Comment	Visual dam inspections at regular frequency are critical to ensure dam safety by observing the visual performance of the dams. SRK has noted that AE needs to improve the number of visual inspections to follow the recommended frequency. Monitoring of their inspection progress would prevent another potential occurrence of missed inspections not found out until the following year.
Recommendation/Request	The following comments and questions are noted and should be addressed; • What staffing plans and associated contingency plans are in place to ensure AE meets the recommended inspection frequency, especially during the care and maintenance stage? • How will AE document and monitor that the recommended inspection frequency is being achieved? How will this be communicated to the EOR?

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Importance	Low

KIA-NWB-5

Review Comment Number	KIA-NWB-5
Subject/Topic	2021 Annual Geotechnical Inspection – Doris Tailings Impoundment Area, Hope Bay Mine, Nunavut, March 2022 and associated Table 1 Tailings Impoundment Area Annual Geotechnical Inspection Report, Recommendations and Agnico Response
References	2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Section 4.2.2.
Summary	• The North 2 thermosyphon is not working correctly. • It does not appear possible to repair this thermosyphon. • SRK notes there are no significant concerns arising from the loss of the North 2 thermosyphon.
Detailed Review Comment	Thermosyphons are a critical element in the design of the North Dam and the loss of any such element could have impacts on the performance of the dam. Although SRK has stated "no significant concerns", relevant stakeholders should be informed of the rationale and criteria to support that conclusion.
Recommendation/Request	The following comments and questions are noted and should be addressed; • What specific rationale and associated criteria have SRK used to arrive at the conclusion that no significant concerns exist with the loss of that element? • What would happen if another thermosyphon became non-functional? • What specific monitoring requirements are in-place to assess this specific concern? What contingency plans are in-place should concerns be noted regarding the dam's performance?
Importance	Moderate

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KIA-NWB-6

Review Comment Number	KIA-NWB-6
Subject/Topic	2021 Annual Geotechnical Inspection – Doris Tailings Impoundment Area, Hope Bay Mine, Nunavut, March 2022 and associated Table 1 Tailings Impoundment Area Annual Geotechnical Inspection Report, Recommendations and Agnico Response
References	2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Sections 4.2.4, 4.2.5 and 4.2.6.
Summary	• Table 15 provides a summary of measured (actual) inclinometer measurements in the North Dam. No comments provided regarding comparison of these values versus design values. • Table 16 provides a summary of survey monument measurements since 2012. No comments provided regarding comparison of these values versus design values. • Table 17 provides predicted creep deformations, as well as allowable design values. • Figure 15 compares predicted versus measured vertical displacements along the dam crest at Station 1+20. No discussion on horizontal displacements is provided.
Detailed Review Comment	Actual dam deformations are measured (as in Tables 15 and 16), but typical practice would be to compare actual versus predicted (or design) values for context, as SRK did for the creep measurements in Section 4.2.6. Vertical displacements are important for water level and liner considerations while horizontal displacements are critical for cracking and stability concerns.
Recommendation/Request	The following comments and questions are noted and should be addressed; • Can SRK confirm that the measured deformation values in Tables 15 and 16 meet design values/expected performance? • Can SRK confirm that horizontal deformations for creep (Table 17) meet design values/expected performance? • Can measured deformations be compared to design values for both vertical and horizontal components?

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	• Can SRK confirm that design deformation values have been considered within TARP's developed for the dam?
Importance	Moderate

KIA-NWB-7

Review Comment Number	KIA-NWB-7
Subject/Topic	2021 Annual Geotechnical Inspection – Doris Tailings Impoundment Area, Hope Bay Mine, Nunavut, March 2022 and associated Table 1 Tailings Impoundment Area Annual Geotechnical Inspection Report, Recommendations and Agnico Response
References	2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Section 4.3.1.
Summary	• Seven ground temperature cables (GTC's) are inactive and 2 GTC's are partially operating out of 27 GTC's originally installed in the South Dam. • Thermal performance conclusions (actual versus design criteria) are not provided for three areas of the dam identified in Table 19 because GTC's are missing or offline. • The thermal design criteria along the base of and in the foundation of the key trench is being met in all locations where data is available. • Four replacement GTCs are suggested to be installed at this time (two upstream and two downstream).
Detailed Review Comment	*In situ* temperature data is critical to assess the performance of a frozen foundation dam design. By BGC's assessment, the number of specific GTC temperature beads has reduced from 262 to 177, a 32% reduction in the of specific temperature measurement locations. SRK is not able to specifically comment if three areas of the South Dam are meeting design criteria. SRK has recommended that 4 additional GTC's be installed in this dam.
Recommendation/Request	The following comments and questions are noted and should be addressed; • Given that temperature data is missing for three areas of the South Dam (Table 19), what rational is provided that the dam meets its design criteria?

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	• If no rationale can be provided, what specific risks may exist and what mitigations plans are in place if the risks are realized? • Will the four recommended GTC's (with associated number of beads) be able to assess the geothermal conditions within the South Dam at a similar level that the original GTC's were intended to? Will SRK be able to provide conclusions for all sections of the dam shown in Table 19? • What installation deadline has been recommended by SRK and is AE following this schedule?
Importance	Moderate

KIA-NWB-8

Review Comment Number	KIA-NWB-8
Subject/Topic	2021 Annual Geotechnical Inspection – Doris Tailings Impoundment Area, Hope Bay Mine, Nunavut, March 2022 and associated Table 1 Tailings Impoundment Area Annual Geotechnical Inspection Report, Recommendations and Agnico Response
References	2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Sections 4.3.2.
Summary	• Table 20 provides a summary of survey monument measurements since 2019 for the South Dam. No comments provided regarding comparison of these values versus design values. • The overall vertical and horizontal displacement since August 2019 is limited in all survey locations. • At this point, the limited displacements observed are not of concern.
Detailed Review Comment	Similar context as for Issue 7 for the North Dam.
Recommendation/Request	The following comments and questions are noted and should be addressed; • Can SRK confirm that the measured deformation values in Table 20 meet design values/performance expectations? • Can the rationale to support the "not of concern" conclusion be provided? • Can SRK confirm that design deformation values have been considered within TARP's developed for the dam?

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Importance	Moderate

KIA-NWB-9

Review Comment Number	KIA-NWB-9
Subject/Topic	2021 Annual Geotechnical Inspection – Doris Tailings Impoundment Area, Hope Bay Mine, Nunavut, March 2022 and associated Table 1 Tailings Impoundment Area Annual Geotechnical Inspection Report, Recommendations and Agnico Response
References	2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Section 4.3.5.
Summary	• Permafrost degradation (thaw depressions and ponding) has been observed at the toe of the South Dam. • Mitigation of the permafrost degradation will be required, and mitigation is proposed as part of the Phase 2 South Dam raise. • A thermal toe berm should be implemented.
Detailed Review Comment	Permafrost degradation is occurring and SRK has recommended that mitigation measures be implemented. The site is now in care and maintenance with likely a reduce staffing capacity.
Recommendation/Request	The following comments and questions are noted and should be addressed; • What time frame has SRK recommended to implement the noted thermal toe berm? • Has AE agreed to the time frame with suitable staffing, equipment and resources to implement the measure?
Importance	Low

KIA-NWB-10

Review Comment Number	KIA-NWB-10
Subject/Topic	2021 Annual Geotechnical Inspection – Doris Tailings Impoundment Area, Hope Bay Mine, Nunavut, March 2022 and associated Table 1 Tailings Impoundment Area Annual Geotechnical Inspection Report, Recommendations and Agnico Response

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References	2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Section 4.7.
Summary	• Settlement and tension cracking have been observed since construction at the TIA Reclaim Jetty Pad. • Repairs were made to the Reclaim Jetty pad to provide shallower side slopes to reduce the likelihood of a failure. • There is still one area of the jetty that is over-steepened. • Survey monitoring does not indicate any displacement concerns after repairs were completed.
Detailed Review Comment	The statement of no concerns following repairs requires some clarification.
Recommendation/Request	The following questions should be addressed; • Are there any remaining concerns with the section of the jetty that remains over-steepened? • Does the over-steepened section require any mitigative measures?
Importance	Low

2021 Annual Geotechnical Inspection for the Doris and Madrid Sites

KIA-NWB-11

Review Comment Number	KIA-NWB-11
Subject/Topic	Doris and Madrid - 2021 Annual Geotechnical Inspection – Pad T Doris Waste Rock Pile
References	Doris and Madrid - 2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Attachment 1 Summary of Observations and Recommendations Doris.
Summary	• The slopes of the waste rock pile stored on Pad T were observed to have been reduced compared to previous inspections but remain over steepened. • SRK has recommended that material being excavated from the pad for mine backfill purposes be preferentially sourced from over steepened area of the pad and that the pad be re-surveyed for the purposes of an updated stability assessment.
Detailed Review Comment	Given the current C&M status of the mine it is uncertain when underground placement of waste rock will resume and

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	if the waste rock pile on Pad T will remain over-steepened as a result.
Recommendation/Request	The following comments and questions are noted and should be addressed; • Has the pad been re-surveyed and have the results been used to update the stability assessment of the over-steepened section of the waste rock pile? • Will placement of waste rock as backfill in the underground mine continue during the C&M period? • If backfilling activities are not resumed during C&M period, will AE re-slope the over-steepened areas of the waste rock pile to comply with the design criteria?
Importance	Low

KIA-NWB-12

Review Comment Number	KIA-NWB-12
Subject/Topic	Doris and Madrid - 2021 Annual Geotechnical Inspection – Madrid North Contact Water Pond
References	Doris and Madrid - 2021 Annual Geotechnical Inspection (SRK Consulting Canada Inc.), Attachment 2 Summary of Observations and Recommendations Madrid.
Summary	• Survey monitoring of the berm has identified areas of elevated deformations corresponding to where the foundation materials consist of overburden permafrost. The deformations are currently within the design criteria. • SRK has recommended continued monitoring
Detailed Review Comment	If the deformations are related to warming of permafrost within the foundation materials it could lead to a negative impact on the performance of the facility.
Recommendation/Request	The following comments and questions are noted and should be addressed; • What is the root cause of the observed deformation? • What contingency measures or actions could be undertaken if the deformations exceed the design criteria.
Importance	Moderate