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Kugluktuk

Bathurst Inlet
Kingaok

Bay Chimo
Umingmaktok

Cambridge Bay
Ikaluktutiak

Gjoa Haven
Okhoktok

Taloyoak

Kugaaruk

Richard Dwyer

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

July 13th, 2022

Re: Review of AEM's 2021 Annual report for Hope Bay Project.

Dear Richard Dwyer, the KIA has reviewed AEM's 2021 Annual Report for the Hope Bay project to the NWB.

1) Compliance Monitoring:

The KIA's Framework Agreement (FA) and Inuit Impact and Benefits Agreement (IIBA) with Agnico Eagle Mines Limited. the cover terms and conditions of NIRB Project Certificate 009 and the NWB Type A water licenses.

The Framework Agreement is a confidential agreement between KIA and TMAC that supersedes and replaces all previous contractual arrangements between both parties. Section 3.1 of the FA covers Terms and conditions of land use license and reporting.

Appendix A of Section 3.1 of the Framework Agreement specifies the details of annual reporting by AEM to the KIA, which is summarized as follows:

AEM is to provide an annual report to KIA providing details of its operations under any land use License, Advanced Exploration Lease and/or Commercial Lease covering the location and operations area of lands affected, and the nature of facilities and equipment at these sites. In addition, AEM is to provide details of progressive reclamation or closure activities undertaken during the year and details of all permits, licenses, and authorizations from other regulatory bodies or agencies that are required for operations.

This annual report is to provide information on:

- Ground disturbances including land use activities for camps, infrastructure, equipment, winter roads and trails.
- Fuel and Chemical storage including Chemicals of Potential Concern inventory (COPC), fuel and chemical usage, and spill records.
- Drilling programs, locations, and methods.
- Water use and effects on water.

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- Wildlife interaction, data logs, and summaries.
- Waste disposal, waste management practices, inventory of waste on site, and inventory of hazardous materials or non-combustible waste removed from site.
- Closure and reclamation progress associated with waste management, drilling, and ground disturbance along with associated costs.
- General information on annual inspection activities by staff and other agencies and their results, community consultations, future exploration work plans, submissions to NIRB, NWB, or NPC or other regulators related to mining activity, archaeological sites and burial grounds, and any incidents of storage or possession of alcohol and drugs on site.

AEM has provided the KIA with the **Hope Bay Project 2021 Annual Report for KIA Framework Agreement** in accordance with Appendix A to Schedule 3.1 of the Framework Agreement. This report is separate from the **Hope Bay Project 2021 Annual Report to the NWB**.

Compliance Status

2) Effects of Monitoring:

a) **Whether the conclusions reached by AEM in the Hope Bay 2021 Annual Report to the NWB are Valid.**

KIA's consultants in the areas of wildlife, aquatic sciences, fish sciences, hydrogeology and geotechnical engineering reviewed the Hope Bay 2021 Annual Report to the NWB and the following documents:

- Hope Bay Project 2021 Nunavut Water Board Annual Report

Overall, our consultants find Sabina's conclusions in the 2020 Annual Report are valid. TMAC has generally presented adequate information to demonstrate that the Hope Bay Belt projects have not adversely affected the aquatic environment. However, several issues were identified in our review of the 2021 Annual Reports and appendices relating to under predicted concentrations, water storage, implementation of spill corrective action, and the need for a more appropriate reference lake. These concerns should be addressed in the coming year to ensure that any trending changes in the aquatic environment from mine related impacts are managed and mitigated in a timely manner.

b) **Any areas of significance requiring further supporting information or changes to the monitoring program, which may be required.**

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Hope Bay Project 2021 Annual Report to NWB

KIA-NWB-01

Review Comment Number	KIA-NWB-01
Subject/Topic	Missing 2021 Wildlife Mitigation and Monitoring Plan and other Project documents
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022)
Summary	The updated 2021 Hope Bay Project Wildlife Mitigation and Monitoring Plan was not available for review alongside the 2021 NWB Annual Report.
Detailed Review Comment	Throughout the 2021 NWB Annual Report, Agnico Eagle states that they submitted to the NWB an updated Hope Bay Project Wildlife Mitigation and Monitoring Plan (Agnico 2021) in April 2021. However, the updated WMMP Plan was not available in the NWB Annual Report package, nor was the document sent directly to the KIA for review. The KIA has provided technical review comments based on the information available in the 2021 NWB Annual Report, the 2021 WMMP Compliance Report, and other relevant Project documents. However, it is anticipated that some outstanding issues may be addressed in the updated 2021 WMMP Plan, and that other issues may arise through review of the updated WMMP Plan. In addition, within the "Operations, Maintenance and Surveillance Manual: Hope Bay Doris Tailings Impoundment Area" document, the Dam Emergency Plan (AEM 2022) in Appendix F is missing.
Recommendation/Request	The KIA requests/recommends the following: • Please distribute the updated 2021 WMMP Plan and other missing management plans to the KIA and interested parties for review as soon as possible.
Importance	High

KIA-NWB-02

Review Comment Number	KIA-NWB-02
Subject/Topic	General report structure
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report

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	(March 2022)
Summary	The structure of the Hope Bay Project 2021 NWB Annual Report is not user-friendly, and the addition of bookmarks, as well as overall improvement of the report structure, may be required to aid the readers.
Detailed Review Comment	In general, the organization and structure of the Hope Bay Project 2021 NWB Annual Report is difficult for readers to follow, as it contains multiple appendices within appendices. For example, the main Appendix F (2021 Waste Rock, Quarry and Tailings Monitoring Report, Doris and Madrid Mines, Hope Bay Project) has an Appendix A to E within it. However, the entire report has five appendices titled "Appendix F" within the document. The current structure of the report makes it difficult to know which appendix is being referenced at times, and the reader should always be able to easily find referenced appendices.
Recommendation/Request	The KIA requests/recommends the following: • Please re-organize the report for next year, such that all appendices have a unique number or letter (i.e., Appendix A-1, etc.). • Please consider adding bookmarks to the PDF to allow the reader to easily navigate to different appendices and sections.
Importance	Moderate

KIA-NWB-03

Review Comment Number	KIA-NWB-03
Subject/Topic	Ongoing issues with environmental resource maps
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Appendix H: Updated Management Plans – Hope Bay Spill Contingency Plan; Appendix 3: Environmental Resource Maps, p. 1809-1812.
Summary	Many of the maps are difficult to interpret with unclear resolution. Furthermore, in most cases, the legends on the maps are unreadable, and certain attributes are outdated.
Detailed Review Comment	In their review of the 2020 NWB Annual Report, KIA commented that the resource maps had extremely low resolution, making it difficult to clearly see and read information presented on the maps, including the legend. The KIA also provided similar comments regarding the same resource maps in previous reviews, and again no improvements have been made. Furthermore, some important fisheries information is still missing from maps A, B, and C. The maps

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	show sampled fish bearing lakes/ponds but do not include fish habitat information for watercourses (i.e., rivers and creeks) that connect with these larger waterbodies. For example, the maps do not present known Arctic char runs/migration habitats. The maps present information/data for certain VCs but only within various time periods. For example, raptor nests are shown for the 2006-2008 period and the 2009 to 2015 period on maps A, B and C. Monitoring has been conducted since 2015, however the environmental resource maps have not been updated. Map updates should be provided, as they can aid with protecting environmental values by providing current information for environmental resources.
Recommendation/Request	The KIA requests the following: • Please increase resolution of Environmental Resource (Sensitivity) Maps A, B, C, and D to improve legibility. It would be helpful if the proponent applied a standard map resolution to all maps. Due to the amount of information shown on some maps (including insets), a larger scale and size format would help. • Please update maps to provide current information for environmental resources, including fish habitat, which can be used to guide spill contingency planning and support other management objectives. • If the proponent does not intend to update maps, please explain how the proponent intends to protect environmental values. • Please consider adding a feature count next to important attributes on the legend to inform the reader on the number of important features on the map. This will help the reader understand quickly how many environmental values may be impacted by a spill, as well as help ensure no features that may not be easily recognized on a map are missed.
Importance	High

KIA-NWB-04

Review Comment Number	KIA-NWB-04
Subject/Topic	Impact of runoff from drill sites on vegetation, soils, and wildlife
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Summary of Project Activities for 2021; Section 3.2.1: Drilling, p. 23. Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Appendix H: Updated Management Plans - Ore

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	and Mine Backfill Management Plan; Section 2.6: Underground Brine Water, p. 1881.
Summary	The proponent conducts underground diamond drilling using saline water to prevent the drill equipment from freezing as it excavates through permafrost. Water quality monitoring was performed on runoff; however, the proponent does not note the impacts of using saline water on vegetation, soil, and wildlife via potential spills.
Detailed Review Comment	In Section 3.2.1 of the summary of project activities for 2021, the proponent states "Water quality monitoring was performed on runoff from drill sites and water used for drilling to ensure the respective Water License Criteria were met". Furthermore, in the Ore and Mine Backfill Management Plan, the proponent notes that underground brine water may be used as a lubricant in the drilling procedure to ensure a lower freeze point and to avoid water supply lines freezing. An excess amount of runoff of underground brine water may result in a brine spill, which can heavily impact wildlife and vegetation. If tundra plants and soils absorb underground brine runoff water, it could also attract various species of wildlife. Ungulates, such as caribou, will seek soils with higher salt content for mineral supplementation to compensate for deficiencies or imbalances, and to aid with digestion by decreasing the influence of digestive disorders and toxic plant compounds, as well as for mineral supplementation (Ayotte et al. 2008). Furthermore, a brine spill can burn tundra vegetation, which already occurred in the area in 2011. Although no long-term impacts from this event were documented, a spill of this calibre could have been toxic to fish if it were to occur in certain contexts: https://www.cbc.ca/news/canada/north/hope-bay-orbit-garant-make-reparations-for-spill-charges-1.2661673 The impact of another brine spill would be detrimental to the area, as tundra vegetation grows at a slower rate and may take hundreds of years before recolonizing the area.
Recommendation/Request	The KIA recommends/requests the following: • Please consider additional safety protocols when using underground brine water to avoid a spill from reoccurring. • Please document all spills of any severity, report them to the KIA, and remediate immediately as required.
Importance	Moderate-High

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KIA-NWB-05

Review Comment Number	KIA-NWB-05
Subject/Topic	Open burning and incineration impacting soils, vegetation, and wildlife
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Solid Waste Disposal; Section 6.1.1: Non-Hazardous Waste Management – Camp Incinerators, p. 30. Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Solid Waste Disposal; Section 6.1.2: Non-Hazardous Waste Management – Open Burning, p. 30.
Summary	The proponent has ensured that animal attractants will be promptly incinerated; however, they have not defined "promptly". Furthermore, the proponent does not mention the impacts of open burning waste on soils, vegetation, or wildlife, or whether those potential impacts are monitored for.
Detailed Review Comment	In Section 6.1.1 of the section on Solid Waste Disposal, the proponent notes that the Incinerator Management Plan strives to ensure that *"animal attractants are promptly incinerated"*. A definition of "promptly" should be provided if the timing is longer than expected. In Section 6.1.2 of the section on Solid Waste Disposal, the proponent mentions the use of open burning for untreated wood, cardboard, and paper products; however, this protocol should be avoided when possible as it can have negative impacts on soils, vegetation, and wildlife. Pollutants from open burning typically disperse through the air as gas, particulate matter, or ash (Cogut 2016). Open burning of waste releases toxic and/or organic pollutants, such as dioxins and furans, into the air, which can impact soil and water quality (Cogut 2016). Organic pollutants are also carcinogenic and have been linked to diseases (Cogut 2016). Furthermore, open burning releases greenhouses gases, such as carbon dioxide, methane, and particulate matter, into the atmosphere, which impact air quality and can lead to respiratory diseases in extreme cases (Cogut 2016). Although less severe than contaminated wood, combustion of untreated woods releases dioxin emissions, in turn impacting air quality and therefore impacting wildlife and vegetation (Lavric et al. 2004). Open burning could also lead to ash build-up, therefore impacting soils. Additionally, open burning could lead to toxic dioxins and furans being deposited on vegetation, which may be later consumed by wildlife (Environment Canada 2010). Dioxins released from open burning also tend to bind to organic matter in sediments and soils (Lavric et al. 2004); therefore,

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	further mitigation may be required.
Recommendation/Request	The KIA recommends/requests the following: • Please define the timeline of incineration, and what the proponent considers "prompt" timing for disposal of animal attractants. • Please indicated whether any monitoring is occurring, or will occur, to determine impacts of incinerator burning on the surrounding environment.
Importance	Moderate

KIA-NWB-06

Review Comment Number	KIA-NWB-06
Subject/Topic	Ocean discharge pipeline 100 litres spill
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Section 11: Spill Reports; p. 46-49.
Summary	A 100 litres spill of treated effluent from the ocean discharge pipeline was reported; however, the extent and severity of the spill were not explained. Furthermore, the spill was not reported to ECCC.
Detailed Review Comment	On June 27th, 2021, in the summary table of reportable spills in 2021, the proponent notes that a 100-litre spill of treated effluent from the ocean discharge pipeline occurred. Details surrounding the impact and remediation or monitoring of the spill were not provided.
Recommendation/Request	The KIA recommends/requests the following: • Please provide details on the impacted surface area of the June 27th, 2021 spill caused by an ocean discharge pipeline leak. • Please confirm whether the proponent conducted soil sampling in the area to determine the severity and extent of the spill.
Importance	Moderate-High

KIA-NWB-07

Review Comment Number	KIA-NWB-07
Subject/Topic	Lead analysis for paint in Doris Commercial infrastructures
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Section 15: Annual Inspection Activities; Table

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	15-1: Summary of Annual Inspection Activities, p. 65.
Summary	The proponent expects to do a lead analysis in paint for the demolition of buildings in Windy Lake Camp; however, they did not outline the timeline and reporting of the analysis.
Detailed Review Comment	On August 19-20, 2021, in the summary table of annual inspection activities, the proponent notes that a lead analysis of paint will be conducted on the infrastructures of the Windy Lake Camp to continue remediation of the facility. The paint in the infrastructures must be lead-free to be demolished, cut up, and burned (refer to TC-03 on the impacts of open burning). The proponent has not detailed the timeline of the lead analysis, and the expected date of completion. Furthermore, the proponent did not clarify when or if they will provide the results of the lead analysis to the KIA. The lead analysis should be submitted to the KIA prior to the release of the 2022 annual report if possible.
Recommendation/Request	The KIA requests the following: • Please provide details on the timeline of the lead analysis and expected date of completion. • Please provide the KIA the results of the lead analysis should they be completed prior to the release of the 2022 annual report.
Importance	Moderate

KIA-NWB-08

Review Comment Number	KIA-NWB-08
Subject/Topic	Load balance parameters for initial screening assessment of water
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Appendix E: Water and Load Balance Assessment; Section 2.2: Review of Water Quality Inputs; Table 7: Initial Screening Assessment of Water and Load Balance Parameters, p. 234.
Summary	Further details may be required for the comparison of results to model prediction for the "conservative" and "trending well" classification types in the table explaining the initial screening assessment of water and load balance parameters.
Detailed Review Comment	In Section 2.2 of the Water and Load Balance Assessment, a review of water quality inputs is described, and Table 7 presents the initial screening assessments of water and load balance parameters. Under the "conservative" classification

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	type, the proponent explains that measured values are below the model predictions, but that "some values may be at or close to the method detection limit and slightly above the model prediction". Furthermore, under the "trending well" classification type, the proponent explains that measured values are tracking well with the model predictions, but that "some parameters tended to exhibit seasonal offsets from measured data". The current laboratory testing used for the assessment of water and load balance parameters had higher detection limits than the predicted values; therefore, it is not possible to determine if the model predictions were correct. To help better inform water quality and the level of accuracy of the model predictions, more details on the quantitative results for each parameter should be provided, explaining what values were at or close to the detection limits or exhibited seasonal offsets.
Recommendation/Request	The KIA recommends/requests the following: • Please note parameters close or equal to the method detection limit and provide these parameters to the KIA. • Please consider using a laboratory that can detect the water quality parameters at a lower detection limit, such that the proponent can comment on the values as being above or at the model prediction values.
Importance	Moderate

KIA-NWB-09

Review Comment Number	KIA-NWB-09
Subject/Topic	Impacts of alternate dust suppressants
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Appendix H: Updated Management Plans – Operations, Maintenance, and Surveillance Manual; Section 4.4: Dust Management, p. 668.
Summary	The proponent notes the use of alternate chemical dust suppressants that are mainly comprised of sugars, starches, and minerals. Further details should be provided on the type of dust suppressant, its response to wildlife and vegetation, and the time it takes to disintegrate or break down.
Detailed Review Comment	In Section 4.4 of the Operations, Maintenance and Surveillance Manual, the proponent notes that alternate suppressants composed of sugars, starches, and minerals will be used during the winter season to control dust. Dust suppressants can impact

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	site characteristics such as topography, soil texture and chemistry, groundwater flow path, vegetation, and wildlife (Piechota et al. 2004). A response to dust suppressants should be evaluated, particularly for soil and soil microbes, aquatic organisms, and vegetation (Piechota et al. 2004). The environmental impacts of the alternate dust suppressants on wildlife and vegetation should be outlined if known. If widely used in the tundra, these chemical dust suppressants can enter the food chains for many species. Furthermore, to mitigate long-term impacts, the length it takes the chemical suppressants to break down or disintegrate in an Arctic environment should also be outlined.
Recommendation/Request	The KIA recommends/requests the following: • Please outline or determine the known impacts of the alternate dust suppressants on wildlife and vegetation. • Please detail the length of time it will take the chemical suppressants to break down in an Arctic environment.
Importance	High

KIA-NWB-10

Review Comment Number	KIA-NWB-10
Subject/Topic	Impacts of blasts on wildlife
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Appendix H: Updated Management Plans – Hope Bay Project Quarry Management Plan; Section 3.1.6: Wildlife Monitoring, p. 1648.
Summary	Wildlife monitoring efforts during blasts include visual inspection of the quarry and surrounding tundra, and behavioural monitoring of animals near the blast area. Further details on the visual inspection procedure and behavioural monitoring program should be provided.
Detailed Review Comment	In Section 3.1.6 of the Hope Bay Project Quarry Management Plan, the proponent notes that visual inspections of the quarry and surrounding tundra will be carried out to verify no caribou or muskox are within 2.8 km from the quarry high point. The KIA recommends that visual inspections should only occur on fog-free days, when line of sight is optimal, and visibility to the intended distance is possible. Furthermore, as 2.8 km is a relatively short distance, it may be beneficial to lengthen the line of sight using an infrared detection device, as trialed for the Back River project. The proponent also mentions that should a caribou or muskox

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	be found at a distance greater than 2.8 km from the blast site, behavioural monitoring during the blast will be conducted to evaluate an individual's response to the blast. The KIA expects that details on behavioural monitoring should be provided in the missing WMMP Plan (see review comment KIA-TC-01) and recommends cross-referencing it in Section 3.1.6 of the Hope Bay Project Quarry Management Plan. In the case of Hope Bay, the goal of behavioural monitoring is meant to lead to adaptive management; however, it should be outlined how monitoring results will be used to inform mitigation through adaptive management.
Recommendation/Request	The KIA recommends/requests the following: • Please elaborate on the visual inspection procedure and confirm whether these will be carried out on clear days. • If visual inspections will only be carried out on clear days, please confirm if blasting will also only occur on clear days. If blasting may occur on non-clear days, please explain how Agnico will ensure that no caribou or muskox are located within 2.8 km of the blast. • Please provide further detail on the behavioural monitoring program, and how it will be used to inform mitigation through adaptive management. Alternatively, provide the updated WMMP for 2021, which may contain these details.
Importance	Moderate

KIA-NWB-11

Review Comment Number	KIA-NWB-11
Subject/Topic	Mitigation measures on oiled shoreline vegetation and nests/eggs
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Appendix H: Updated Management Plans – Hope Bay Spill Contingency Plan; Section 2.3.19.2: Mitigation of Impacts to Birds, p. 1695.
Summary	The proponent noted wildlife monitoring and assessment surveys for oiled and unoiled wildlife; however, they do not consider the impacts on oiled shoreline vegetation consumed by wildlife, as well as culturally important vegetation.
Detailed Review Comment	In the event of an oil spill, the proponent has noted initial wildlife response measures will include hazing to deter wildlife from spill area, wildlife monitoring of impacted species, and bird collection. For wildlife monitoring, the procedures include "assessment surveys for oiled and unoiled wildlife". Although

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	the proponent notes the impacts to archaeological features and sensitive habitats in Section 2.3.19.3, a link between the indirect negative impacts oiled vegetation may have on wildlife is lacking. The proponent does not mention assessment surveys for oiled shoreline vegetation that may be consumed by either terrestrial or marine wildlife. Indirect impacts from oil spills may also affect wildlife as they may consume oiled vegetation, and therefore vegetation should also be assessed. In cases where shorelines of soils, rocks and vegetation are oiled, a need for immediate remediation and shore clean-up may be required. Furthermore, culturally important vegetation should be assessed, as they can be become poisonous, and therefore a danger to First Nations, as well as wildlife. Oiled nests and eggs should also be assessed during an oil spill.
Recommendation/Request	The KIA recommends/requests the following: • Please consider incorporating oiled shoreline vegetation, culturally important vegetation, and nests and eggs to assessment surveys following an oil spill.
Importance	High

KIA-NWB-12

Review Comment Number	KIA-NWB-12
Subject/Topic	Mitigation measures on shoreline substrates or aquatic vegetation
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Appendix H: Updated Management Plans – Hope Bay Spill Contingency Plan; Section 2.3.19.3: Mitigation of Impacts to Archeological Features and Sensitive Habitat, p. 1695.
Summary	The proponent has mentioned the removal of oiled shoreline substrates or aquatic vegetation following advice given by ECCC and the DFO.
Detailed Review Comment	In Section 2.3.19.3, the proponent lists mitigation impacts to archaeological features and sensitive habitat, including contacting the Project Archaeologist to advise next steps, and removing oiled shoreline substrates or aquatic vegetation under the guidance of ECCC and the DFO. The proponent does not mention reporting to the KIA to seek their approval or advice prior to removing oiled shoreline substrates or aquatic vegetation. Inuit organizations should also be consulted prior to any removals, as culturally important vegetation may also be

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	impacted.
Recommendation/Request	The KIA recommends/requests the following: • Please consider only removing oiled shoreline substrates or aquatic vegetation after the approval of local First Nations in addition to ECCC and the DFO.
Importance	High

KIA-NWB-13

Review Comment Number	KIA-NWB-13
Subject/Topic	Environmental impact of diesel fuel on terrestrial wildlife and vegetation.
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Appendix H: Updated Management Plans – Hope Bay Spill Contingency Plan; Appendix 1: Hazardous Materials and Product Specific Emergency Response Plans – Diesel Fuel Specific Spill Response Plan, p. 1767.
Summary	The proponent has noted that diesel fuel is toxic to aquatic life with long lasting effects but does not mention the impacts to terrestrial wildlife and vegetation.
Detailed Review Comment	In the Diesel Fuel Specific Spill Response Plan, the proponent lists health effects, as well as environmental effects. The only listed environmental effects include toxicity to aquatic life with long lasting effects. The proponent does not include terrestrial wildlife or vegetation in the environmental effects; however, diesel fuel can be highly volatile to terrestrial species for a short time, as they may inhale toxic fumes before the diesel has dissipated, feed on contaminated fish, or try to clean fuel from fur and feathers leading to ingestion. Furthermore, if diesel spills into feeding areas for terrestrial wildlife, such as songbirds, this could result in immediate mortality. Terrestrial wildlife and vegetation should be incorporated under environmental effect in the diesel fuel specific spill response plan.
Recommendation/Request	The KIA recommends/requests the following: • Please consider including toxicity to terrestrial wildlife and vegetation to the environmental effects in the diesel fuel specific spill response plan.
Importance	High

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KIA-NWB-14

Review Comment Number	KIA-NWB-14
Subject/Topic	Monitoring wildlife avoidance of pollution ponds
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Appendix H: Updated Management Plans – Hope Bay Project Doris and Madrid Water Management Plan; Section 3.2: Facilities, p. 1913.
Summary	Monitoring protocols for pollution control pond in the Doris Mine Area include measuring water levels, total discharge, and water quality. Wildlife should also be monitored to ensure they are not using the pollution control ponds.
Detailed Review Comment	In Table 3-1 of Section 3.2, the proponent has listed out two pollution control ponds in the Doris Mine Area. For all pollution ponds, the proponent recommends the following monitoring procedures: (1) measure water levels during open water season and frequently during winter or intense rainfall, (2) ensure the pumps have in-line flow meters to quantify total discharge, and (3) take water quality samples annually. More frequent water testing should be considered, as unsafe or toxic water can be detected sooner. Furthermore, wildlife should be monitored to ensure they are not consuming water from pollution ponds, or are exposed to the potentially harmful water, such as ducks wading or swimming on the pollution ponds. Even if fences are established around the pollution ponds to deter wildlife, it cannot prevent waterbirds from using the ponds; therefore, a wildlife monitoring program would be beneficial. The KIA expects that details about wildlife monitoring at pollution control ponds are provided in the missing WMMP Plan (see review comment KIA-TC-01) . The Proponent could also refer to the WMMP Plan within the Water Management Plan to demonstrate that potential wildlife effects are being considered.
Recommendation/Request	The KIA recommends/requests the following: • Please consider incorporating wildlife in the pollution control pond monitoring protocol to ensure they do not consume or expose themselves to potentially toxic water. • Please consider taking water quality samples more frequently if any wildlife is detected using the ponds.
Importance	Moderate-High

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KIA-NWB-15

Review Comment Number	KIA-NWB-15
Subject/Topic	Water quality monitoring not expected in the sumps
References	Agnico Eagle, Hope Bay Project 2021 NWB Annual Report (March 2022), Appendix H: Updated Management Plans – Hope Bay Project Doris and Madrid Water Management Plan; Sections 3.2.4 and 4.2.2: Sumps, pp. 1915 and 1925.
Summary	The proponent does not expect to conduct water quality monitoring in the sumps; however, they do not provide an explanation as to why not.
Detailed Review Comment	In Sections 3.2.4 and 4.2.2 of the Hope Bay Project Doris and Madrid Water Management Plan, the proponent noted that they do not expect water quality monitoring in the sumps. It is not clear why the proponent is not testing water quality in the sumps, and further explanation may be required. It should be outlined if a condition in the license exists where the water quality in sumps only needs monitoring under a certain criterion not predicted to be met in this scenario.
Recommendation/Request	The KIA recommends/requests the following: • Please clarify why the proponent is predicting that water quality monitoring in the sumps will not be required. • Please clarify the established triggers or thresholds where water quality monitoring would be required in the sumps.
Importance	Moderate

KIA-NWB-16

Review Comment Number	KIA-NWB-16
Subject/Topic	Clarification needed for Care and Maintenance activities
References	Agnico Eagle, Hope Bay Project Care and Maintenance Plan (April 2022), Section 3.1: Underground Mine Workings, p. 23; Section 4.2: Water and Waste, p. 34.
Summary	Although an updated Doris and Madrid Water Management Plan (April 2022) was submitted with the Care and Maintenance Plan, it does not include additional information about water management and inspections that may be different as a result of care and maintenance activities. Further clarification is also needed for water and waste management and monitoring during this phase of the Project (Section 4.2 of the Care and Maintenance Plan).

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Detailed Review Comment	In Section 3.1 of the Doris-Madrid Care and Maintenance Plan (DMCMP), the Proponent describes how the Madrid North portal has been moved into Care and Maintenance, including installation of water management equipment. The Proponent states that "an electric, manually operated, submersible pump is located underground which can be used to pump water into a truck or to the ore lined pad as needed." It is unclear how frequently the Madrid North portal will be inspected to determine whether the pump needs to be manually operated. The KIA expected to see further discussion about Madrid North underground water monitoring and inspection in the April 2022 Hope Bay Project Doris and Madrid Water Management Plan (WMP), which was updated and distributed along with the DMCMP for review. However, there does not appear to be additional information about Madrid mine water management in the WMP; Section 6.1 (Care and Maintenance Options) has not changed since the previous version of the plan. The Hope Bay Project Groundwater Management Plan (March 2022), where discussion of mine water would be appropriate, was not updated for the DMCMP and does not explicitly include mine inflow monitoring and mitigation during Care and Maintenance. In Section 4.2, the Proponent states that water and waste management will continue throughout Care and Maintenance as per the Project's Type A and Type B water licenses. Monitoring and reporting will include "visual inspections of discharge to tundra from contact water ponds and sumps". It is unclear what visual inspections of discharge are meant to accomplish. Based on Section 5.5 (Inspections) of the WMP, visual inspections may be used to assess the "integrity of erosion protection at point of discharge to the tundra". However, one of the major components of the WMP is to conduct water quality sampling prior to discharge to the tundra, and this type of monitoring is not mentioned in Section 4.2 of the DMCMP. It will be important to continue with water quality testing to avoid or minimize potential impacts to tundra vegetation and wildlife that may forage on this vegetation.
Recommendation/Request	The KIA recommends/requests the following: • Please update the Doris and Madrid Water Management Plan and/or the Groundwater Management Plan to include measures needed during Care and Maintenance that may be different from the scope of the current plans. • Please clarify whether water quality testing will continue to be conducted on contact water ponds and sumps prior to discharge to the tundra, and at what frequency/time of year. Visual inspections for signs of erosion, if this is the purpose, is

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	only one aspect of water management and monitoring.
Importance	Moderate

KIA-NWB-17

Review Comment Number	KIA-NWB-17
Subject/Topic	Large-scale site layout
References	Hope Bay Project - 2021 NWB Report (AEM, March 2022) Appendix C
Summary	Site layouts provided do not show a large-scale plan view of the three areas (i.e., Doris, Madrid and Boston) encompassing the Hope Bay Project and do not include Boston.
Detailed Review Comment	A comprehensive site layout should include all Project areas to allow for a geospatial understanding of the relevance of area-specific activities/monitoring to another. Furthermore, Figure C-1 and Figure C-2 outline changes to the extents of various facilities in 2021 (e.g., Doris tailings impoundment area (TIA) subaerial beach extents; Figure C-1), but do not show these in detail (e.g., inset) nor is the relevance of these 2021 extents presented by including comparable extents from 2020 (or other years), for example.
Recommendation/Request	KIA requests Site Layouts be updated to be more comprehensive to the Project, namely: • Include a plan view map of all three areas, similar to the one provided in the Aquatics Effects Monitoring Program (reviewed as part of BGC's review of AEM (April 2022) and found in Appendix D-4 therein). • In addition to the 2021 extents of facilities, BGC recommends prior year's extents are included.
Importance	Low

KIA-NWB-18

Review Comment Number	KIA-NWB-18
Subject/Topic	Model-estimated Lake water levels
References	Hope Bay Project - 2021 NIRB Report (AEM, April 2022), Appendix D-2. Water Licence Monitoring data 2BE-HOP1222, Table D2-3.
Summary	• The bulk of data presented in Table D2-3 are italicized, which

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	(according to the table notes) reflects "estimated and modelled values" • Non-italicized data is provided for dates between June 25 and August 19, consistent with the active monitoring period of the water level station at Windy Lake. • No details nor references are provided to describe the assumptions and approach used to estimate/model Windy Lake mean daily water levels (as presented in Table D2-3).
Detailed Review Comment	Review of the information shown in Table D2-3 suggests a linear interpolation is used to estimate water levels. Specifically, a model-estimated low of 18.196 metres above sea level (m asl)) was assumed for water levels from January 1 to June 10, 2021 and November 13 to December 31, 2021 and a linear interpolation was applied to "connect" these low values to the measured data recorded from June 25 to August 19, 2021. It is not clear if these interpolated values, from June 11 to June 24, 2021 and August 20 to November 12, 2021 are reflective of the start of ice break-up and lake freeze-over periods, respectively. Further, it is unclear if the May 17, 2021 under-ice monitoring was incorporated into the values presented in Table D2-3.
Recommendation/Request	KIA requests TMAC/AEM provide the assumptions and approaches used to estimate/model Windy Lake mean daily water levels, as shown in Table D2-3 and discussed in Appendix D-2.
Importance	Low

KIA-NWB-19

Review Comment Number	KIA-NWB-19
Subject/Topic	Water and load balance contributions
References	Hope Bay Project - 2021 NIRB Report (AEM, April 2022), Appendix E. Doris Mine Annual Water and Load Balance Assessment
Summary	Section 1.0 of the Water and Load Balance Assessment (SRK, March 23, 2021) describes the contributing flows and loads to the Doris TIA, but does not include sludges (from the Sewage Treatment Plant [STP]) to be deposited in the TIA as outlined in the Domestic Wastewater Treatment Management Plan and discussed in the main report (Section 5.1; AEM, March 2022)
Detailed Review Comment	Section 1.0 of Appendix E states, "The Doris TIA receives tailings slurry from the mine's process plant (mill); mine water from the Doris and Madrid underground mines; runoff from the

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	Naartok East crown pillar recovery pit; runoff from the camp, ore and waste rock pads (and associated ponds); as well as natural runoff and precipitation." The above statement does not include wastes from sludges produced by the STP and to be stored in the Doris TIA, as described in Section 5.1 of the main report (AEM, March 2022) as follows: "Sludge produced by the treatment plant is disposed of in the TIA as outlined in the Hope Bay Domestic Wastewater Treatment Management Plan." It is not clear how much sludge waste was generated in 2021 and where it is ultimately stored.
Recommendation/Request	Can TMAC/AEM: • Provide details on how STP sludges are managed at site. • Clarify if sludge wastes were produced in 2021 and provide details on where in the NWB submission that these sludge waste volumes are recorded and where they are to be stored for the long term. • Describe whether sludge wastes are included in the water and load balance model.
Importance	Moderate

KIA-NWB-20

Review Comment Number	KIA-NWB-20
Subject/Topic	Water and load balance build details
References	Hope Bay Project - 2021 NIRB Report (AEM, April 2022), Appendix E. Doris Mine Annual Water and Load Balance Assessment, Section 2.1.4
Summary	No model build details are provided in Appendix E, as SRK (March 23, 2022) defers this description to the Final Environmental Impact Statement (FEIS) Water and Load Balance report (SRK, November 2017). However, the absence of basic details of model software, a flow/load schematic to describe inputs/outputs, and governing mechanisms/assumptions hinders a reader's review of model suitability.
Detailed Review Comment	In several sections of the SRK (March 23, 2022) memo, the authors briefly describe mechanisms or inputs to the model that were updated to account for 2021 data and/or where differences to FEIS-modelled values exist. For example, Table 5

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	and Table 6 compare FEIS modelled flows to those measured in 2021 and, in each case, model flow terms were updated to reflect measured values. Models are typically dynamic in that updates to one component invariably influence other components and therefore model predictions. Without an understanding of the model structure, it is unclear how these updates may influence other model components.
Recommendation/Request	BGC recommends TMAC/AEM: • Provide a schematic (e.g., box-and-pointer diagram) describing the model components, linkages, and nodes associated with the water and load balance model • Provide this schematic in future Water and Load Balance Assessment reporting • Provide a summary of the key mechanisms and assumptions incorporated in the model.
Importance	Moderate

KIA-NWB-21

Review Comment Number	KIA-NWB-21
Subject/Topic	Comparison of FEIS modelled mine water flows vs. measured
References	Hope Bay Project - 2021 NIRB Report (AEM, April 2022), Appendix E. Doris Mine Annual Water and Load Balance Assessment, Section 2.1.4
Summary	• Table 5 presents a summary of FEIS forecasted and measured mine water flows for 2021, which breaks down measured 2021 flows from the Doris Mine to Roberts Bay (170,000 m3) or to the Doris TIA (320,000 m3), as well as flows from the Madrid Mine (0 m3). In comparison, the FEIS modelled mine flows were estimated to be 500,000 m3. • The paragraph preceding Table 5 states, "Although the sources and destinations are different than originally modelled, the overall amount of mine water that was indicated as needing management in the FEIS was consistent with the total intercepted mine outflows, with measured flows being 97% of the predicted."
Detailed Review Comment	It is not clear if the authors assume the similarity between FEIS-modelled versus measured values for total intercepted mine flows in 2021 to be a suitable rationale to assess the appropriateness of the FEIS model for flow and load predictions

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	in 2021. Furthermore, it is not clear how the value of "97% of the predicted" was calculated, when 490,000 m3 of mine water was measured and 500,000 m3 was modelled in the FEIS – should this value be 98% or is there a rounding error or other input not described? It is expected that most modelled flow terms have associated water quality inputs (or geochemical source terms), which would influence water quality predictions at downstream model nodes or receptors. Therefore, while the authors have updated the model to account for the measured flows in 2021, the observation that the source or origin of these 2021 measured flows differs considerably from the FEIS assumptions suggests comparison of water quality predictions to the FEIS modelled values may no longer relevant.
Recommendation/Request	KIA requests that TMAC/AEM provide: • A description on how the appropriateness of FEIS modelled flows versus those that were measured in 2021 was evaluated. • Comment as to how the differences in flow origin/sources in 2021 may impact water quality model predictions relative to those provided as part of the FEIS.
Importance	Moderate

KIA-NWB-22

Review Comment Number	KIA-NWB-22
Subject/Topic	Comparison of updated model output to measured data
References	Hope Bay Project - 2021 NIRB Report (AEM, April 2022), Appendix E. Doris Mine Annual Water and Load Balance Assessment, Section 2.2
Summary	• Updates to water balance inputs are made to the calibrated 2020 model (SRK, March 30, 2021) and modelled water quality are compared to measured water chemistry collected at the Doris TIA at the reclaim pump station (TL-1) • Parameters are grouped based on whether they are defined as: o Conservative = measured values are less than model prediction o Trending well = measured values are tracking well with the model predictions o Underpredicted = measured values are greater than model predictions.

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	• No action to update water quality inputs is taken if parameters are defined as 'conservative' or 'trending well', whereas updates are considered if they are defined as 'underpredicted'. o Cyanate (CNO) is identified as underpredicted • Section 2.2.1 states measured CNO values in 2021 range from 2 mg/L to 7 mg/L, in contrast to modelled values between 0 mg/L and 4 mg/L. The same section states the process water source term, which is not described further, has a CNO value reflecting 56% of the measured value at the process plant supernatant (TL-5) (i.e., 40 mg/L vs. 72 mg/L, respectively). • Despite these differences, "no change was made to the calibrated SRK (2021) model" since there is "high variability in the data, and predictions for other cyanide derivatives and nitrogen species (especially ammonia) trended well with measured values."
Detailed Review Comment	Time-series plots of modelled versus measured values in 2021 are provided in Attachment 2 and figures associated with cyanate derivates or N-species involved in cyanide degradation (i.e., thiocyanate (SCN), ammonia, cyanide (CN)) were reviewed. The following is observed: • Overestimation of modelled CN values, by up to several orders of magnitude, relative to measured values • Peak modelled SCN values are underestimated relative to measured values • Modelled ammonia values agree with measured values and generally follow the observed seasonality in both modelled and measured trends It is also noted that other N-species (i.e., nitrate (NO3) and nitrite (NO2)), which may represent further derivatives of ammonia degradation through nitrification and/or denitrification, are shown to be overestimated by model predictions (NO3) or demonstrate an inconsistent 'seasonal' trend to measured values (NO2). Taken as a whole, the results of N-species in the time-series plots are not immediately suggestive of a "trending well" classification (with the exception of ammonia). Further details should be provided on the evaluation of the suitability of modelled values to measured data for these parameters, to support the statement in Section 6 of "overall the mechanisms behind the FEIS water and load balance appear to be well calibrated to the measured data for most parameters."
Recommendation/Request	KIA requests TMAC/AEM describe the mechanisms and assumptions used to model CNO and other cyanide derivatives and/or N-species. Further. these details are recommended to be

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	included as part of annual water and load balance reporting, to support the assessment and conclusions made therein.
Importance	High

KIA-NWB-23

Review Comment Number	KIA-NWB-23
Subject/Topic	Underpredicted values
References	Appendix E Doris Mine Annual Water and Load Balance Assessment – 2021 Calendar Year Section 2.2 Review of Water Quality Inputs and 2.2.1 Cyanate Table 7 Page 234 of 1938
Summary	AEM categorizes predicted concentrations of water quality parameters under four different classifications; conservative, trending well, underpredicted or detection limit greater than prediction. To understand how predictions are classified it is important to understand the methods used determine the classifications. It is recommended the AEM provide clarity of the methods used to classify each parameter.
Detailed Review Comment	To understand if parameters are being correctly classified, a more fulsome definition and the methods used for classification need to be provided. AEM defines underpredicted as, “Model predictions are lower than measured values.” In section 2.2.1 AEM states, “Cyanate (CNO) concentrations in 2021 generally varied within a range of approximately 2 and 7 mg/L with values steadily increasing during ice cover, then decreasing during the open water season before the cycle repeats as ice formation repeats again. The modelled values follow a similar trend, but exhibit an offset at a lower range from measured values, ranging instead between 0 and 4 mg/L.” The reviewer would like to understand what qualifies a parameter as “underpredicted”? Is the difference based on the absolute difference between predicted and measured or a multiplication factor? Or is it based on professional judgement which takes into consideration the parameter of interest? Please provide clarity on the classification.
Recommendation/Request	It is recommended that AEM provide a more fulsome definition of each of the predicted parameter classifications and the methods used for classification.

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Importance	Low

KIA-NWB-24

Review Comment Number	KIA-NWB-24
Subject/Topic	SNP early indicators
References	Hope Bay Project 2021 Kitikmeot Inuit Association Annual Report. Appendix D Water Licence(s) Monitoring Data
Summary	A single year's worth of the surveillance network program (SNP) station data is provided in the annual reports. Early signs of the need for additional treatment and assessing adherence to model inputs would be improved with a discussion that includes additional years data to identify trends in water chemistry.
Detailed Review Comment	The potential need for water treatment can be more easily assessed by evaluating water quality over several years. A single year's worth of data is currently presented in annual reports making it more difficult to identify changes in water chemistry. Data from SNP sites are collected based on the requirements set out in the mines Water Licence(s). Data are provided in annual reports for the past year. The SNP stations are not regulated via effluent quality criteria but act as early warning indicators for potential treatment requirements and to assess model inputs. It is recommended that TMAC include previous years data in the annual reports or provide data analysis (or graphical displays) of previous data so the SNP data can more easily provide early signs that additional treatment may be required, and to assess adherence with the inputs to models that generated FEIS predictions.
Recommendation/Request	Include previous years SNP data in annual reports to help detection the need for additional treatment and to assess adherence with the inputs to models that generated FEIS predictions.
Importance	High

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KIA-NWB-25

Review Comment Number	KIA-NWB-25
Subject/Topic	Doris Sedimentation Pond
References	Hope Bay Project 2020 Kitikmeot Inuit Association Annual Report. Appendix D Water Licence(s) Monitoring Data Appendix D.1. 2AM-DOH1335
Summary	Table D1-1 indicates that sampling at SNP station ST-1 is collected annually.
Detailed Review Comment	It is important that regular sampling of water that is transferred from ST-1 to the TIA from June to October is monitored on a monthly basis. Table D1-1 indicates that samples are collected from ST-1 annually, however water is transferred from ST1-1 to the TIA from June to October of any given year. Therefore, sampling should be completed to be representative of the entire transfer period to ensure it is meeting the influent water quality requirements of the water treatment plant.
Recommendation/Request	It is recommended that AEM complete monthly sampling while discharging to the TIA.
Importance	High

KIA-NWB-26

Review Comment Number	KIA-NWB-26
Subject/Topic	TSS exceedance at BOS-2
References	Hope Bay Project 2020 Kitikmeot Inuit Association Annual Report. Appendix D Water Licence(s) Monitoring Data Appendix D.4. 2BB-BOS1727
Summary	TSS concentrations exceeded the maximum allowable concentration in any grab sample at BOS-2 on September 5th, 2021.
Detailed Review Comment	TSS concentrations exceeded the maximum allowable concentration in any grab sample at BOS-2 on September 5th, 2021. TSS concentrations were well above the maximum allowable concentration in any grab sample of 30 mg/L.
Recommendation/Request	Was the high TSS concentration considered a spill? It is recommended that AEM provide further discussion regarding

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	the high TSS concentration and complete follow up monitoring after exceedances to monitor TSS concentrations and complete investigations to determine reason for high TSS concentrations.
Importance	High

KIA-NWB-27

Review Comment Number	KIA-NWB-27
Subject/Topic	Modeling Total Suspended Solids
References	Hope Bay Project 2021 Nunavut Water Board Annual Report Appendix E. Doris Mine Annual Water and Load Balance Assessment – 2020 Calendar Year Section 1 Introduction Section 2.2 Review of Water Quality Inputs Section 5. 1 Measured Values Table 12 Attachment 2 Annual WLB Assessment – 2021 - PLOTS
Summary	TSS concentrations are not currently evaluated as part of the model predictions as parameters are treated conservatively by the model. As it currently stands TSS concentrations are underpredicted by the model therefore, settling does not appear to be a problem of model predictions. Furthermore, TSS concentrations at the TIA exceed MDMER criteria.
Detailed Review Comment	It would be of benefit to AEM if they were to evaluate predicted model TSS concentrations as they are currently under predicted and concentrations at the TIA exceeded MDMER criteria in October of 2021. In section 2.2 AEM states, "TSS was not evaluated as the model is a conservation of mass balance that does not include a mechanism for TSS settlement (SRK 2021)." Mass balance modelling predicts fully mixed concentrations, and treats all parameters as conservative, in that they do not undergo any assimilation (uptake, transformation, settling) reactions after discharge. It does, however, provide a conservative calculation of fully mixed concentrations in the receiver. Therefore, all parameters, not just TSS, would be treated conservatively. AEM has modeled TSS and provide outputs as plotted in Attachment 2 (reproduced below). The plot shows that despite mass balance modeling not taking settling into consideration, measured concentrations are

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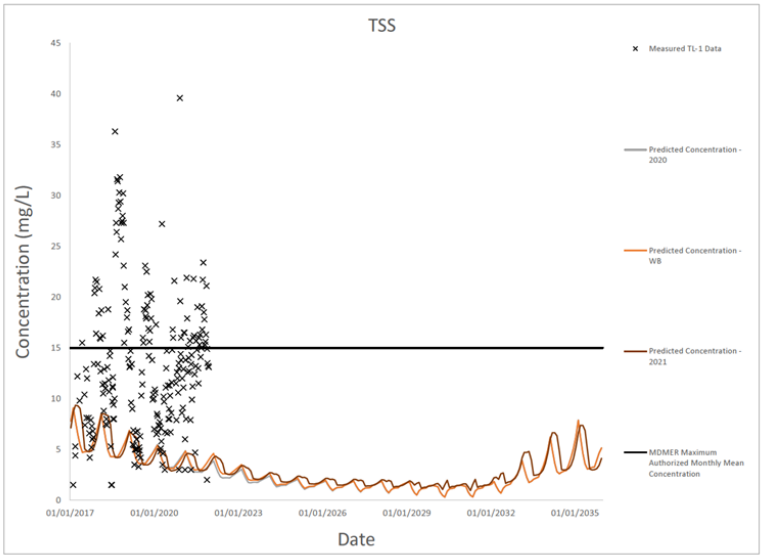
	greater than predicted. Furthermore, in Section 5.1, Table 12 it is noted that TSS concentrations in the Doris TIA exceeded the MDMER maximum authorized monthly mean concentration (15 mg/L) in October (18.75 mg/L). With conservative predictions, a model should typically be overpredicting TSS concentrations. We are concerned however, that AEM's model is underpredicting. This suggests there may be a problem with the assumptions of the model or a divergence in on site conditions. 
Recommendation/Request	It is recommended that TSS be evaluated as part of the annual water load balance assessment as concentrations of TSS appear to be under-predicted and concentrations at the TIA appear to be higher than authorized under MDMER.
Importance	Moderate

KIA-NWB-28

Review Comment Number	KIA-NWB-28
Subject/Topic	Misclassification of Water Quality Parameters
References	Hope Bay Project 2021 Nunavut Water Board Annual Report Appendix E. Doris Mine Annual Water and Load Balance Assessment – 2021 Calendar Year Section 1 Introduction Section 2.2 Review of Water Quality Inputs Attachment 2 Annual WLB Assessment – 2021 - PLOTS Hope Bay Project 2020 Nunavut Water Board Annual Report

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	Appendix E. Doris Mine Annual Water and Load Balance Assessment – 2020 Calendar Year Section 1 Introduction Section 2.2 Review of Water Quality Inputs Attachment 2 Annual WLB Assessment – 2020 - PLOTS
Summary	Several measured concentrations of total and dissolved phosphorus and total vanadium were greater than predicted concentrations in both 2020 and 2021. However, these values were considered conservative (measured values below model predictions), no efforts were made to explain the discrepancy between measured and predicted results and no efforts were made to correct the model predictions.
Detailed Review Comment	Underpredicting concentrations of several metals indicates that the model predictions are not accurate. This was noted in review comments of the 2020 annual report as well as noted in the review of the 2021 annual report. AEM states, *"After the water balance (quantity or volume) adjustment, the model was assessed from a water quality perspective. Parameters were grouped based on the comparison of predicted and observed results for the Doris TIA. The following parameter groups were previously identified Conservative predictions (measured values below the model predictions),* o *Predictions trending well with measured data,* o *Underpredicted, and,* o *Detection limit greater than prediction (i.e. below testing detection)* *The model was considered adequate for the parameters where predictions were conservative (overestimated in the model), trending well with measured data, and where detection limits were greater than prediction. Underpredicted values were assessed individually and adjusted based on measured observations in the process water, mine water and the Doris TIA."* According to Section 2.2, Table 7 in the 2021 report: Initial Screening Assessment of Water Load Balance Parameters (reproduced below), concentrations of total and dissolved phosphorus, and total vanadium were all categorized indicating "measured values are below model predictions". Plots presented in Attachment 2 of the Annual Water Load and Balance Assessment show a large number of measured values above the predicted concentration line. Parameters that were considered underpredicted were carried forward in the assessment and a

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discussion of corrective actions provided. Since total and dissolved phosphorus, and total vanadium were not classified as underpredicted, they were not carried forward in the analysis and no corrective actions were discussed for the greater than predicted concentrations. It is recommended that AEM provide a more detailed definition of classification types (number of measured values greater than the predicted value to be considered underpredicted) to support the classifications provided, indicate if the detection limit is greater than prediction for these parameters or reclassify total and dissolved phosphorus and total vanadium. A discussion should be provided for these parameters regarding the potential causes for the underprediction, potential corrective measures if necessary, and improvements to model outputs.

Table 7: Initial Screening Assessment of Water and Load Balance Parameters

Classification Type	Parameters Included	Comparison to Model Prediction
Conservative	F, nitrate (NO_3) Dissolved Metals: Al, Sb, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Li, Hg, Mn, Mo, Ni, Se, Ag, Tl, V, P, Zn Total Metals: Al, Sb, As, Ba, Ca, Cd, Cr, Fe, Pb, Li, Hg, Mn, Mo, Ni, Se, Ag, Tl, V, P, Zn	Measured values are below the model prediction. The modeled values are reflective of conservative assumptions (typically higher predictions than measured parameter values). *Note: some values may be at or close to the method detection limit and slightly above the model prediction; these parameters were still considered to be in the conservative classification type.*
Trending Well	Total dissolved solids (TDS*), Cl*, ammonia (NH_4), nitrite (NO_2), total cyanide (CN-T), Free cyanide (CN-F), WAD cyanide (CN-WAD), thiocyanate (SCN) Dissolved Metals: Be, B*, Co, Mg*, Na*, U Total Metals: Be, B*, Co, Cu, Mg*, Na*, U	Measured values are tracking well with the model predictions. **Note: while predicted values were within measured ranges, some parameters tended to exhibit seasonal offsets from measured data.*
Underpredicted	cyanate (CNO)	Model predictions are lower than measured values. Corrective actions discussed in subsequent sections.

Sources: https://srk.sharepoint.com/:x:/r/sites/NA1CT022.076/Internal/4_2021_AnnualWLB/Inputs/HopeBay_2021Inputs_1CT022-066_R00_ajb_nf.xlsx?d=w1f5e5cf44ca64e258620c218b584fe03&csf=1&web=1&e=3KqTYd

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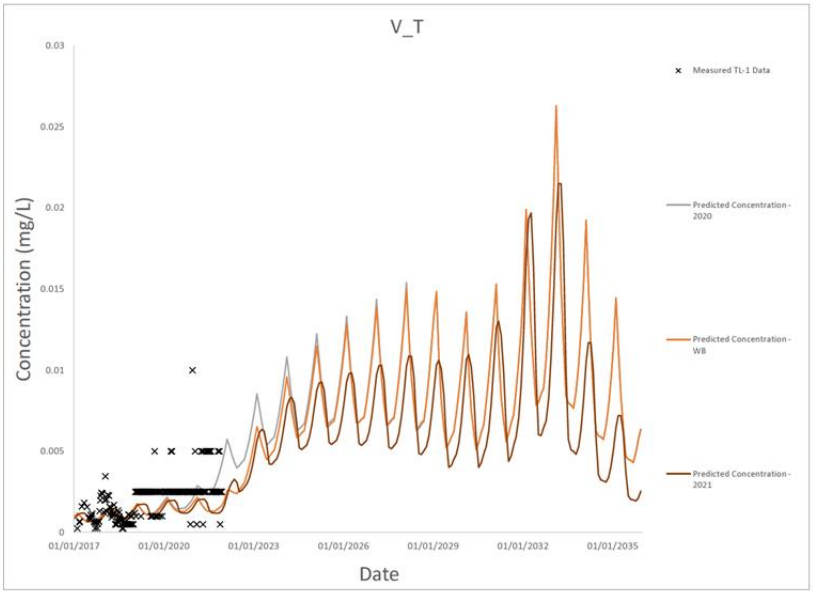

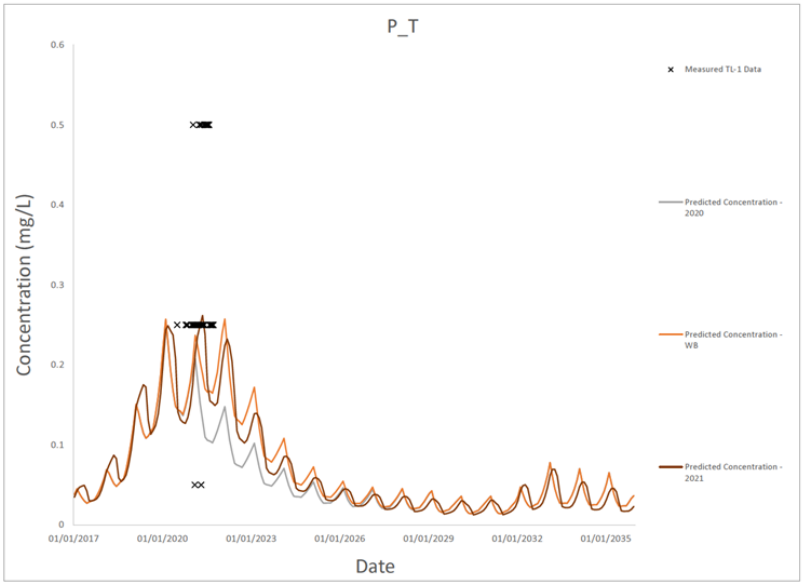

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	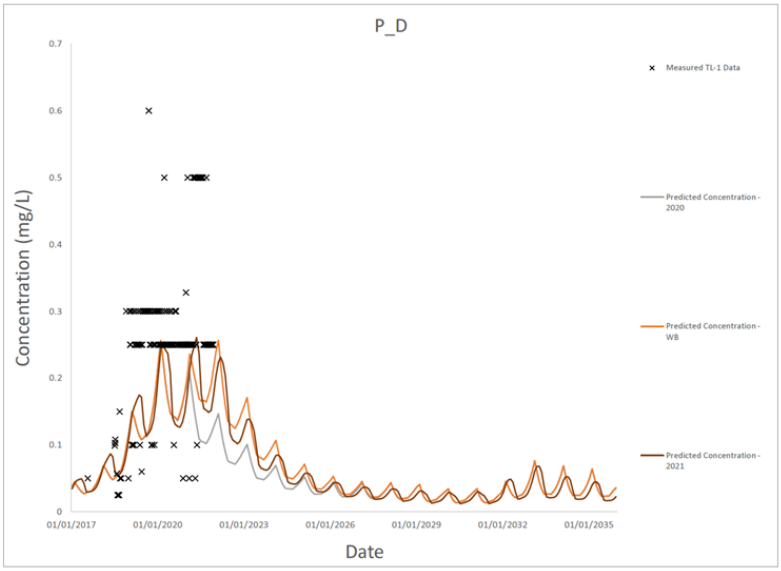
Recommendation/Request	It is recommended that AEM provide a more detailed definition of classification types (number of measured values greater than the predicted value to be considered underpredicted) to support the classifications provided or reclassify total and dissolved phosphorus and total vanadium. A discussion should be provided for these parameters regarding the potential causes for the underprediction, potential corrective measures if necessary, and improvements to model outputs. It is noted that this was identified in the review of the 2020 annual report and continued to be a problem for the 2021 annual report.
Importance	Moderate

KIA-NWB-29

Review Comment Number	KIA-NWB-29
Subject/Topic	Distance of Chemical Storage
References	Hope Bay Project 2021 Nunavut Water Board Annual Report Appendix H. Updated Management Plans Hope Bay Spill Contingency Plan Module A: Doris page 1709
Summary	To ensure that AEM if abiding by all regulations and policy it is important to know if chemical storage locations are a minimum of 31 meters from waterbodies/watercourses.

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Detailed Review Comment	To protect water quality and aquatic biota from mine related degradation due to chemical spills and leaks it is important that all chemical storage locations remain a minimum distance of 31 meters from watercourses/waterbodies. It is recommended that AEM reassure the reviewer that this regulation is being followed. Pages 1716 and 1717 have photos of Roberts Bay Laydown and Doris Camp highlighting fuel or chemical storage locations and spill kit locations. The figures do not have a distance reference, so it is not possible for the reviewer to determine the distance of fuel and chemical storage locations to waterbodies/watercourses. Fuel and chemical storage locations must be a minimum 31 m from waterbodies/watercourses. Please indicate if fuel and chemical storage locations abide by the minimum distance policy.
Recommendation/Request	It is recommended that AEM indicate if fuel and chemical storage locations abide by the minimum distance policy or provide a scale for the reviewer to determine it on their own.
Importance	Moderate

KIA-NWB-30

Review Comment Number	KIA-NWB-30
Subject/Topic	Suitable Refence Lakes
References	Hope Bay Project 2020 Aquatic Effects Monitoring Program Report. Section 3.2.2 Temperature
Summary	Refence Lake B did not reflect the thermal regime of deeper Project lakes in 2020. A deeper refence lake is needed for suitable comparison to deep project lakes.
Detailed Review Comment	To assess the impact of the Project on the physical, chemical and biological properties of lakes in close proximity to project infrastructure both baseline data and suitable Refence Lakes are required. It may not be fitting to use Refence Lake B to comparatively assess regional changes in thermal conditions of deep lakes. The refence lake is used to assess Project related changes to water quality and aquatic biota compared to natural regional shifts. Reference Lake B does not provide a suitable refence for larger deep lakes such as Windy and Doris. An example of this is described in Section 3.2.2 where TMAC states, “In the

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	shallower study lakes, Patch Lake and Reference Lake B, August 2020 temperature profiles were within the range of baseline temperatures (Figure 3.2-2b). However, in the deeper lakes, Windy and Doris, temperatures were warmer than usual in the upper portion of the water column, and the water column was more strongly stratified than usual." A deeper lake with similar thermal regimes should be used for comparisons to deep Project lakes. The need for more reference lakes is particularly important given the continued expansion of the Project. It is recommended that AEM identify additional refence lakes that reflect similar physical, chemical and biological attributes as project lakes and expedite the collection of reference data for future monitoring. This comment was originally provided to TMAC as part of our review of the 2020 annual report. No response to the recommendation was provided. KIA reiterates the recommendation and notes that while the mine is under care and maintenance it provides a good opportunity to begin monitoring additional reference lakes before the mine expands further.
Recommendation/Request	It is recommended that AEM identify additional refence lakes that reflect similar physical, chemical and biological attributes as project lakes and expedite the collection of reference data for future monitoring.
Importance	High

KIA-NWB-31

Review Comment Number	KIA-NWB-31
Subject/Topic	Missing Responses
References	HOPE BAY SPILL CONTINGENCY PLAN Appendix 4: Responses to Comments on Previous Plan Versions
Summary	There appears to be missing responses by AEM to several comments.
Detailed Review Comment	It is important that all comments are provided a response so that the reader understands if the comment is dealt with or if it is still outstanding. For the reviewer to fully understand if these comments have been addressed, a response should be provided for each comment or rationale for why a response is not required.
Recommendation/Request	It is recommended that AEM provide a response for every comment, even if the response indicates the comment has been

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	addressed or refer to a previous response.
Importance	Low

KIA-NWB-32

Review Comment Number	KIA-NWB-32
Subject/Topic	Quarry Rock Blasting
References	Section 2.1.3 HOPE BAY PROJECT 2020 Nunavut Water Board – Annual Report • Setback distances for quarry blasting are required to protect fish • Section 8.1.3 indicates five blasts took place in Quarry 2 • No setback distances are reported from any nearby water bodies • Section 3.1.5 HOPE BAY PROJECT 2020 Nunavut Water Board – Annual Report • Blast vibration monitoring is required for quarry blasting to protect fish • Section 8.1.3 indicates five blasts took place in Quarry 2 • No vibration monitoring reported from any nearby water bodies
Summary	Missing information on whether blasting in Quarry 2 is located near any water bodies where setback distances and vibration monitoring would be required.
Detailed Review Comment	It is important to know whether Quarry 2 is located near any fish bearing water bodies.
Recommendation/Request	Same as above.
Importance	Low

KIA-NWB-33

Review Comment Number	KIA-NWB-33
Subject/Topic	Quarry discharge
References	Appendix D.2. HOPE BAY PROJECT 2020 Nunavut Water Board – Annual Report A sample was taken at monitoring station HOP-7D located in Quarry D, on August 8, 2021. Notification of discharge was provided to the Inspector on May 10, 2021 and results of the monitoring are

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	presented in Table D2-1. An estimated total of 800 m3 of water was discharged to the tundra (13W 0432823 7551708), based on pumping times. Section 2.2.4 HOPE BAY PROJECT 2020 Nunavut Water Board – Annual Report It is required that quarry discharge not be into fish bearing water bodies.
Summary	It is unknown whether quarry water discharged onto the tundra was in proximity to any fish bearing water bodies.
Detailed Review Comment	It is important to know whether the water discharged onto the tundra could have flowed or seeped into any nearby fish bearing water bodies.
Recommendation/Request	Please report whether the discharged quarry water was in proximity to any fish bearing waters.
Importance	Moderate

KIA-NWB-34

Review Comment Number	KIA-NWB-34
Subject/Topic	Active monitoring stations
References	5. Water Use and Waste Disposal (2021 Nunavut Water Board Annual Report) Text: *"During 2021, Agnico collected data from the following active or seasonally active monitoring stations: TL-1, TL-2, TL-5, TL-6, TL-7a, TL-7b, TL-9, TL-11, TL-12, ST-1, ST-2, ST-4, ST-5, ST-6a, ST-6b, ST-* *7, ST-7a/MMS-4b, ST-8, ST-9, ST-11, ST-12, MMS-1, and MMS-9. Monitoring at stations ST-3 (Landfill Sump), ST-13 (Doris Contact Water Pond Pad U), MMS-4a (Freshwater intake at Windy Lake North), and MMS-8 (Madrid North Fuel Storage Facility) did not occur, as these facilities were not constructed as of 2021.* *Monitoring at ST-10 (Doris Site runoff from sediment controls) and MMS-9 (Madrid Site runoff for sediment controls during construction) was not conducted as no new infrastructure was constructed at Doris or Madrid in 2021."*
Summary	MMS-9 is referenced as an active monitoring station; however, Appendix D.1 indicates MMS-9 as not being conducted as no new infrastructure was constructed in Doris or Madrid.
Detailed Review Comment	Same as above.

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Recommendation/Request	Confirm that MMS-9 is not an active monitoring station.
Importance	Low

KIA-NWB-35

Review Comment Number	KIA-NWB-35
Subject/Topic	Year
References	5.4 Boston – 2BB-BOS1728 (2021 Nunavut Water Board Annual Report) Text: *"No water was used from Aimaokatalok (Spyder) Lake (BOS-1a) or from Stickleback Lake (BOS-1b) for domestic use at Boston Camp, to support surface exploration drilling activities or any other purpose in 2020.* *No samples were collected from monitoring stations BOS-1a or BOS-1b in 2020."*
Summary	-
Detailed Review Comment	-
Recommendation/Request	1) Please provide confirmation for whether or not water was used from Aimaokatalok (Spyder) Lake or from Stickleback Lake for domestic use at Boston Camp, to support surface exploration drilling activities or any other purpose in 2021. 2) Please confirm no samples were collected from monitoring stations BOS-1a or BOS-1b in 2021.
Importance	Low

KIA-NWB-36

Review Comment Number	KIA-NWB-36
Subject/Topic	Sample ID
References	9.1.1 Doris Waste Rock Influences Area (2021 Nunavut Water Board Annual Report) 6.3.1 Doris (2021 Waste Rock, Quarry and Tailings Monitoring Report, Doris and Madrid North Mines) 5.1.1 Doris Waste Rock Influenced Area (2021 Hope Bay Waste Rock, Ore and Infrastructure Seep Monitoring) Text: *"Prior to 2020, the seepage chemistry at the toe of the access road had the signature of waste rock and was more dilute than seepage at the toe of Pad I. Since 2020, seepage chemistry has*

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	indicated a loading source other than waste rock and has been geochemically characterized according to two loading sources: i) the downstream toe of the waste rock/ore stockpile on Pad I (21-DC-01 to 21-DC-03), and ii) toe of the access road (21-DC-04 and 21-DC-05). *For the access road samples (21DC-04 and 21DC-06)"*
Summary	See above
Detailed Review Comment	Attachment 2 – 2021 Field Observations and Measurements confirms that there is no sample ID 21DC-06
Recommendation/Request	Verify that 21DC-06 is 21DC-05
Importance	Low

KIA-NWB-37

Review Comment Number	KIA-NWB-37
Subject/Topic	Source of loading and contaminants
References	9.1.1 Doris Waste Rock Influences Area (2021 Nunavut Water Board Annual Report) 6.3.1 Doris (2021 Waste Rock, Quarry and Tailings Monitoring Report, Doris and Madrid North Mines) 5.1.1 Doris Waste Rock Influenced Area (2021 Hope Bay Waste Rock, Ore and Infrastructure Seep Monitoring) Text: *"Concentrations were higher in chloride and ammonia concentrations in the road seepage samples than the Pad I sample, suggesting a loading source other than waste rock"*
Summary	Additional source of loading is expected.
Detailed Review Comment	The 2021 Seepage Monitoring of Doris and Madrid Waste Rock, Ore, and Infrastructure Technical Memo indicates that not only chloride and ammonia concentration are higher in the road seepage samples than the Pad I sample but also Nitrate and Cyanate.
Recommendation/Request	The additional loading source for the seepages 21DC-04 and 21DC-05 should be identified and investigated, as necessary.
Importance	Moderate

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KIA-NWB-38

Review Comment Number	KIA-NWB-38
Subject/Topic	Arsenic values
References	9.1.1 Doris Waste Rock Influences Area (2021 Nunavut Water Board Annual Report) 6.3.1 Doris (2021 Waste Rock, Quarry and Tailings Monitoring Report, Doris and Madrid North Mines) Test*: "A comparison of seepage trace element concentrations is summarized as follows:* *Higher for stockpile stations: sulphate (530 mg/L), arsenic (ranging from 0.0040 to 00042 mg/L and three times higher), cobalt (0.034 to 0.035 mg/L and one order of magnitude higher), molybdenum (0.012 to 0.013 mg/L and one order of magnitude higher), and nickel (0.051 to 0.053 mg/L and one order of magnitude higher). Trends in these parameters were relatively stable except sulphate, which has been increasing with time."*
Summary	Arsenic values are ranging from 0.0040 to 0.0042 according to Table 3-1 Summary of select Laboratory Results of 2021 Doris Waste Rock Influenced Area (WRIA) Seepage Samples – 2021 Seepage Monitoring of Doris and Madrid Waste Rock, Ore, and Infrastructure / Technical Memo. Concentration values in text is incorrect.
Detailed Review Comment	Same as above.
Recommendation/Request	Please rectify concentration values: arsenic (ranging from 0.0040 to 0.0042 mg/L).
Importance	Low

KIA-NWB-39

Review Comment Number	KIA-NWB-39
Subject/Topic	Sulphate values
References	9.1.1 Doris Waste Rock Influences Area (2021 Nunavut Water Board Annual Report) Test: *"For stockpile seepage, trends for all parameters were either decreasing or stable except for sulphate, which was increasing."* Technical Memo: 2021 Seepage Monitoring of Doris and Madrid Waste Rock, Ore, and Infrastructure. 4.1 Doris Waste Rock Influenced Area *Historically, sulphate concentrations in seepage at the toe of the access road were lower than…… ore (average stable rate of*

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	13 mg/kg/week, n=3; SRK 2015a) compared to Doris ore (average stable rate of 3.2 mg/kg/week, n=4; SRK 2015b).
Summary	The effects of sulphate increase in the seepage from the toe of the stockpile on Pad I on receiving environments should be clarified. A remediation action plan, to decrease or to stabilize the sulphate concentrations at the seepage should be investigated.
Detailed Review Comment	Same as above
Recommendation/Request	Please confirm if the 2021 updated water balance includes the latest sulphate concentrations for the waste rock influenced area and clarify how the proponent is addressing this increase in sulphate concentrations.
Importance	High

KIA-NWB-40

Review Comment Number	KIA-NWB-40
Subject/Topic	Concentration values
References	9.1.3 Madrid infrastructures and Roads (2021 Nunavut Water Board Annual Report) 6.3.2 Madrid North (2021 Waste Rock, Quarry and Tailings Monitoring Report, Doris and Madrid North Mines) 4.2.2 Infrastructure and Roads (2021 Seepage Monitoring of Doris and Madrid Waste Rock, Ore, and Infrastructure / Technical Memo) Text: *"o Nitrogen nutrients, which are present in or residuals of explosives, were present at significantly lower concentrations in 2021, including ammonia (two orders of magnitude lower), nitrate (three to five orders of magnitude lower) and nitrite (up to two orders of magnitude lower).* *o Trace element concentrations were lower for all elements indicated as having high rates of metal leaching by the 2020 seepage survey, including dissolved cadmium (one to two orders of magnitude), cobalt (two orders of magnitude), iron (three to four orders of magnitude), manganese (one order of magnitude), nickel (one order of magnitude), selenium (one order of magnitude) and zinc (one order of magnitude).* *o Seepage from the Overburden Stockpile in 2021 was characterized by lower concentrations of EC and most major ions, whereby EC, sulphate, calcium, and potassium were one order of magnitude lower than 2020 samples and chloride, magnesium*

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	and sodium were up to two orders of magnitude lower. The major ion composition of 2021 samples was relatively uniform and distinctive from 2020 seepage samples. *o Ammonia and phosphorus concentrations in 2021 were two orders of magnitude lower than in 2020.* *o Concentrations of dissolved trace elements were lower in 2021 with levels one or two orders of magnitude lower for antimony, cadmium, cobalt, iron, lead, manganese, molybdenum, nickel, selenium, and zinc. Notably, arsenic concentrations were roughly equivalent.* *o The significant decrease in concentrations of major ions and trace elements in seepage from 2020 to 2021 validates the conceptual geochemical model that the source loading to seepage chemistry in 2020 was the thawing and draining of frozen saline porewater within overburden. Seepage samples collected in 2021 were from a different location than 2020 samples and therefore may represent drainage from non- and less saline overburden that is present in the stockpile (SRK 2021d)."*
Summary	Concentration values not indicated.
Detailed Review Comment	Same as above
Recommendation/Request	To be consistent with the rest of the report, please indicate concentration values ranges.
Importance	Very Low (It's more a recommendation for future annual reports)

KIA-NWB-41

Review Comment Number	KIA-NWB-41
Subject/Topic	Underground Seepage Monitoring (TL-11)
References	Appendix D Text*: "In December, three flowing seeps were identified, and samples were collected at each location. Results of this sampling is provided in Table D1-33 and Table D1-36."*
Summary	Table D1-33 and D1-34 present a summary of the results of seepages from Underground Backfilled Stopes (TL-11). Three seeps were observed and sampled at three locations during the inspection in August and December 2021 (TL-11A, TL-11B and TL-11C).
Detailed Review Comment	It has been noted a difference in some parameters for seep TL11-C between the two sampling events (i.e.: Conductivity: 21800 µs/cm in August and 279 µs/cm in December, Ammonia-Total (as N): 34.2 mg/l in August and 0.0117 mg/l in December,

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	Sulfate: 1910 mg/l in august 2021 and 4.23 in December 2021 etc.). It is recommended to explain or investigate the cause of the fluctuation in concentrations between August and December sampling. Concentrations appear to be stable during the two sampling events for seeps TL-11A and TL-11B.
Recommendation/Request	The fluctuation of conductivity, total ammonia, sulfate and metals concentrations at TL-11C between the two sampling events should be clarified or investigated.
Importance	High

KIA-NWB-42

Review Comment Number	KIA-NWB-42
Subject/Topic	Table D1-44
References	Appendix D – Table D1-44 Sample ID: MMS-1/MAE-04S ALS ID: YL2100748-005 Date Sampled: 2021-07-07 -13:45
Summary	Table D1-44 shows results for Sample MMS-1/MAE-04S from 2021-07-07 twice.
Detailed Review Comment	There is a possibility that one Sample ID was overwritten.
Recommendation/Request	Please verify the following: • That Table D1-44 is not missing one Sample Result from 2021-07-07 (MMS-1/MAE-04N) • If no other sample result is missing or overwritten, please remove duplicate (MMS-1/MAE-04S – 2021-07-07)
Importance	Low

KIA-NWB-43

Review Comment Number	KIA-NWB-43
Subject/Topic	HOP-7D sample results
References	Appendix D.l2 Text: *"A sample was taken at monitoring station HOP-7D located in Quarry D, on August 8, 2021. Notification of discharge was provided to the Inspector on May 10, 2021 and results of the monitoring are presented in Table D2-1."*
Summary	Table D2-1 refers to 2BE-HOP1222 Sample Stations, Sample

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	Frequency and Analytical Parameters and not HOP-7D sample results.
Detailed Review Comment	No Table shows HOP-7D sample results from August 8th, 2021.
Recommendation/Request	Please add Table with HOP-7D parameter results from August 8th, 2021.
Importance	Low

KIA-NWB-44

Review Comment Number	KIA-NWB-44
Subject/Topic	BOS-2, BOS-5 and BOS-9 Water Quality sampling
References	5.4 Boston – 2BB-Bos1727 (2021 Nunavut Water Board Annual Report) Text: "*Water management occurred at the Containment Pond (BOS-2) and the Bulk Fuel Storage Facility (BOS-5) in 2021. Water accumulation in the Bulk Fuel Storage Facility (BOS-5) was transferred to the Containment Pond (BOS-2). No water was discharged to tundra from this facility in 2021.* *Dewatering of the Portal (BOS-9) was not conducted in 2021. Dewatering of the Landfarm Treatment Area (LTA; BOS-6) was not required in 2021. The LTA was decommissioned in 2019 and no water quality sampling was conducted for this facility.* *Water quality sampling of seepage/runoff from the ore stockpiles and camp pad to the tundra (BOS-8) was conducted in 2021.* *A summary of water quality monitoring for the Boston Site under this license 2BB-BOS1727 is provided in Appendix D.4."*
Summary	There is no mention in the annual report, more specifically in section 5.4, that BOS-2, BOS-5 and BOS-9 were sampled.
Detailed Review Comment	The annual report indicates BOS-8 was sampled in 2021, but it does not specify that BOS-2, BOS-5 and BOS-9 were also sampled in 2021.
Recommendation/Request	• BOS-2 was sampled on June 28th, 2021, July 18th, 2021 and September 5, 2021. The sample collected on September 5th, 2021 exceeded the Maximum Concentration in Any Grab Sample for TSS. In addition, Arsenic did not pass the Maximum Average Concentration for the sample collected on July 18th, 2021. • The Bulk Fuel Storage Facility (BOS-5) was sampled in June 28 and the measured concentration for Arsenic and Lead did not pass the Maximum Concentration in any

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	Grab Sample allowable criteria (as outlined in Part D Item 19 of the water license). • BOS-9 was sampled in July 18, 2021 and results met the discharge criteria outlined I Pard D Item 6 of the water license.
Importance	Please add clarification in paragraph 5.4 regarding the sampling and the exceedances for the samples collected at BOS-2, BOS-5 and BOS-9.

KIA-NWB-45

Review Comment Number	KIA-NWB-45
Subject/Topic	Mine discharge
References	2.2.1 Cyanite (Appendix E Doris Mine Annual Water and Load Balance Assessment – 2021 Calendar Year) Text*: "Comparing the measured data to the process water source term, it was found that since 2018, monthly average concentrations of cyanate in process water have increased above the source term concentration of 40 mg/L, with average 2021 concentrations being approximately 72 mg/L."*
Summary	SRK stated that cyanate will continue to be monitored in the future to determine if cyanite in process water is maintained at an elevated concentration (indicating a need for a change in source term) or is increasing/decreasing (indicating a need for assessment of the mechanisms controlling cyanate).
Detailed Review Comment	The increasing trend in cyanite has been confirmed based on water sampling results. It is understood that there is a high variability in values, but the increasing trend is clear. The reasons for the increasing trend in cyanite concentrations should be investigated and clarified and remediation action should be considered.
Recommendation/Request	Please clarify the reasons for the increasing trend in cyanite concentrations or, at least, please clarify the steps taken to address this potential concern.
Importance	Moderate

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Thank you.

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