



August 7<sup>th</sup>, 2020

Erin Reimer / Emily Koide  
Technical Advisor I  
Nunavut Impact Review Board  
P.O. Box 534  
Arviat, NU  
X0C 0E0

**Re: Agnico Eagle's response to Meadowbank (03MN107) and Whale Tail (16MN056) 2019 Annual Report comments**

Dear Ms Reimer and Ms. Koide,

As per previous discussion, the following information are intended to address some of the regulator's comments regarding the Meadowbank (03MN107) and Whale Tail (16MN056) 2019 Annual Report. Agnico Eagle's second part of our responses will be provided by August 21, 2020.

- Government of Nunavut – July 6, 2020: Comment Request for Agnico Eagle Mines Limited's Meadowbank Gold Mine Project and Whale Tail Pit Project 2019 Annual Report (03MN107 & 16MN056)
- Fisheries and Oceans Canada – July 27, 2020: [03MN107/16MN056] – Agnico Eagle Mines Ltd. – Meadowbank Gold Mine and Whale Tail Pit Projects- 2019 Annual Report
- Crown-Indigenous Relations and Northern Affairs Canada – July 6, 2020: Comment Request for Agnico Eagle Mines Limited's Meadowbank Gold Mine Project and Whale Tail Pit Project 2019 Annual Report
- Kivalliq Inuit Association – July 6, 2020: Review of 2019 Meadowbank and Whale Tail Annual Report
- Kivalliq Inuit Association – May 21, 2020: Kivalliq Inuit Association technical review of the Meadowbank Terrestrial Ecosystem Management Plan Version 8, April 2020
- Environment and Climate Change Canada – July 6, 2020: 03MN107/16MN056 – Agnico Eagle Mines Ltd. – Meadowbank Gold Mine and Whale Tail Pit Projects - 2019 Annual Report
- Transport Canada – July 6, 2020: Transport Canada's comments on Agnico Eagle's 2019 Annual Report for the Meadowbank Gold Mine and Whale Tail Pit Projects (NIRB File No.: 03MN107 & 16MN056)



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Should you have any questions or require further information, please do not hesitate to contact us at the below.

Regards,

**Agnico Eagle Mines Limited – Meadowbank Complex**

Nancy Duquet-Harvey

[Nancy.harvey@agnicoeagle.com](mailto:Nancy.harvey@agnicoeagle.com)

819-759-3555 x 4606980

Environment Superintendent



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## **1 Government of Nunavut (GN)**

### **1.1 Caribou Movement Effects**

**Term and Condition:** No 29 (Project Certificate 008)

**References:** Agnico Eagle Mines (AEM) Limited. (2019). Meadowbank Gold Project 2018 Annual Report, Appendix 45 (Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report); Agnico Eagle Mines (AEM) Ltd. (2020). Meadowbank Mine 2019 Wildlife Monitoring Summary Report. Final. Appendix 52 of the Meadowbank Mine Annual Report.

**Identification of Issue:** The 2018 Wildlife Monitoring Summary Report (AEM 2019) concluded that the Environmental Impact Statement predictions and the monitoring threshold for sensory disturbance of caribou were exceeded in 2018 (AEM 2019, Appendix 45, Tables 3.12 and 6.1). Migrating caribou appeared to exhibit significant deflection and delayed crossing in response to Project roads (AEM 2019, Appendix 45, Figures 6.7 and 6.8, Sections 6.6 and 6.7).

The 2019 Wildlife Monitoring Summary Report (AEM, 2020) provides further commentary on caribou movements in 2018 concluding that a GN-led satellite collaring field program conducted in the spring of 2018, using a helicopter, may have affected the movements of caribou through the Project's regional study area and could account for the apparent disruption of migratory movements across Project's roads that was observed in 2018. However, the report does not provide any evidence to substantiate this conclusion.

Drawing important conclusions regarding environmental effects without presenting evidence is a concerning trait that leads to unnecessary confusion and disinformation amongst reviewers, regulators and the public at large. Conclusions presented in annual monitoring reports should be based on data, analyses and fact-based interpretations of results only.

**Importance to review and supporting rationale:** Section 17 of the 2019 Wildlife Monitoring Summary Report states that:

"Overall, very high caribou numbers were recorded along project roads during surveys in 2019 with numbers in April higher than in any other previous year. Mitigation measures (e.g., convoying, reduced speed limits, limiting vehicle volumes, and road closures) for Caribou along the roads appeared to facilitate passage of Caribou across the roads as compared to what was observed in 2018. Of note, is that Caribou movements in 2018 may have been affected by a satellite-collaring program in late April and early May."



The conclusion that a satellite collaring program may have affected caribou movements is not supported by any data, analyses or other information presented in the report. This conclusion appears to be based on the opinion of the report's author but is not referenced as such.

The deployment of satellite collars on migrating caribou in the Project's regional study area in the spring of 2018 was part of the GN's on-going caribou monitoring program, supported in part by financial contributions from the Proponent. One of the objectives of this program is to understand potential effects of the Project on caribou movements and to provide real-time information on movements to support implementation of the Proponent's caribou protection measures (CPM). The deployment of collars in 2018 occurred over a period of 3 days in the spring. A total of 34 collars were deployed (M. Campbell pers comm.)

Currently, there are no analyses suggesting that a 3-day deployment of collars had any detectable effect on the migratory movements of regional caribou herds in the spring of 2018.

**Recommendation 2:** The GN offers the following recommendations to the Board with respect to this issue:

1. That the Proponent clarify where, in the 2019 Wildlife Monitoring Summary report, those data, analyses and information supporting the Proponent's assertion that the collaring program affected caribou movements can be found.

**Agnico Eagle's Response:**

*Agnico Eagle has provided funding to support the GN's collaring program under a Memorandum of Understanding between Agnico Eagle and the GN Department of Environment, but does not contribute input about where deployment should occur. The GN did not communicate its intent to deploy collars on caribou in 2018 in areas adjacent to the Whale Tail Haul Road or All-weather Access Road (AWAR).*

*A simple search of the scientific literature yields five studies on the effects of capture and collaring of ungulates (Morellett et al. 2009; Neumann et al. 2011; Dechen Quinn et al. 2012; Northrup et al. 2014; Becciolini et al. 2018), but none specific to caribou. This means that such effects to caribou have either not been studied or reported. It does not mean that effects from capture and collaring to caribou do not occur. The behavioural response to capture and collaring noted in the five studies was either increased or decreased movements, so adverse effects were measurable. In all but one study, censoring data was recommended. Censoring recommendations ranged from 1 day to 14 days post-capture. The lone study (Becciolini et al. 2018) that did not discuss censoring of location data still measured increased movements for up to 10 days following capture. Investigators would*



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*desire to censor data to remove capture and collaring effect bias that may confound the effects of study interests. While there are no collaring effects studies on caribou, the scientific literature does have examples where caribou data are censored relative to capture dates (DeMars et al. 2013; Wilson et al. 2016).*

*Collaring of caribou involves use of close-action net gun by low-level helicopter, and if net gunning is successful, constraining a caribou for a period of time (e.g., up to 20 to 30 minutes) where morphological and samples such as blood are collected. At the end of the period the captured animal is released. From the caribou's perspective the capture and handling may be a similar experience to escape from predation and therefore, traumatizing. It would be reasonable to expect that traumatizing experiences such as capture during collaring programs may elicit an adverse response to exposure to helicopters in future years. As well, caribou that are pursued for capture but where net gunning is unsuccessful may also adversely respond to subsequent exposure to helicopters due to helicopter harassment. Response by barren-ground caribou to helicopter disturbance has been also been recorded (Calef et al. 1976, Miller and Gunn 1979, Gunn et al. 1983). The Government of British Columbia recommends waiting two to three weeks post capture to allow animals to re-distribute themselves before re-sighting (MELPRIB 1998). Of note is that the GN currently prohibits monitoring of caribou by helicopter and Agnico Eagle assumes this is because the GN believes that helicopters disturb caribou. In 2018, the GNs collaring program took place between April 30 to May 2, which is during spring migration and late in cow pregnancy, which is less than ideal.*

*According to 2018 collaring program capture information provided by the GN, distances from Meadowbank Mine infrastructure of 34 caribou captures ranged from 75 metres to 69 km, with a median distance of 6 km, which are well within distances caribou can move in a 10 to 14 day period of observed collaring effects observed in ungulates (Morellett et al. 2009; Neumann et al. 2011; Dechen Quinn et al. 2012; Northrup et al. 2014; Beccioli et al. 2018). Caribou collaring by the GN in 2018 also coincided with the later stages of caribou pregnancy. It is unknown if this further affects caribou behaviour in the short-term. This means that any effect of sensory disturbance from the Meadowbank Mine will be confounded by a behavioural response of the collaring program that was completed near the Mine in 2018, including caribou that had been collared in previous years that are reacting adversely to helicopter disturbance.*

*Analyses of Lorillard collared caribou completed in Golder (2019, updated in 2020) on interactions with the Haul Road and AWAR, which the GN reviewed, showed that newly collared caribou in 2018 behaved differently during spring migration duration than other collared caribou. The duration of spring migration for caribou newly collared in 2018 was*





*on average 8.4 days less (95%CI: -14.2 days to -2.7 days) than for other collared caribou during 1998 to 2019. A shorter duration could be achieved by either faster movement or movement over a shorter distance or both. Regardless of which, an effect was statistically measurable.*

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- Northrup JM, Anderson CA JR, Wittemyer, G. 2014. Effects of helicopter capture and handling on movement behavior of mule deer. *Journal of Wildlife Management* 78:731-738.
- MELPRIB (Ministry of Environment, Lands and Parks Resources Inventory Branch). 1998. Ground-based inventory methods for selected ungulates: Moose, elk and deer. Standards for Components of British Columbia's Biodiversity No. 33. Prepared by the Ministry of Environment, Lands and Parks Resources Inventory Branch for the Terrestrial Ecosystems Task Force Resources Inventory Committee. March 12, 1998.
- Wilson RR, Parrett LS, Joly K, Dau JR. 2016. Effects of roads on individual caribou movements during migration. *Biological Conservation* 195:2-8.



2. That, if such data, analyses and information are not currently presented in the report, they be provided by the Proponent in a revised version of the report for review and comment by the NIRB, GN and other parties.

**Agnico Eagle's Response:**

*Please see the response to Section 1.1, Recommendation 2-1. There is existing evidence available in the scientific literature demonstrating adverse effects of capture and collaring programs and disturbance to caribou from helicopters, which are used in collaring programs and prohibited by the GN for monitoring programs. Agnico Eagle has already provided analysis and evidence to the GN regarding behavioural changes by caribou captured and collared in 2018 (Golder 2019, updated in 2020).*

**References**

Golder (Golder Associates Ltd.). 2019. Lorillard collared caribou movements: Implications from interacting with the Whale Tail Haul Road and All-weather Access Road. Prepared for Agnico Eagle Mines Limited by Golder Associates Ltd. DRAFT Revision 1, November 2019. Victoria, BC.

Golder (Golder Associates Ltd.). 2020. Lorillard collared caribou movements: Implications from interacting with the Whale Tail Haul Road and All-weather Access Road. Prepared for Agnico Eagle Mines Limited by Golder Associates Ltd. DRAFT Revision 2, May 2020. Victoria, BC.

3. That if such data, analyses and information cannot be provided by the Proponent, section 17 of the 2019 Wildlife Monitoring Summary Report be revised to remove statements about effects of caribou collaring on caribou movements.

**Agnico Eagle's Response:**

*Please see the response in Section 1.1, Recommendation 2-1. The statements are appropriate and do not require removal.*

## **1.2 Blasting Measurements**

**Term and Condition:** No 28 (Project Certificate 008)

**References:** Agnico Eagle Mines (AEM) Ltd. (2019). Meadowbank Division Terrestrial Ecosystem Management Plan, Version 7; Agnico Eagle Mines (AEM) Ltd. (2020). Appendix 53 - Whale Tail Blast Measurements

**Identification of Issue:** The Project's TEMP includes a program to collected data on noise and vibration levels generated by blasting in-order to assess the extent to which this activity may disturb wildlife (AEM 2019 – Section 3.4.2.4). The 2019 Annual Report provides an update on this blast measurement study (AEM 2020). Review of this report raises some questions regarding the methodology employed in this study. Clarification is sought on this topic.



**Importance to review and supporting rationale:** Figure 1 in Appendix 53 of the Report identifies the locations of blast monitoring equipment in the vicinity of the Whale Tail pit. It is noted that the topography around the pit is undulating and that at least one monitoring location (R4) appears to be on the other side of a relatively large hill from the pit. It is unclear how topography such as this will affect Peak Pressure Level (PPL) and Peak Particle Velocity (PPV) measurements. How will the measurement program account for topography in-order to make the results more robust and applicable to differing conditions around the Whale Tail pit?

The study is recording two metrics, noise and vibration (PPL and PPV) that may affect caribou. A third source of potential disturbance associated with blasting activities is dust; either by the visual or olfactory stimulus of a dust cloud. This source of disturbance is not being measured.

**Recommendation 3:** The GN offers the following recommendations with respect to this issue:

1. That the Proponent clarify how the effect of topography on the measurement of blasting related PPV and PPL is accounted for in the study.

**Agnico Eagle's Response:**

*The following factors were considered when selecting measurement locations for the first year of the blasting study:*

- *Prevailing wind conditions*
  - *Measurement locations were selected to be approximately downwind from the Whale Tail Pit to capture maximum or near-maximum Peak Pressure Levels (PPL).*
- *Linear pattern*
  - *Where practical, measurement locations were distributed along a straight-line to determine how noise/vibration levels attenuate with propagation distance.*
- *Ease of access*
  - *Measurements were collected at locations that are accessible via pickup truck to facilitate regular data download and equipment maintenance.*
- *Stable ground conditions*
  - *The measurement locations are located in areas of exposed bedrock or soft but stable ground, which is important for equipment setup and stability.*

*In Golder's professional opinion, the factors listed above are more relevant than local topography when selecting appropriate measurement locations for characterizing PPL and Peak Particle Velocity (PPV) from explosive blasting.*



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*There are no hills or substantial topographical features between Whale Tail Pit and measurement locations R1, R2, or R3. Consequently, topography has minimal influence on PPL or PPV levels at these measurement locations and there is no need to consider or account for topography when analyzing data collected at R1, R2, or R3.*

*Agnico Eagle acknowledges there is a hill located between Whale Tail Pit and measurement location R4. Based on Golder's professional experience, the presence of this hill is unlikely to materially influence PPV values measured at R4, but the presence of this hill may partially screen airblast waves and thereby reduce PPL values measured at R4 (relative to values that would be measured at the same distance over flat topography).*

*Given the complexity of the environment and variability in blasting parameters, it is challenging to provide a quantitative estimate of the extent to which the hill may reduce PPL values measured at R4. However, because R4 is located approximately 5 kilometres (km) from Whale Tail Pit, Golder expects PPL levels would be well-below the annoyance threshold considered in this study (i.e., 115 dBL) regardless of topographical effects. In other words, PPL values measured 5 km from a blast site are unlikely to exceed 115 dBL, even in cases where topography is favourable to airblast propagation. As such, the presence of a hill between Whale Tail Pit and measurement location R4 is unlikely to materially influence the conclusions of the blasting study. That being said, if PPL values measured at R3 (i.e., 3 km from Whale Tail Pit) during future years of the blast program show exceedances of the annoyance threshold, Agnico Eagle may consider repositioning R4 to a location where topography is neutral or more favourable to airblast propagation.*

2. That the Proponent consider the addition of more monitoring sites, varying in terms of topography between the Whale Pit and measurement location.

### **Agnico Eagle's Response:**

*For the reasons discussed in response to part 1, Agnico Eagle respectfully submits that measurement locations used during the first year of the study (i.e., R1, R2, R3, and R4) are appropriate for characterizing PPL and PPV from blasting activities in Whale Tail Pit. As such, Agnico Eagle plans to continue measuring PPL and PPV at R1, R2, R3, and R4 during the second year of the blasting study. If data collected during the second year of the study proves sufficient to fully characterize PPL and PPV levels at R1, R2, R3, and R4 under a variety of environmental and propagation conditions, Agnico Eagle may consider adjusting measurement locations during subsequent years of the study. In particular, if PPL values measured at R3 show exceedances of the annoyance threshold (i.e., 115 dBL),*



*Agnico Eagle may consider repositioning R4 to a location where topography is neutral or more favourable to airblast propagation.*

*Agnico Eagle respectfully submits that measuring PPL and PPV at four locations is sufficient to achieve the objectives of the blasting study and that including additional measurement locations would be logistically challenging and unnecessary. As discussed in response to part 1, measurement locations must be readily accessible to facilitate regular data download and equipment maintenance. For this reason, R3 and R4 are located along the project haul road. Measurement locations at comparable distances in other directions (e.g., 3 km and 5 km north, west, or south of Whale Tail Pit) would be inaccessible by pickup truck. As such, including these measurement locations in the study would necessitate regular helicopter trips and/or access by other means (e.g., ATVs) to download data and perform equipment maintenance. These helicopter and other vehicle trips would be both costly and disruptive to wildlife that may be present in the area. In addition, measuring PPL and PPV during wintertime conditions requires the installation of equipment such as solar panels for summertime, spring and fall, and small-scale wind turbines for the winter at each measurement location. The wind turbines power electric heaters that keep the blast monitoring units within an acceptable temperature range during harsh weather conditions. Installing the small-scale wind turbine setup may require construction of concrete foundation slabs in locations where bedrock is at depth of soft or unstable ground and which cannot be moved from one measurement location to another.*

### **1.3 Traffic Rates**

**Term and Condition:** Nos 28 and 31 (Project Certificate 008)

**References:** Agnico Eagle Mines (AEM) Ltd. (2019). Meadowbank Division Terrestrial Ecosystem Management Plan, Version 7; Agnico Eagle Mines (AEM) Ltd. (2020). Meadowbank Mine 2019 Wildlife Monitoring Summary Report. Final. Appendix 52 of the Meadowbank Mine Annual Report.

**Identification of Issue:** In accordance with term and conditions 28 and 31, the 2019 Wildlife Monitoring Summary Report (AEM 2020) provides a summary of traffic data for the Project's roads that can be compared to traffic predictions made in the Project's Final Environmental Impact Statement (FEIS) and FEIS Addendum. There is some uncertainty about the traffic parameters reported. Clarification is sought on this matter in-order to determine whether traffic levels in 2019 were above or below predicted level of Project roads.

**Importance to review and supporting rationale:** The traffic data reported in Table 3.7 and Figure 3.6 of Appendix 52 are expressed as "monthly traffic data" and "number of vehicle trips",



respectively. It may be assumed, by the reviewer, that each of these metrics represents the number of one-way transits made by vehicles along roads rather than round trips. However, this assumption should be verified since it affects whether traffic levels are above or below FEIS predictions which in turn determines whether the adaptive management provisions of term and condition 31 are applicable.

**Recommendation 4:** The GN offers the following recommendations to the Board with respect to this issue:

1. That AEM provide an explanation of the reported traffic metrics clarifying whether they represent one-way transits or round trips.

**Agnico Eagle's Response:**

*Data reported represents the number of one-way transits to or from one location to another location. Agnico Eagle acknowledges the recommendation and will add clarification in the next annual report.*

## **2 Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)**

### **2.1 Ongoing Issues Identified during 2018 Annual Report Review**

**References:** CIRNAC Comments on Agnico Eagle Mines' (AEM's) 2018 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects; Appendix 1, AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects

**Background / Rationale:** CIRNAC's review of the 2018 Annual Report resulted in the generation of 10 comments for AEM's consideration. As demonstrated in the 2019 Annual Report, and summarized in Appendix 1 of that report, AEM has provided appropriate responses and completely addressed 6 of these comments. Outstanding items are listed below in sequence.

#### **2.1.1 Tailings Freeze back and Capping Thickness**

**Comment:** In its comments for the 2017 Annual Report Review, CIRNAC recommended that AEM include a meaningful discussion of the results from the permafrost monitoring in the Annual Report. Specifically, FEIS predictions should be compared with monitoring results and be clearly presented. AEM should present the updated modeling supporting their conclusions that the conceptual plans for thermal encapsulation of the Tailing Storage Facility and the Waste Rock Storage Facility remain effective to prevent and control deleterious seepage over long term. If results show discrepancies from the predicted values, AEM should discuss the management actions that should be implemented to address the risk.



CIRNAC notes that AEM continues to assess the existing and predicted long-term thermal performance of mine wastes and cover systems at the Meadowbank and Whale Tail sites. Multiple assessments are ongoing and have been integrated into the closure planning process. AEM also notes that while progressive reclamation of some mine wastes has begun, designs have not been finalized. As such, progressively reclaimed areas may need to be upgraded as additional information on freezeback becomes available in the future. Such information will be provided in future annual reports, specific research studies and/or closure and reclamation plans.

**Recommendation 1.1:** This is an on-going topic that will be a focus of future planning for the operational and closure phases of the project. As such, the prior recommendation has yet to be fully addressed and continues to apply.

**Agnico Eagle's Response:**

*Agnico Eagle is monitoring freeze back in tailings and the waste rock and will continue to do so and expand the monitoring program as required. The data gathered will continue to be analysed and compared to the FEIS prediction to ensure that the closure strategy and concept still met the closure prediction.*

*The closure strategy for the WRSF and TSF are documented in the interim closure plan. Detailed Engineering closure design will be updated to reflect the current condition of the TSF and WRSF but no significant change to the closure concept are planned based on the available information. As such progressively reclaimed area should be considered reclaimed and will only be modified if data show that the previously accepted closure criteria would not be met.*

### **2.1.2 Tailings Freezeback and Capping Thickness**

**Concern:** CIRNAC recommended that AEM continue to provide information on the nature and extent of research efforts, results of the research and a discussion of how the proposed cover design has been influenced by these results.

AEM continues to assess the existing and predicted long-term thermal performance of mine wastes and cover systems at the Meadowbank and Whale Tail sites. Multiple assessments are ongoing and have been integrated into the closure planning process. Such information will be provided in future annual reports, specific research studies and/or closure and reclamation plans.

**Recommendation 1.2:** This is an on-going topic that will be a focus of future planning for the operational and closure phases of the project. As such, the prior recommendation has yet to be fully addressed and continues to apply.





**Agnico Eagle's Response:**

*Agnico Eagle is monitoring freeze back in tailings and the waste rock and will continue to do so and expand the monitoring program as required. The data gathered will continue to be analysed and compared to the FEIS prediction to ensure that the closure strategy and concept still met the closure prediction. Results will be provided annually.*

*Detailed Engineering closure design will be updated and reflect the current condition of the TSF and WRSF. This update will integrate information regarding the completed research studies and their results along with a discussion on how these results could be used to optimise the cover design to adequate performance.*

### **2.1.3 Progressive Reclamation**

**Concern:** CIRNAC recommended that future updates to Interim Closure and Reclamation Plans (ICRP) include more details on progressive reclamation such as: areas of Tailings Storage Facility (TSF) and Waste Rock Storage Facility (WRSF) facilities covered in the prior year, total areas covered to date, along with the volumes associate with these areas, amongst others.

**Recommendation 1.3:** The Meadowbank ICRP and 2019 Annual Report both include high level summaries of progressive reclamation completed during the reporting period. However, there is insufficient detail to develop a full understanding of the completed work. As a result, the prior recommendation continues to apply.

**Agnico Eagle's Response:**

*Agnico Eagle acknowledges the recommendation and will continue to provide more details on progressive reclamation in future update of the ICRP. Details related to work completed and scheduled of progressive reclamation is included in the closure schedule presented in Appendix P of the ICRP (found in Appendix 55 of the 2019 Annual Report).*

### **2.1.4 Results of Thermistor Measurements for Tailings and Waste Rock Storage Facilities**

**Concern:** CIRNAC recommended that AEM continue analyzing the thermistor monitoring results against early thermal modelling predictions and update its Waste Rock and Tailings Management Plans if large discrepancies are observed between the monitoring results and model predictions.

AEM continues to assess the existing and predicted long-term thermal performance of mine wastes and cover systems at the Meadowbank and Whale Tail sites. Multiple assessments are ongoing and have been integrated into the closure planning process. Additional information will





be provided in future annual reports, specific research studies and/or closure and reclamation plans.

**Recommendation 1.4:** This is an on-going topic that will be a focus of future planning for the operational and closure phases of the project. The prior recommendations have yet to be fully addressed and continue to apply.

**Agnico Eagle's Response:**

*Agnico Eagle is monitoring freeze back in tailings and the waste rock and will continue to do so and expand the monitoring program as required. The data gathered will continue to be analysed and compared to the FEIS prediction as more data become available to ensure that the closure strategy and concept still met the closure prediction.*

## **2.2 Geotechnical Design Processes**

**References:** S.3.1, AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects

**Background / Rationale:** With respect to the Whale Tail Pit Project, the 2019 performance of multiple water management structures deviated significantly from their design intent. Specifically, all four dikes at the Whale Tail site experienced major issues, including:

1. Whale Tail Dike – High seepage rates through the foundation.
2. Mammoth Dike – Water levels in Mammoth Lake were above their normal operating levels.
3. Waste Rock Storage Facility (WRSF) Dike – High seepage and uncontrolled discharge to Mammoth Lake.
4. Northeast Dike – The dyke is incapable of diverting non-contact water from the Whale Tail Lake watershed to the Nemo Lake watershed, as intended.

CIRNAC notes that it is common for some mine components to underperform relative to their design intent as a new mine transitions from the construction to operations phases. In addition, AEM rapidly identified these performance issues and started to implement a range of measures to mitigate the concerns. Overall, the actions taken by AEM demonstrate they have an effective system for identifying and responding to emerging performance issues with an appropriate sense of urgency.

Nonetheless, the fact that all four of the Whale Tail dikes initially failed to meet their design intent warrants further consideration. For example, seepage through both the Whale Tail and WRSF dikes suggest that the design process failed to adequately consider potential permafrost degradation and hydraulic conductivity through the dike foundations. For Mammoth Dike, it appears that operating procedures neglected to consider the potential for ice blockages at the outlet of Mammoth Lake. In the case of the Northeast Dike, the survey data and/or design



processes appear to have been insufficient. Given AEM's history of designing effective water retention structures in the North with relatively few performance issues, it is unclear why multiple Whale Tail dikes failed to meet their design intent.

**Recommendation 2:** CIRNAC recommends that AEM perform a "lessons learned" assessment of its design processes for the Whale Tail Pit Project water retention structures. The goal of this assessment is to identify and address any systemic design, construction, or operational process deficiencies that may have contributed to the sub-standard performance of the Whale Tail dikes. AEM should also indicate how it will incorporate the lessons learned into its design and environmental management processes.

**Agnico Eagle's Response:**

*Agnico Eagle appreciates CIRNAC's recommendation. As noted above, underperformance of some component for a new mining project can be expected and Agnico Eagle was able to successfully identify and mitigate issue in a timely manner. Three of the mentioned above structure (Mammoth, NE and WRSF Dike) now have a Green TARP status (normal operating condition) and data seem to suggest that the mitigation measure at Whale Tail Dike had a positive impact on the seepage rate.*

*Agnico already performed a lesson learned exercise on water management in winter 2020 to improve operational procedure related to water management. For the design of the expansion project infrastructure, Agnico is leveraging the site experience from the first year of operation in the design and is working closely with the MDRB, designer, third-party reviewers, and internal experts to ensure that the structures will meet their design intent.*

### **2.3 Non-Compliant Discharges**

**References:** S.11.6.2, AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects

**Background / Rationale:** In August 2019, AEM determined that seepage from the recently constructed WRSF dike was discharging to Mammoth Lake at a rate of approximately 100 m<sup>3</sup>/hour. This event was disclosed to the relevant authorities and, in the opinion of CIRNAC, appropriate measures were taken to address the issue.

Once the WRSF pond level was lowered the seepage was no longer observed. The risk associated with this event is contaminant release to Mammoth Lake and the area downstream of the dike as well as possible damage to the dike. Analysis of seepage water samples showed no exceedances of the Metal and Diamond Mining Effluent Regulations (MDMER) water quality criteria.



Section 11.6.2 presents a summary of non-compliance issues associated with the Whale Tail Pit Project. The summary does not include the unauthorized discharge of WRSF seepage to Mammoth Lake.

**Recommendation 3:** CIRNAC recommends that AEM clarify why the unauthorized discharge of WRSF contact water to Mammoth Lake is not reported as a non-compliance issue.

**Agnico Eagle's Response:**

*Agnico Eagle should have reported the unauthorized discharge of WRSF contact water to Mammoth Lake as a non-compliance issue. Agnico Eagle acknowledges the recommendation and will have a closer attention in future annual report.*

## **2.4 Meadowbank WRSF Seepage Quality**

**References:** S.8.5, AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects

**Background / Rationale:** As discussed in Section 8.5.3.1.13, of the 2019 Annual Report, ponded water was observed and collected from the base of the Vault Rock Storage Facility (sampling station ST-24) in June, July, August and September 2019. Based on the results of those analyses, AEM concluded: "To date water monitoring analysis from run off indicates no concerns related to ARD. The water seepage from the Vault RSF area is expected to be of suitable quality to allow discharge to the environment without treatment and capping of this facility is therefore not proposed."

AEM initially reached similar conclusions regarding seepage from waste rock storage facilities (WRSFs) associated with the Whale Tail Pit Project. However, during NIRB and NWB reviews of that project, CIRNAC requested that AEM extend its modelling predictions to include periods after the "breakthrough point" when WRSFs reach their field capacities. Prior to that point, the facilities will continue to function as sponges, absorbing precipitation and potentially contaminated seepage that percolates into the core of the WRSFs. AEM's revised modelling indicated there would be a significant spike in seepage quantity and a deterioration of seepage quality after the breakthrough point which is predicted to occur 80 years after closure. Based on the findings of that revised modelling, there remains a potential that treatment of seepage from the Whale Tail WRSFs will be required in the future.

It is unclear to CIRNAC whether AEM's modelling of long-term seepage from the Meadowbank WRSFs is of sufficient duration to identify the long-term implications of seepage (i.e., after breakthrough).



**Recommendation 5:** CIRNAC recommends that AEM confirm whether long-term modelling of seepage from the Meadowbank WRSFs is of sufficient duration to characterize seepage after breakthrough. If not, CIRNAC recommends that AEM extend the temporal scope of its WRSF seepage modelling to ensure that potential seepage impacts after breakthrough are accurately characterized.

**Agnico Eagle's Response:**

*The closure strategy for the Meadowbank WRSF is documented in the interim closure plan and is based on documentation that show that the water quality objective will be met at closure. The cover system is designed to keep the active layer in the NAG material to ensure there is no ARD generation. Contrary to the Whale Tail Project where the presence of arsenic leaching material was identified as a risk to water quality there is no data to suggest that release of water from the Meadowbank WRSF would impact the water quality.*

## **2.5 Chromium in Meadowbank Third Portage Lake Sediments**

**References:** S.8.12.3.1.1, AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects

**Background / Rationale:** There is conclusive evidence that chromium has increased in the sediments at Meadowbank Third Portage Lake (TPE) relative to the baseline period. Despite observed effects on some species, AEM indicates that the increase in sediment chromium is not adversely affecting the benthos at TPE (i.e. there is negligible ecological effect on lower trophic levels, and FEIS predictions are not being exceeded). As a result, AEM is not planning to conduct further targeted studies at this time, other than annual monitoring of the benthos community as part of the routine Core Receiving Environment Monitoring Program (CREMP). Further, AEM concluded that supplemental mitigations are not required to address the elevated chromium concentrations.

According to AEM, the elevated chromium concentrations in TPE are likely attributable to ARD/ML ultramafic rock used to construct the Bay-Goose Dike.

**Recommendation 7:** AEM concluded that further assessment of chromium in TPE sediments is not justified and that no supplemental mitigations are necessary. CIRNAC recommends that AEM provide additional analyses to support their conclusion that additional mitigation for chromium is not required.

As noted above, the elevated chromium concentrations were caused by the use of ultramafic waste rock with elevated metal leaching potential as a construction material. CIRNAC



recommends that AEM indicate why rock with elevated metal leaching potential was used as a construction material. Further, AEM should describe any changes made to its waste rock management practices to ensure similar materials do not result in adverse impacts in the future.

**Agnico Eagle's Response:**

**Source of Chromium to TPE.** *The 2014 CREMP report included a detailed summary of the source of chromium in sediment at TPE. Erosion of fine particles associated with dike ultramafic rock used as construction material is the probable source rather than metal leaching from the waste rock. Ultramafic rock is generally known to contain elevated concentrations of chromium and was considered the best dike capping material to reduce the potential for metals leaching/acid rock drainage (ML/ARD) (Cumberland, 2006). Regarding waste rock management practices, as detailed in the Operational ARD-ML Sampling and Testing Plan, Agnico Eagle conducts quarterly chemical/geochemical sampling of waste rock to define the acid generating and metal leaching potential of waste rock for the Project. This characterization is to be used by mine staff to ensure that waste rock, overburden (till), and lake sediments are identified, managed, segregated and disposed of in an environmentally appropriate manner, as designated in the Plan. The Plan will also define if the waste rock, the overburden, and the lake sediment can be used as construction/closure material and is not a source of contaminants to nearby waterbodies.*

**Rationale for No Mitigation Actions.** *A summary of the key findings from the routine monitoring and targeted studies are provided below as evidence that no further studies or mitigation actions are needed at the present time.*

**Sediment Chromium Concentrations.** *Sediment chromium concentrations increased between 2010 and 2015 (Figure 4-67, plot of sediment chemistry in grabs and cores). However, temporal plots of the data shown that chromium concentrations in the top 1 cm have stabilized at between 150 and 200 mg/kg since 2016. When the sediment grab chemistry data (top 3-5 cm) are included in the temporal assessment, chromium concentrations appear stable going back to 2013.*

Year	Mean Cr (mg/kg)
2008	73 ± 10.3
2009	88 ± 8.5
2012	105 ± 42
2014	117 ± 39
2017	205 ± 40
2018	150 ± 40
2019	193 ± 78



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**Benthic Invertebrate Community.** Another important point to consider regarding the decision not to pursue mitigation was the overall health of the benthic invertebrate community at TPE. Despite the increase in sediment chromium concentrations in the years since completion of the Bay-Goose Dike, total benthic invertebrate abundance at TPE was fairly stable dating back to the baseline period (2006-2008) with relatively only minor variability between years (see Figure 4-73 in the 2019 CREMP report).

**Targeted Sediment Metals Bioavailability Testing.** The multi-year targeted sediment metals bioavailability study also provided strong evidence showing that naturally-elevated concentrations of manganese in sediment porewater, rather than chromium, was the probable cause of impaired growth and survival for *Hyaella azteca* in laboratory sediment toxicity tests in 2015, 2018, and 2019. In summary, the long-term sediment chemistry and benthic invertebrate community monitoring programs, coupled with the targeted sediment bioavailability study, demonstrated that increases in sediment chromium related to dike construction are a) not increasing year-over-year and b) not adversely affecting the health of the benthic invertebrate community.

**Summary.** The Management Response Plan (MRP) for Meadowbank (and now Whale Tail), defines management actions in two ways: those aimed at further assessment and those aimed at mitigation. With respect to the increasing concentration of chromium in sediment at TPE, the appropriate management action was further assessment in the form of targeted bioavailability studies in 2015, 2018, and 2019 in addition to routine annual monitoring of sediment chemistry and the health of the benthic invertebrate community. The need for additional targeted studies was considered unnecessary given the weight of evidence assessment that showed 1) sediment chromium concentrations are no longer increasing year-over-year, 2) the benthic invertebrate community is healthy and similar in abundance and richness compared to the “before” period, and 3) sediment chromium was not correlated with impaired growth or survival in the sediment toxicity tests conducted as part of the targeted bioavailability studies (rather, the observed toxicity in the laboratory, which likely occurred in some reference sediment samples as well, was linked to naturally elevated and spatially heterogeneous porewater manganese [refer to Section 4.6.3 of the 2019 CREMP Report]).

Another year of sediment coring and benthic invertebrate community monitoring is planned for August 2020. These data will help determine if sediment chromium concentrations are stable or increasing and verify the health of the benthic invertebrate community.



## 2.6 Whale Tail Pit Project Nutrient Sources

**References:** S.8.1.2, AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects

**Background / Rationale:** The FEIS for the Whale Tail Project identified a risk that mining activities could result in a change to the ultra-oligotrophic status of local lakes. This prompted Condition #23 which requires AEM to conduct several different studies to support the conclusions that a change in trophic status in Mammoth Lake would not impact fish productivity.

Notably, during 2019 (i.e., the first year of operational monitoring of the Whale Tail Pit Project) AEM identified statistically significant increases in primary productivity (as biomass). AEM speculates that the increase is due to the combined influence of natural variability and mining-related activities. Specifically, AEM considers the flooding of terrestrial soils (e.g., Whale Tail Lake South) to be the primary source of increased nutrient loadings from mining activities. CIRNAC notes that explosives use represents another potential source of nutrient loadings to the watershed. AEM's Annual Report does not appear to discuss this possibility, nor does it present information regarding the use of explosives at the Whale Tail site.

**Recommendation 8:** CIRNAC recommends that future monitoring reports include a section that describes and quantifies AEM's use of explosives relative to assumptions used in the FEIS modelling.

In addition, in light of 2019 monitoring results, CIRNAC recommends that AEM revisit its prior conclusion that a change in trophic status in Mammoth Lake will not impact fish productivity.

### **Agnico Eagle's Response:**

***Use of Explosives Relative to Assumptions in the FEIS.*** The primary sources of residual explosives for the Whale Tail Pit Project are from the Whale Tail Pit and the Whale Tail Waste Rock Storage Facility. Concentrations observed in the operating pits at Meadowbank were used to model water quality and chemical loading. Golder determined that the similarity of the setting and operation of the Whale Tail Pit Project to the Meadowbank Mine meant that similar nitrogen contents would occur in the waste rock and open pit drainages (Appendix 6-H, Section 5 in the 2016 version of the FEIS). Golder also stated that if explosives management practices differed at Whale Tail compared to Meadowbank, the predicted concentrations could differ from the concentrations at Meadowbank that were used in the model.

*As stated in Ammonia Management Plan (AMP) (April 2020), blasting operations on site include monitoring the quantities of explosives used, and blast design procedures and*





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*practices. Combined with water monitoring, the compilation of this data is used to assess blasting performance. The results of this assessment are used to adjust blasting practices as needed to a) optimize the use of explosives, and b) increase the completion and efficiency of explosive detonations (refer to Append 8-D.1 in the 2016 version of the FEIS).*

*Explosive quantities are recorded for each blasting event in accordance with the monitoring plan outlined in the AMP. Records are conserved throughout the mine life and can be provided on request.*

***Changes in Trophic Status and Impacts to Fish Productivity.*** *Given the Project has only been in operations since 2018, emphasis is on monitoring to verify that changes in primary productivity observed in 2019. As documented in the 2019 CREMP report, the increase in phytoplankton biomass at WTS and MAM was likely related to increased nutrient concentrations in WTS (due to flooding of the tundra) and MAM (due to discharge of treated contact water). The observed increase in phytoplankton biomass in the lakes downstream is, however, consistent with changes predicted in the FEIS:*

*Based on conservative predictions of dissolved phosphorus concentrations, the meso-eutrophic trigger value will be exceeded in Mammoth Lake, Lake A15, and Lake A12 during operations and closure with a subsequent return to oligotrophic conditions expected to occur by 2039. The increase in lake productivity may result in altered species composition and shifts in dominance at the level of major phytoplankton group (Reynolds 1998). The observed dominance by chrysophytes in Mammoth Lake under baseline conditions may change to dominance by other groups, such as diatoms, chlorophytes, and dinoflagellates that usually dominate mesotrophic and eutrophic lakes (see Section 6.5.3.3 in Volume 6 of the FEIS).*

*The mesotrophic classification corresponds to total phosphorus concentrations between 10 – 20 µg/L. Although there were noticeable increases in phytoplankton biomass at WTS and MAM in 2019, total phosphorus concentrations remained within the oligotrophic range (4 – 10 µg/L) at WTS (max 7.5 µg/L) and MAM (max 5.1 µg/L).*

*The ecological significance of increased primary productivity at WTS and MAM will depend on how long these trends continue and how far they extend. It is challenging to isolate the drivers of changes to productivity with only one season of after data (i.e., 2019). Whether the changes in biomass observed in WTS and MAM in 2019 represent of a short-term spike or a longer-term trend shift will depend on nutrient inputs to the system. On-going monitoring of nutrient concentrations and potential changes in primary productivity will*





*help determine whether the conclusion that effects from the Project are not expected to have a significant adverse effect on fish and fish habitat needs to be revisited.*

*Researchers at the University of Waterloo are leading the investigation of mine-related effects on fish productivity. That study is on-going, with additional field studies planned for August/September 2020.*

## **2.7 Reporting of Mean Data**

**References:** CREMP, Appendix 35 of AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects

**Background / Rationale:** The 2019 CREMP report (Appendix 35) provides an assessment of water quality monitoring results, with analysis of inter-annual trends and comparisons to site-specific trigger values and FEIS predictions. When performing these comparisons, AEM used the annual mean monitoring results of each parameter from all stations in a given water body. Using annual mean monitoring results for entire lakes has the potential to mask spatial and temporal variability in the monitoring data and, by extension, could result in a failure to detect elevated results. Specifically, while mean concentrations for a given parameter may be below an applicable limit, there is a potential that results from some sampling stations and/or sampling events will be greater than the limit.

**Recommendation 10:** CIRNAC recommends that AEM modify its reporting approach to ensure that comparisons between monitoring data and applicable criteria reflect the temporal and spatial variability inherent in these natural systems.

### **Agnico Eagle's Response:**

*As outlined in the CREMP Design Document (Azimuth 2012), the CREMP is intended to monitor large-scale basin-wide changes in physical and biological variables to evaluate potential impacts from all mine related stressors to the receiving environment. The basins/lakes for the Meadowbank and Whale Tail Study Areas are typically well mixed both vertically and horizontally. While some spatial variability (e.g., a sample collected near the edge of the lake may be more prone to spring runoff than samples collected farther off-shore) or temporal variability (e.g., cryo-concentration of some ionic compounds during the winter sampling events) may occur, sampling locations for each event are randomly generated to provide an unbiased estimate of the prevailing conditions within the basin or lake of interest.*

*The decision-making framework for deciding whether adaptive management actions are needed is based on the mean concentration of the samples collected each year at a given*



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*basin/lake. Spatial and/or seasonal changes in water quality are evaluated after each sampling event by screening each sample against the early-warning triggers. This step is completed after each sampling event to, as CIRNAC recommends, identify potential spatial and/or seasonal differences that would otherwise be masked by only comparing the annual mean concentration to the trigger and thresholds. All exceedances are “flagged”, and depending on the parameter, follow-up monitoring or mitigation measures may be recommended prior to the next sampling event. Parameters without effects-based thresholds (e.g., hardness, conductivity, etc.) often exceed the trigger values at the impact areas. Unless there is a significant increase relative to the early-warning trigger, investigation of spatial and temporal trends is deferred to the BACI analysis. Trigger exceedances for parameters with effects-based thresholds (e.g., ammonia, zinc, etc.) are given more scrutiny in the sample-by-sample screening assessment conducted each month because of the potential for effects to aquatic life. Occasionally there are metals that exceed the trigger values in one of the two samples collected each basin/lake per sampling event, but rarely do both samples exceed the trigger value. If sample-by-sample screening indicates there are within-station seasonal and/or spatial trends, more focused sampling and analysis plans are developed to characterize the potential spatial or seasonal variability within a given lake or basin.*

*CIRNAC’s recommendation that “AEM modify its reporting approach ...” is based on the premise that the annual mean concentration has the potential to underestimate the water quality, and potentially lead to fewer parameters being carried forward for formal statistical analysis. In practice, comparison of the annual mean concentration to the early-warning triggers, combined with visual examination of the chemistry plots, has been an effective approach for identifying parameters that have increased in concentration due to mine-related activities.*

### **2.8 Sewage Treatment Plant (STP) Effluent Discharge to Whale Tail Lake North Basin**

**References:** S.8.5.4.3, Table 8-59, and S.11.6.3, AEM’s 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects; Nunavut Water Board Water Licence 2BB-MEA1828, Part D Item 10

**Background / Rationale:** Effluent from the Sewage Treatment Plan (STP) is discharged to the Whale Tail Lake North Basin, fishless since 2018, and monitoring is conducted as per Water License 2BB-MEA1828, Part D Item 10. Monitoring results were reported in Table 8-59 of the 2019 Annual Report. Six exceedances of the water licence limits were reported in 2019, one (1) for Oil & Grease and five (5) for Fecal Coliform. All of the non-compliances were properly acknowledged



and reported to the GN Spill hotline (i.e. fecal coliform exceedances) and the following preventative measures were put into place:

- Remind technician to make sure to eliminate the possibility of cross contamination during the sampling
- Preventative maintenance was done on the unit including cleaning and disinfecting all sampling lines, changing UV lights on Newterra system and installed UV light on Bionest system
- Reminder to technicians and operators to flush the lines prior to sampling

CIRNAC notes the number of Fecal Coliform exceedances of the license limit (1,000 CFU/100mL) to be excessive, representing 5/40 samples or 12.5%. Given the increasing population of the camp and greater reliance on the STP, it is important to ensure that the system is meeting the required performance standards to reduce the discharge of contaminated effluent into Whale Tail North basin.

**Recommendation 11:** CIRNAC recommends that AEM conduct a thorough review of the system design, operation, and management procedures of the STP to ensure that the system is capable and robust enough to ensure that required performance standards are met continuously and that contaminated effluent is not being discharged into Whale Tail Lake North basin.

#### **Agnico Eagle's Response**

*As discussed in Section 8.5.4.3 of the 2019 Annual Report, the STP associated with the Water License 2BB-MEA1828 was no longer in operation since November 3<sup>rd</sup>, 2019. The sewage produced by the exploration camp is transferred by truck to the permanent STP associated with the permanent operation camp and regulated under the Water License 2AM-WTP1830. There is currently no water effluent quality limit associated to the STP effluent under the 2AM Water License. Nevertheless, Agnico Eagle acknowledges CIRNAC's recommendation and if the STP associated with the Water License 2BB needs to be restarted, a thorough review of the system design, operation, and management procedures will be undertaken to ensure that the system effluent comply with the water quality limit.*

## **2.9 Community notices regarding public use of Meadowbank All-weather Access Road**

**References:** Term and Condition (T&C) #32, NIRB Project Certificate No. 004; S. 11.7.2.1 and S. 11.7.2.2, AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects



**Background / Rationale:** With respect to the operation of the Meadowbank All-weather Access Road, T&C #32(f) of the Meadowbank Project Certificate requires AEM to:

“Place notices at least quarterly on the radio and television to explain to the community that the road is a private road with non-mine use of road limited to authorized, safe and controlled use by all-terrain-vehicles for the purpose of carrying out traditional Inuit activities.”

Based on a review of the 2019 Annual Report, it appears AEM has not fulfilled this requirement. Rather, AEM provides information regarding their All-weather Access Road (rules of use and status) in both English and Inuktitut through a company website ([www.aemnunavut.ca/community/roads](http://www.aemnunavut.ca/community/roads)). In addition, AEM uses social media (Facebook) and meets with Baker Lake community members to discuss the All-Weather Access Road’s management. Although these means of communication are useful and should be continued, the T&C requires notices be provided at least quarterly on the radio and television.

**Recommendation 12:** AEM’s current methods of providing information on the Meadowbank All-weather Access Road’s to Baker Lake community members appear to be sufficient. CIRNAC is not aware of any complaints to indicate the contrary. As a result, CIRNAC recommends that T&C #32(f) be revised to reflect these communication protocols if the NIRB and other interested stakeholders agree.

**Agnico Eagle’s Response:**

*Agnico Eagle acknowledges CIRNAC’s recommendation and is supporting the effectiveness of the communication method detailed above. Agnico Eagle is in continuous improvement to find the best way to keep the community informed.*

## **2.10 Authorized non-mine use of the Meadowbank All-weather Access Road**

**References:** Term and Condition (T&C) #32(g), NIRB Project Certificate No. 004; S. 11.7.1.1(g), AEM’s 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects

**Background / Rationale:** With respect to the operation of the Meadowbank All-weather Access Road, T&C #32(g) of the Meadowbank Project Certificate requires AEM to:

“Record all authorized non-mine use of the road, and require all mine personnel using the road to monitor and report unauthorized non-mine use of the road, and collect and report this data to NIRB one (1) year after the road is opened and annually thereafter.”

Although AEM records non-mine authorized use of the road on a daily basis, the 2019 Annual Report notes 2019 usage was greater than prior years because of a change in reporting



procedures (both drivers and passengers counted as road users). A consistent approach to monitoring road use should be applied moving forward to allow for reliable data analysis.

**Recommendation 13:** CIRNAC recommends that AEM establish and implement consistent monitoring parameters for non-mine authorized use of both the Meadowbank and Meliadine All-weather Access Roads.

**Agnico Eagle's Response:**

*Agnico Eagle will continue to implement and improve the monitoring and reporting procedure for the Meadowbank AWAR and will look to hold discussions with Meliadine Mine regarding consistency in reporting.*

## **2.11 Semi-annual calls with Government of Nunavut Career Development Personnel**

**References:** Term and Condition (T&C) #49, NIRB Project Certificate No. 008; S. 11.11.1.2, AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects

**Background / Rationale:** T&C #49 of the Whale Tail Project Certificate requires AEM to meet with Government of Nunavut career development personnel on a semi-annual basis, at minimum, to discuss:

- Hiring procedures and policies;
- Issues regarding employee recruitment and retention;
- Agnico Eagle policies regarding career pathways and opportunities for advancement;
- Internal and/or partnered training and development of employees; and
- Long-term labour market plans to facilitate training in communities.

As stated in the 2019 Annual Report, AEM and the Government of Nunavut's Acting Regional Manager of Career Development met in on-site in 2019 and a follow-up meeting is planned in 2020. Although it is encouraging AEM and the Government of Nunavut met last year to discuss career development initiatives, the Project Certificate requires AEM to initiate semi-annual calls at a minimum. It is not clear if this frequency of meetings is being met.

**Recommendation 15:** CIRNAC recommends that AEM strive to meet with the Government of Nunavut career development personnel on a semi-annual basis, at minimum, pursuant to T&C #49 of the Whale Tail Project Certificate. A rationale should be provided if the frequency of meetings, as recommended within the NIRB T&C, is not being met.

**Agnico Eagle's Response:**

*Agnico Eagle aims to meet the NIRB T&C # 49 and agrees with this recommendation. In 2019, Agnico Eagle and the Government of Nunavut's Acting Regional Manager of Career Development met at Meadowbank site and a follow-up meeting of 2019 was scheduled in February 2020. Agnico will strive to fulfill the requirement of meeting with the Government of Nunavut career development personnel on a semi-annual basis.*



## 2.12 Cross-cultural training initiatives

**References:** Term and Condition (T&C) #59, Whale Tail Project Certificate; S. 11.10.3, AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects; 2019 Socio-economic Monitoring Report, Appendix 69 of AEM's 2019 Annual Report for Meadowbank Gold Mine and Whale Tail Pit Projects

**Background / Rationale:** Pursuant to T&C #59 of the Whale Tail Project Certificate, AEM are encouraged to make cross-cultural training initiatives available to employees and on-site sub-contractors. The 2019 Socio-economic Monitoring Report provides the uptake and completion rates for employees only.

**Recommendation 17:** CIRNAC recommends that AEM include the uptake and completion rates of cross-cultural training initiatives for on-site sub-contractors as well as employees in future annual report submissions. As specified in T&C #59, such initiatives are a means of promoting respect and consideration for the importance of Inuit Qaujimajatuqangit.

**Agnico Eagle's Response:**

*Agnico Eagle's cross-cultural training program, developed with the assistance of the Nunavut Literacy Council, is mandatory for all Agnico Eagle employees and contractors who will be on site for six months or more. Agnico Eagle agrees with this recommendation and will report on the number of employees and contractors who complete the program beginning in the 2020 reporting year.*

## 3 Kivalliq Inuit Association (KivIA)

### 3.1 Aquatic Environment Technical Comments

#### 3.1.1 Central Dike Seepage - Meadowbank

**References:** 2019 Annual Report; Section 3.1.1 Meadowbank Site; 3.1.1.1 Performance Evaluation

**Comment:** Agnico Eagle provides the following description of iron precipitate observed in downstream of the central dike:

"In the summer of 2017 the water in the downstream pond became orange and this was associated with rapid temperature variation. This event was investigated by chemical analysis and was found to be caused by the precipitation of iron oxide from bacterial process. As predicted this event re-occurred in the summer of 2018 and 2019."



However, no initiatives are described to manage or mitigate the iron rich water downstream of the central dike. While not an immediate concern, seepage through the central dike will eventually influence surface water in the Portage Pit which is intended as future aquatic habitat once in pit disposal of tailings has been completed.

**Recommendation 1:** Please describe what measures have been implemented to limit iron rich water from flowing from the downstream pond to the current and future receiving environment.

**Agnico Eagle's Response:**

*The bacterial process occurring in the small pond downstream of Central Dike is only observed in that body of water and not the entire South Cell or North Cell. This is due to the shallow depth of the pond (allowing quick changes in temperature during the summer months) and protection from the elements (it is very sheltered from wave action). As the water level rises in the area due to the completion of in pit disposal it is anticipated that this process will no longer occur. Water testing will continue at the pond throughout operations to confirm this. Water quality modelling predictions for the site will continue to be updated as part of the Annual Report process and reconnection to the natural environment will only be done once water quality objective have been met.*

### **3.1.2 Adaptive Management Plan – Water Level Mammoth Lake**

**References:** 2019 Annual Report; Section 3.1.2 Whale Tail Site; 3.1.2.1 Performance Evaluation

**Comment:** Agnico Eagle notes the following concern pertaining to potential inflows to Whale Tail Pit:

“In December 2019 the TARP level of Mammoth Dike was increased to yellow due to the water level in Mammoth Lake being over the normal dike operating level. The water level increase was due to pumping of water from Whale Tail Lake South to Mammoth Lake while Mammoth Lake outlet was frozen preventing water from flowing to the nearby lakes. The risk associated with this event is overtopping of the dike liner, possibly causing damage to the dike and allowing water to flow to the Whale Tail Pit area.”

Agnico Eagle has proposed responses to this concern, including:

“Preparation of an action plan linked to a decision tree if the water level are higher than those expected at freshet”.



We note that an Adaptive Management Plan has been developed for the Whale Tail site, but does not include adaptive management thresholds and responses based on water levels in the receiving environment.

**Recommendation 2:** Please adaptive management thresholds, triggers and responses pertaining to water levels in Mammoth Lake, and incorporate these into the Adaptive Management Plan for the Whale Tail site.

Specific thresholds and action levels are intended to provide clarity as to what measures will be taken and when in response to elevated water levels in the receiving environment.

**Agnico Eagle's Response:**

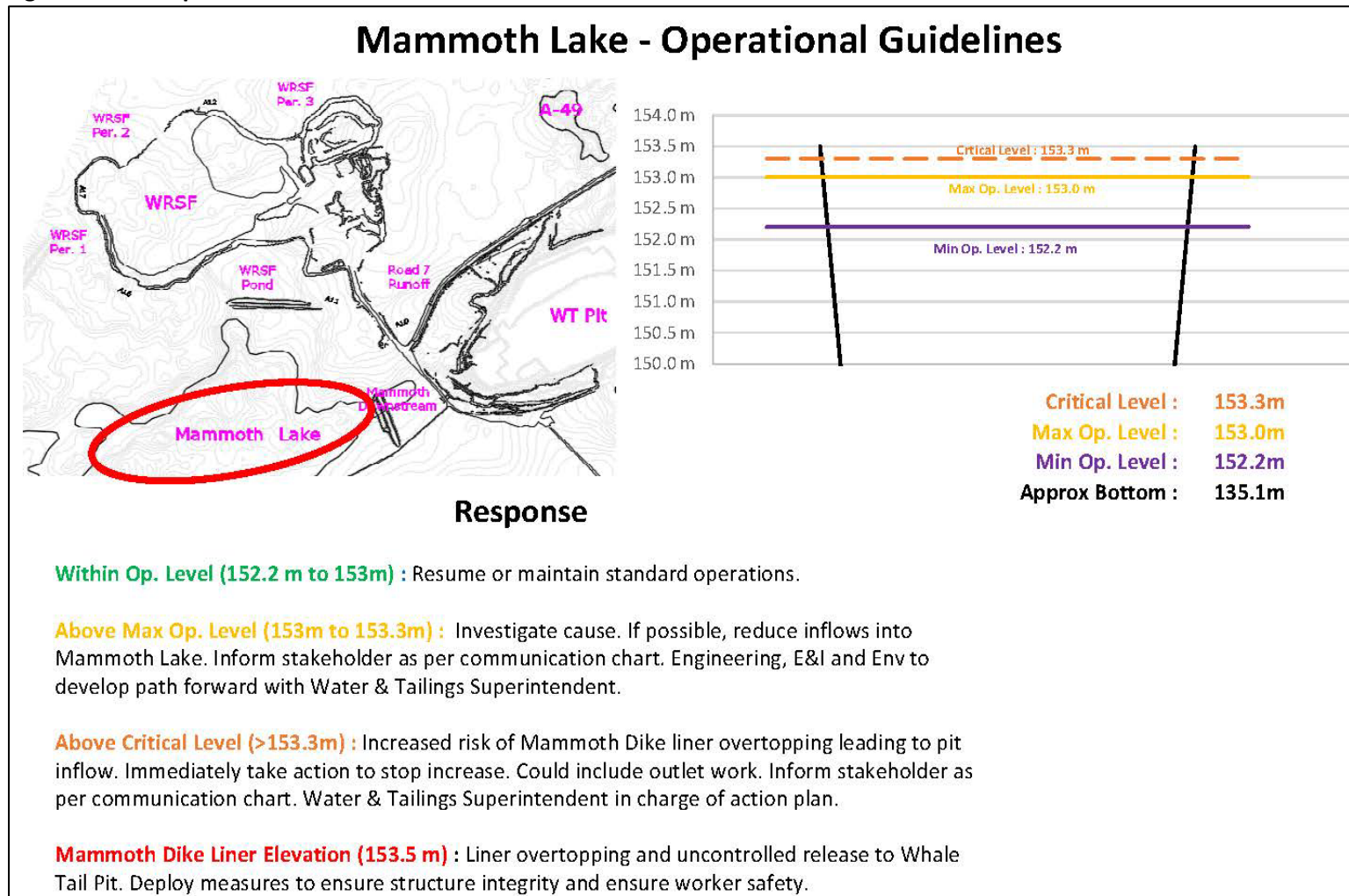
*The Adaptive Management Plan for the Whale Tail site is still undergoing the NWB approval process. Pond operational guidelines have been developed for the lakes and ponds at the Whale Tail site to ensure that freeboard is respected during operation. All pond operational guidelines will be included in the next version of the Whale Tail Water Management Infrastructure OMS Manual. Figure 1 is the pond operational guideline for Mammoth Lake.*





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Figure 1. Pond Operational Guideline for Mammoth Lake





### 3.1.3 Water Quality Forecast - Meadowbank

**References:** 2019 Annual Report; 4.4.2 Water Balance Water Quality Model Reporting Summary; 4.4.2.1 Meadowbank Site; 4.4.3 Predicted Vs Measured Water Quality 4.4.3.1 Meadowbank Site; Meadowbank ICRP Update 2019; 5.2.4.2 Closure Objectives and Criteria

**Comment:** “The Water Quality Forecast 2019 (SNC, 2020) provides water quality modelling with updated parameters (including dissolved) to determine the need for potential treatment at closure. The updated water quality forecast model applies to the North and South Cell TSF Reclaim Ponds, and the Portage, Goose, Vault and Phaser Pits. A review of the available water quality data measured in 2019 was undertaken. Treatment may be required for aluminium, arsenic, cadmium, chromium, copper, iron, lead, nickel, selenium, thallium, chloride, fluoride, sulphate, and total ammonia/total nitrogen equivalent, as the pit water quality may exceed CCME limits if the water is not treated, based on the completely mixed assumption.”

We are concerned that treatment may be required in perpetuity to ensure water overlying tailings disposed of in mined out pits will be suitable for aquatic habitat as indicated through current closure planning. This concern is exacerbated by the apparent divergences between predicted water quality and the majority of measured water quality parameters currently measured in all pits at the Meadowbank site.

**Recommendation 3:** Agnico Eagle should include explicit descriptions and planning for treatment of water in the flooded pits sufficient to meet CCME water quality guidelines and establish aquatic habitat in the 2020 annual report should monitoring and updates to the water quality forecast required for that report continue to indicate treatment may be required for water in the flooded pits.

We further recommend Agnico Eagle explore additional habitat offsetting opportunities should water quality modelling and measurements continue to indicate that the end pit lakes may not be viable habitat in the post closure environment without treatment.

**Agnico Eagle’s Response:**

*In-pit deposition of tailings has started as of July 2019 at Meadowbank. The reclaim water stored in Goose Pit and also in Portage Pit are sampled on a regular basis to assess the changes in water quality parameters over time. The data collected are compared against the forecasted values and the water quality forecasting model shall be adjusted accordingly.*

*It is also Agnico Eagle’s intent to start water treatment bench scale testing using the reclaim water stored in the pits. The objective of these bench scale testing shall be to*



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*assess the most suitable water treatment processes that can be used at closure to treat the reclaim water prior to pit flooding. In next year's report, a plan will be provided describing the general timeline to perform bench scale laboratory testing, on-site testing (if required) and development of design of the water treatment process for closure.*

*Agnico Eagle does not intend at this moment to explore additional habitat offsetting opportunities. Agnico Eagle's intent is to meet the end pit lake water quality as per our Water License criteria and current ICRP.*

### 3.1.4 Meadowbank WRSF Seepage

**References:** 2019 Annual Report; 8.5.3.1.7 Portage Rock Storage Facility (ST-16)

**Comment:** "The KIA requested that Agnico continue monitoring until there is a 5 year period of non-detect cyanide results. In 2018 (5 previous year), the monitoring indicated that yearly average for CN levels does not exceed the CCME guideline, the MDMER or Water License limit for effluent discharge into the environment for NP2, NP1 and downstream lakes, Dogleg and Second Portage. Thus, based on the analysis of the previous results, Agnico Eagle has suspended the current program in 2019. However, ECCC's comment regarding the 2018 Annual Report recommended that Agnico continue to monitor Lake NP-2 on a yearly basis for the same suite of parameters as have been measured since 2014. Water quality results for 2019 ST-16 and NP-2 South can be found in Table 8-19 and 8-20, respectively. Monitoring stations are illustrated on Figure 1."

Table 8-19 indicates that WAD cyanide decreased between 2014 and 2016, but increased again in 2017. WAD cyanide was again below detection in 2018 and 2019. The intent of the initial request for cyanide monitoring was to demonstrate that the source had been mitigated and cut off. We remain concerned with potential seepage from the tailings facility given that cyanide concentrations as measured at ST-16 are inconsistently low. We therefore concur with ECCC's recommendation to continue monitoring the full suite of parameters as outlined in Table 8-19 until WAD cyanide measured at ST-16 is below the detection limit for 5 consecutive years.

**Recommendation 4:** Agnico Eagle should continue monitoring water quality at ST-16 and in NP-2 for the full suite of parameters as outlined in Table 8-19 and Table 8-20 until WAD cyanide is measured below the detection limit for 5 consecutive years.

#### **Agnico Eagle's Response:**

*As per Agnico Eagle's responses to ECCC recommendation provided to NWB regarding the 2018 Annual Report on November 1<sup>st</sup>, 2019, Agnico will continue to monitor water quality in NP2-South on a yearly basis for the same suite of parameters measured since 2014. Water quality monitoring at ST-16 will also continue to be sampled as per the Water*



*License 2AM-MEA1530 Schedule 1 Table II Group 1 and will also included the supplemental parameters presented in Table 8-19 of the 2019 Annual Report. Agnico will not commit at this moment on a definitive timeline or threshold (WAD cyanide is measured below the detection limit for 5 consecutive years) for ending the monitoring.*

### **3.1.5 Water Quality Receiving Environment – Whale Tail**

**References:** 2019 Annual Report; 8.5.3.2 Whale Tail Site

**Concern:** Agnico Notes that “there are no applicable license limits” for several lakes in the receiving environment, including Lake A47 (ST-WT-6), Lake A45 (ST-WT-13), Lake A16 outlet (ST-WT-14), Lake A15 (ST-WT-15). These lakes are in the receiving environment and are potentially or may be in the future, impacted by mine activities. Lakes A45, A16 and A15 in particular are part of the Whale Tail Lake and Mammoth Lake flow paths respectively, and will be impacted by both the impoundment of the Whale Tail south basin, and discharge activities into both Whale Tail South and Mammoth Lake.

While licence discharge limits are not applied to these lakes, comparisons should still be made to CCME water quality guidelines and baseline conditions to understand whether the downstream environment is impacted by mine activities and implement mitigations if they are.

**Recommendation 5:** Agnico Eagle should compare results from these sites to a) historical monitoring data to identify if water quality is changing relative to the normal range, and b) CCME WQGs for PAL.

#### **Agnico Eagle’s Response:**

*Agnico Eagle acknowledges KIA’s recommendation and will evaluate the possibility to provide requested comparison and analysis in the 2020 Annual Report.*

### **3.1.6 AP-5 Discharge – Whale Tail**

**References:** 2019 Annual Report; 8.5.3.2.12 Effluent discharged from AP-5 and Trench-water Containment Pond (MEA-4)

**Comment:** Agnico Eagle notes “On September 10th, Agnico contacted the CIRNAC Inspector to notify that following higher than anticipated precipitation during July and August, discharges from AP-5 were higher than originally estimated, and thus it was anticipated that it will continue to discharge an additional approximately 1,000,000 m<sup>3</sup> of compliant water to the tundra over the next few weeks period.... total volume of 1,080,667 m<sup>3</sup> of water was discharged to tundra towards



the Nemo watershed from July 11th to September 26th, 2019. No non-compliance were observed during discharge”

Agnico Eagle acknowledge that this discharge was sufficient in volume to qualify under MDMER as a discharge location. We appreciate that water chemistry analysis collected at this location was compared to MDMER discharge criteria. However, results of acute and sublethal toxicity testing was not provided for this location in the Annual Report. While the effluent itself was not discharged directly to the freshwater environment (i.e. water from AP-5 were discharged to the tundra), those discharges have the potential to impact the freshwater environment within the Nemo watershed, thereby warranting those studies.

**Recommendation 6:** All discharges regulated under MDMER should include acute and sublethal toxicity testing. These tests should be completed for all future discharges deemed to fall under the purview of MDMER by ECCC, and not just those which were predetermined under the water licence and project certificate (i.e. the diffuser in Mammoth and Whale Tail South Basin lakes).

**Agnico Eagle’s Response:**

*As detailed in Section 8.3.2.5 of the 2019 Annual Report, during September 23<sup>rd</sup>, 2019 ECCC’s MDMER inspection at Whale Tail Site, the Inspector observed a discharge from the A-P5 pond to the tundra towards the Nemo Lake watershed. After investigation, Agnico Eagle was notified on October 3<sup>rd</sup>, 2019 that the A-P5 discharge to environment met the definition of an effluent and thus must submit to the Minister of the Environment the information required by MDMER Section 9. The requested information was provided on October 31<sup>st</sup>, 2019. The discharge to environment was stopped on September 26<sup>th</sup>, 2019 as the discharge pipe had completely frozen. Given that the official decision from ECCC was received on October 3<sup>rd</sup>, no MDMER and EEM regulatory water sample were taken.*

*Agnico Eagle acknowledges KIA’s comment and will continue to fulfill the requirements of the MDMER for all the effluent discharges on mine site and not only the one predetermined under the Water License.*

### **3.1.7 Water Quality Model – Whale Tail**

**References:** Appendix 12 Whale Tail Water Management Plan Version 4; Appendix C 2019 Water Balance Report; Appendix A Project Design Document; Table 11: Water Quality and Chemical Loading Input Parameters

**Comment:** Table 11: Water Quality and Chemical Loading Input Parameters, indicates that water quality inputs to the water quality model used average concentrations from 2015 and 2016 for:



- “Initial lake concentrations and natural runoff downstream of Mammoth Lake
- Initial Mammoth Lake concentrations and natural runoff
- Initial Whale Tail Lake (North and South Basins) concentrations and natural runoff to Whale Tail Lake (South Basin)
- Nemo Lake concentrations”

However, shallow groundwater input concentrations used the “75th percentile of Meadowbank groundwater quality”

Rationale was not provided as to why average water quality conditions were appropriate for model inputs for Mammoth, Nemo and Whale Tail lakes as opposed to the more conservative 75th percentile. A more conservative model input provides more confidence Agnico Eagle can effectively manage a range of water quality conditions beyond an average “base case” scenario.

**Recommendation 8:** Please provide rationale as to why average water quality conditions were considered appropriate inputs for the water quality model for Mammoth, Nemo and Whale Tail Lakes as opposed to a more conservative percentile (e.g. 75th) of measurements.

We further recommend that future updates to the water quality and load balance models for the Whale Tail site use the 75th percentile at minimum, and sensitivity analysis using the 95th percentile of measured values in those waterbodies.

**Agnico Eagle’s Response:**

*The inputs used for the Annual Report are consistent with what has been approved for the Phase 1 Permit (Approved Project) and Expansion Project.*

*The magnitude of variability in the baseline water quality is unlikely to impact projected concentrations in the downstream environment under the influence of the mine discharge, as baseline concentrations are overall low. Conversely, there is some uncertainty surrounding the water quality in the shallow bedrock as little information is available, and it is possible that the inflow of shallow groundwater to site facilities may contribute sufficient additional mass to alter treated effluent water quality. Therefore, it was deemed a conservative assumption to use the 75<sup>th</sup> percentile inputs for the shallow groundwater.*

*As this model and annual report represent operational-level assessments, model inputs should be representative of expected conditions; it is of the opinion of Agnico Eagle that 75<sup>th</sup> and 95<sup>th</sup> percentile sensitivities are not necessary, given the modelling is not supporting EA level assessments. Model inputs are updated when sufficient additional data are available from site monitoring programs, and these should be considered most representative of site conditions.*



### 3.1.8 Water Quality Model – Whale Tail

**References:** Appendix 12 Whale Tail Water Management Plan Version 4; Appendix C 2019 Water Balance Report; Appendix A Project Design Document; Table 11: Water Quality and Chemical Loading Input Parameters

**Comment:** It is unclear whether interannual loading to the receiving environment is accounted for in the water quality model. Does the model assume complete flushing of Mammoth Lake each year, or has the model been updated based on the commitments made during the Whale Tail expansion licencing process? Specifically, do the initial lake concentrations increase year over year to account for prolonged loading?

Assumed complete flushing of the receiving environment may underpredict future water quality thereby potentially delaying the implementation of management and mitigation measures that may be warranted.

**Recommendation 9:** Please clarify whether the water quality model assume complete flushing of Mammoth Lake each year (i.e. return to baseline concentrations) or whether the model accounts for interannual loading to the receiving environment. Please ensure that all future water quality models account for interannual loading to the receiving environment.

**Agnico Eagle's Response:**

*The water quality model accounts for interannual loading to the receiving environment and does not assume complete flushing of Mammoth Lake each year. The reader is referred to the water balance report (Golder 2020).*

**Reference:**

*Golder (Golder Associates Ltd.). 2020. Whale Tail Pit – Phase 1 Permit, Approved Permit. 2019 Annual Report – Water Balance. Submitted to Agnico Eagle Mines March 2020.*

### 3.1.9 CREMP QAQC

**References:** Appendix 35 Meadowbank and Whale Tail 2019 CREMP Report; 3.0 QA QC 3.3 Water Chemistry; Appendix A QA/QC; A2.2 Water Chemistry Equipment Blanks

**Comment:** Agnico Eagle highlights concern in the analytical precision of key nutrient analytics, stating “Of the analytes detected in the equipment blanks, total ammonia, and TKN were routinely given a cautionary flag.”

Appendix A, QA/QC, provides further details: “In July total ammonia (as N) was detected [in equipment blanks] at concentrations greater than 10X DL. Total Kjeldahl Nitrogen (TKN) was also





detected at approximately twice the detection limit. No other analytes were detected in July suggesting that the total ammonia and TKN results may be somewhat anomalous; however, both analytes have been flagged for closer scrutiny in the interpretation of the July water quality results.”... Total ammonia was also at 10X DL in September.

We are concerned that both ammonia and TKN were routinely detected in equipment blanks. Contamination pertaining to these may make it difficult to determine whether the mine, particularly via blasting activities, may be having an impact in the aquatic environment.

**Recommendation 11:** Agnico Eagle should address sample contamination with a particular focus on ammonia and TKN in the field protocols implemented as part of the 2020 field programs across all sites.

**Agnico Eagle’s Response:**

*There are, on occasion, parameters that are detected in the field blanks (aka the deionized water blanks) and the equipment blanks. In most cases, the detected concentration is less than 5-times the analytical detection limit. The two results for ammonia in July and September that were greater than 10-times the DL were unusual for the CREMP. We acknowledge that measured concentrations for parameters in the equipment blanks, particularly when concentrations are greater than 10-times the DL, adds uncertainty to the reliability of the samples collected in during the given sampling event.*

*If detectable concentrations are measured in the field or equipment blanks, the source of the contamination is investigated. At a minimum, field personnel are asked to review the standard operating procedure for collecting blanks. If the source of contamination is equipment, then either the tubing or pump is replaced. At a minimum, the tubing used to collect water samples is replaced at the beginning of each year.*

*The field blank and equipment blank results from the March and May sampling events in 2020 came back showing non-detects for ammonia and TKN, indicating the corrective actions were effective at improving the blank results thus far in 2020. Overall, the blank results from the winter 2020 sampling events show no evidence of cross-contamination that could impact the water quality analysis.*

### **3.1.10 CREMP Water Quality Prediction**

**References:** Appendix 35, Section 5 Whale Tail, 5.3.2 Temporal and Spatial Trends; Appendix 12, Sub appendix D, Section 12.4.1.2.2.2 Receiving Environment Water Quality Predictions





**Comment:** Agnico Eagle appears to have had difficulty operating the project in a manner consistent with the FEIS in its initial year of operation.

Phosphorous “exceeded in seven out of 10 samples for WTS and, unsurprisingly, in 2019 the yearly mean total phosphorous concentrations exceeded the trigger/threshold in WTS. The BACI analysis indicated that the observed change was statistically significant.”

Phosphorus is a significant contaminant of concern associated with Whale Tail project activities; the receiving environment is expected to change trophic states during operations. While exceedances of predicted phosphorus concentrations in the receiving environment are of low concern in the short term, prolonged exceedances in the receiving environment may impact the viability of long-term closure objectives if an alternate steady state scenario becomes more likely.

Other exceedances of predicted concentrations are summarized in Table 5-7 which compares FEIS Screening Predictions for Mammoth Lake to mean measured concentration:

Parameter	Prediction (mg/L)	2019 Mean (mg/L)
Ammonia (as N)	0.015	0.046
Chloride	6.73	22.4
Calcium	6.32	12.7
Magnesium	1.93	2.48
TDS	54.3	87.1
Aluminum (Total)	0.0050	0.011
Barium (Total)	0.012	0.022
Lithium (Total)	0.0016	0.0037
Strontium (Total)	0.041	0.11

Chloride, aluminum and strontium all exceed the predictions by an order of magnitude, exceeding the model uncertainty which is described by Golder as “model predictions are estimated to be accurate within one order of magnitude”.

Despite these exceedances, no mention is made of the Adaptive Management Plan. We are concerned that the project is not operating as modelled, and Agnico Eagle does not appear to be taking steps to ensure these exceedances are corrected, potentially jeopardizing the feasibility of site closure objectives.



**Recommendation 12:** Please address the reported divergences from modelled water quality in the project receiving environment as part of the 2020 activities at the Whale Tail site. The 2020 annual report should include

- A summary of mitigation and management measures implemented to address the exceedances including specific references to the Adaptive Management Plan developed for the Whale Tail site, and
- A discussion as to whether closure objectives and timelines are impacted by the observed divergences from modelled water quality.

**Agnico Eagle's Response:**

*In response to this recommendation, it's helpful to provide some background on the water quality model for the Approved Project and how the data should be interpreted relative to operational water quality data. The water quality model for the Whale Tail Pit Project was included as Appendix 6-H of the FEIS (June 2016 submission). The predicted concentrations shown in the Table 5-7 represent the average during the operations period (see Appendix B of Appendix 6-H [page 1107 of Volume 6 of the FEIS]). In this document Golder stated that "a conservative number of assumptions were made in the modelling exercise based on literature, good practice, and comparisons between laboratory results and actual water quality data from the Meadowbank Mine and the Meliadine project" (see page 29 of Appendix 6-H in Golder 2016). This chapter of the FEIS is where the authors also state that "the results are considered accurate within one order of magnitude for the conditions and site configuration that were modelled" and that "the prediction of monthly average results implies that concentrations can be higher or lower at any given time during the month."*

*The following table was adapted from Table 5-7 to show the results of the 2019 water quality assessment compared to the water quality predictions and the corresponding order of magnitude (i.e., 10-fold) level of uncertainty considered accurate for the conditions and site configuration (all data are reported in mg/L).*

Parameter	FEIS Prediction	Prediction x10	2019 Mean	>1 order of magnitude?	Fold increase
Ammonia (as N)	0.015	0.15	0.046	No	3.1
Chloride	6.73	67.3	22.4	No	3.3
Calcium	6.32	63.2	12.7	No	2.0
Magnesium	1.93	19.3	2.48	No	1.3
TDS	54.3	543	87.1	No	1.6



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Aluminum (Total)	0.005	0.05	0.011	No	2.2
Barium (Total)	0.012	0.12	0.022	No	1.8
Lithium (Total)	0.0016	0.016	0.0037	No	2.3
Strontium (Total)	0.041	0.41	0.11	No	2.7

*For parameters that exceeded the FEIS prediction, the mean concentrations were between 1.3-times (magnesium) and 3.3-times (chloride) the predicted concentrations in the FEIS. The results for 2019 were well below the 10-fold (1 order of magnitude) considered accurate given the uncertainties of the model.*

*Given the low-magnitude of exceedances and that the concentrations were well below concentrations associated with effects to aquatic life, no mitigation actions were recommended for 2020 beyond routine water quality monitoring as per the CREMP Design for the Whale Tail Pit Project.*

*The water quality model was updated as part of the EA for the Expansion Project. Water quality data collected in 2020 will be compared to the revised predictions for the Expansion Project. If chloride, aluminum, strontium, or other parameters exceed modelling results, adaptive management measures may be undertaken if the concentrations also exceed water quality guidelines (thresholds). At present, chloride, aluminum, and strontium concentrations are all well below applicable water quality guidelines published by CCME (Cl and Al) and ECCC (new strontium guideline of 2.5 mg/L as of July 2020).*

### 3.1.11 Mercury Monitoring Report – Whale Tail

**References:** Appendix 35 Meadowbank and Whale Tail 2019 CREMP Report; Appendix L Whale Tail 2019 Mercury Monitoring Report

**Comment:** Table L2-1 indicates that Nemo Lake is listed as a reference location. While the watershed has not been flooded (i.e. the watershed has not been inundated and the potential for additional methylmercury generation is low), it may no longer be considered a true reference given discharges of 1,080,667 m<sup>3</sup> to tundra were directed into the Nemo watershed from July 11th to September 26th, 2019.

**Recommendation 13:** Agnico Eagle should provide a discussion as part of the 2020 Mercury Monitoring Report as to whether Nemo Lake is still an appropriate reference site for use in assessing mercury concentrations at the Whale Tail project.



Nemo Lake should no longer be considered a spatial reference location if it continues to receive discharges of contact water in volumes sufficient to qualify as a discharge location under MDMER; Nemo Lake may still be used as a temporal reference.

**Agnico Eagle's Response:**

*Agnico Eagle acknowledges KIA's recommendation and will provide the requested discussion as part of the 2020 Annual Report.*

### **3.1.12 EEM Study Design – Whale Tail**

**References:** Appendix 39 - Whale Tail EEM Cycle 1 Study Design; 8.2.3.2 Water Quality; Table 8-3. Water Quality Detection Limits.

**Comment:** The proposed EEM study includes ortho phosphate and total phosphate to assess phosphorus concentrations in the receiving environment. We appreciate that ortho phosphate is the biologically available form of phosphorus, and will reflect the phosphorus concentration that may result in biological effects. We are concerned however with Agnico Eagle's ability to consistently meet the 48 hour hold time for orthophosphate analysis given the remote location of the project. Total phosphorus is a far more stable analysis with a hold time of 28 days and can serve as a backup should hold times for orthophosphate and total phosphate be exceeded.

Evaluation of phosphorus concentrations in the total phosphorus form is seen as a conservative analysis as it includes all forms of phosphorus in the sample.

A consistent and conservative analysis of phosphorus is particularly important at the whale tail site given phosphorus is a contaminant of concern, and project effects are expected to include an increase in trophic status of Mammoth Lake.

We also note that the modelling of environmental effects at the Whale Tail project area was completed using total phosphorus concentrations. Evaluation of total phosphorus further permits the direct comparison of results to predicted water quality as presented in the Final Environmental Impact Statement.

Finally, we note that the Canadian Council of Ministers of the Environment provides guidelines based on total phosphorus measurements to determine shifts between trophic levels.

**Recommendation 14:** Please add total phosphorus to the analytical suite for the EEM program at the Whale Tail site.



**Agnico Eagle's Response:**

*There was a typo in the design report provided to ECCC. Total phosphorus is currently planned to be analyzed.*

### **3.1.13 Water Quality Forecast TSF Reclaim Pond - Meadowbank**

**References:** Appendix 11 – Meadowbank 2019 Water Management Report and Plan Version 8, Appendix C – 2019 Meadowbank Water Quality Forecasting Update, 2.3.1 Measured vs. Forecasted Concentrations

**Comment:** The forecasting model does not incorporate possible geochemical reactions that could promote metal precipitation of the water column for the North and South Cell TSF Reclaim Ponds. As a result, some forecasted values may be higher than measured values for some parameters (such as total iron and total nickel).

Including metal precipitation in the model would strengthen forecasting calculations.

**Recommendation 22:** Agnico Eagle should incorporate metal precipitation into the forecasting model for the TSF Reclaim Ponds.

**Agnico Eagle's Response:**

*In the Meadowbank Water Quality Forecasting Update for the 2019 Water Management Plan report, section 4.2.4, the water quality in the pits are forecasted assuming a conservative water/mass balance approach. SNC also performed geochemical equilibrium simulation using the software PHREEQC to assess which parameters could precipitate out of solution and which parameters could remain in solution. The equilibrated solution is then compared against CCME guideline.*

*In the 2020 annual water quality forecast report, Agnico will continue to use a conservative water/mass balance approach to assess the water quality parameters in the pits and then perform a geochemical equilibrium simulation to evaluate the best case scenario if some of the parameters were to precipitate out of solution.*

### **3.1.14 Water Quality Forecast - Meadowbank**

**References:** Appendix 11 – Meadowbank 2019 Water Management Report and Plan Version 8, Appendix C – 2019 Meadowbank Water Quality Forecasting Update, 2.4.1 Additional Mill Effluent Water Quality Results

**Comment:** Agnico Eagle states that mill effluent concentrations (not including the Whale Tail contribution) are similar in 2019 to 2015-2018 levels for all parameters except nickel and



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selenium. In 2019, average nickel concentrations were two orders of magnitude greater than in 2018 (2.661 vs. 0.026 mg/L), while selenium average concentrations were two orders of magnitude smaller than in 2018 (0.007 vs. 0.131 mg/L).

Table 2-4: Mill Effluent Concentrations Sampled in 2019

PARAMETER	MILL EFFLUENT CONCENTRATION (mg/L)						SOUTH CELL (mg/L)
	Average 2015	Average 2016	Average 2017	Average 2018	Average 2019 w/o Whale tail	Average 2019 Whale tail	Average 2019
Total Cyanide (CNT)	18.2	9.3	20.4	6.263	11.730	11.780	0.95
Total Aluminum (Al)	0.629	0.326	1.541	2.249	0.394	109.533	0.10
Total Arsenic (As)	0.036	0.026	0.018	0.025	0.034	9.007	0.02
Total Cadmium (Cd)	0.0020	0.0003	0.0072	0.0004	0.0002	0.0035	0.0001
Total Chromium (Cr)	0.002	0.001	0.009	0.005	0.002	3.496	0.001
Total Copper (Cu)	11.0	3.6	5.3	0.161	3.925	9.149	1.61
Total Iron (Fe)	5.9	2.8	6.9	6.533	5.575	401.733	0.42
Total Nickel (Ni)	0.423	0.024	0.982	0.026	2.661	7.664	0.10
Total Selenium (Se)	0.131	0.166	0.076	0.131	0.007	0.143	0.005
Ammonia (NH <sub>3</sub> -NH <sub>4</sub> )	127	105	79	84	64	75	22.3
Nitrate (NO <sub>3</sub> )	15.9	13.3	12.7	8.978	10.030	12.867	-
Chloride (Cl)	775	558	630	515	660	767	206.3
Fluoride (F)	0.545	0.645	0.335	0.680	0.565	0.297	0.422

What were the possible reasons for these deviations in mill effluent concentrations for nickel and selenium in 2019?

**Recommendation 23:** Please discuss possible reasons for the deviations from previous year average concentrations measured in mill effluent for nickel and selenium in 2019.

**Agnico Eagle's Response:**

*With regard to Total Nickel concentration in the mill effluent measured in 2019, one sample showed a high concentration of total and dissolved nickel concentration. The higher concentration of nickel present in the mill effluent could be the result of a change in the operating parameters in the mill process plant which created a condition that did not favour the precipitation of nickel.*

*As for selenium, it is possible that the nature of the ore being processed leached a lower concentration of selenium in the process water.*



### 3.1.15 Water Quality Forecast - Meadowbank

**References:** Appendix 11 – Meadowbank 2019 Water Management Report and Plan Version 8, Appendix C – 2019 Meadowbank Water Quality Forecasting Update, 6.2 Results Summary and Treatment

**Comment:** The SNC-Lavalin Water Quality Forecasting Update makes several recommendations, to improve the predictive ability of the model for the Reclaim Pond and Portage and Goose Pits, all of which Agnico Eagle commits to implementing. One of the recommendations is to

“Perform a bench scale water treatment test to evaluate containment removal efficiency using treatment approaches such as lime neutralization, coagulation/flocculation with aluminum sulphate or ferric sulphate, and coagulation/flocculation with proprietary coagulants designed for metal removal as well as alternate treatment options.”

Agnico Eagle should discuss when it plans to test different treatment options, as the preferred approach should be well established prior to closure.

**Recommendation 24:** Please discuss when different treatment options will be tested for the Reclaim Pond and Portage and Goose Pits.

**Agnico Eagle’s Response:**

*Please refer to response provide in Section 3.1.3 above.*

### 3.1.16 Meadowbank 2019 Groundwater Management Monitoring Report - QA/QC

**References:** Appendix 46 – Meadowbank 2019 Groundwater Monitoring Report, 2.3 QA/QC

**Comment:** Agnico Eagle conducted a charge balance calculation to check the accuracy of the groundwater quality analysis, and reported that a calculated error <5% indicates that “the analysis is assumed to be good”. The charge balance results generated 39% samples with <5% error, while 55% had an error between 5-13%, and one sample had an error >13% (44%). They concluded “that the quality of the analytical data is quite good”. However, since more than half of all samples had >5% error, we are concerned that the quality of much of the data is marginal, suggesting that confidence in the results may not be very high.

**Recommendation 27:** Please explain why the quality of the data is deemed to be good, even though more than 55% of samples did not meet this quality criterion.

Please provide a discussion of the implications low precision groundwater quality data may have on the water quality predictions for the site.



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### **Agnico Eagle's Response:**

*The observed concentrations are low in the water sampled in the wells. As the charge balance is a relative error calculation between cations and anions concentrations, small deviations in these values can lead to significant differences in charge balance calculation results. This is the main reason why, for these low-concentration samples, a maximal 15% charge balance error is considered as acceptable. The presence of turbidity in samples may also affect the result of the calculation since some elements might be absorbed on the suspended particles.*

### **3.1.17 Meadowbank 2019 Groundwater Management Monitoring Report**

**References:** Appendix 46 – Meadowbank 2019 Groundwater Monitoring Report, 3.2 Water Quality Results and Criteria

**Comment:** Agnico Eagle concludes that groundwater samples from well MW-IPD-07 suggest that water quality “does not seem to have been impacted by the in-pit tailings deposition which was started in July 2019 in Goose Pit only”, since many parameters have similar or lower mean annual concentrations as those measured in 2018. However, Agnico Eagle acknowledges that “the Total cyanide value is slightly higher in 2019 than 2018 but the difference is not significant enough for interpretation”.

Based on the results presented in Table 3-5 we are concerned that the increase in cyanide warrants more attention:

**Table 3-5: Comparison of mean annual concentrations at MW-IPD-07 for selected parameters**

Parameter	Units	2018	2019
Chloride	mg/L	4.85	3.45
Sulphate	mg SO <sub>4</sub> /L	29.5	23.6
Total arsenic	mg/L	0.00985	0.00495
Total copper	mg/L	0.00025	0.000375
Total cyanide	mg/L	0.00075	0.00175
Total iron	mg/L	1.315	0.4625
Total phosphorus	mg/L	0.075	0.035





The change in total cyanide concentration between 2018 and 2019 represents an 113% increase.

**Recommendation 28:** Please discuss why there was 113% increase in total cyanide mean annual concentrations in groundwater samples between 2018 and 2019 and whether this indicates an effect of in-pit tailings deposition on groundwater quality.

**Agnico Eagle's Response:**

*The measured total cyanide concentrations at well MW-IPD07 are very low and close to the detection limit (DL) of 0,001 mg/L. The four measured values in 2017-2018 were between below DL and 0,003 mg/L. The most recent total cyanide concentration value obtained for the 2019 October sampling campaign was below DL. Such variability close to the DL might be due to the analytical method inaccuracy at such low concentrations.*

*With regards to a potential effect of in-pit deposition on groundwater quality, it not possible to date to identify trends for the following reasons:*

- *More than two years of monitoring results are required to identify trends, if any.*
- *If an effect of the in-pit deposition was to be identified, it would impact several chemical parameters that are specific to tailings porewater quality (i.e. chlorides, sulfates, etc.) and not only Total cyanides parameter. The mean annual concentration for chlorides and sulfates (Table 3-5 above) doesn't seem to show an effect of the in-pit deposition between 2017 and 2018.*

## **3.2 Terrestrial Technical Comments**

### **3.2.1 Wildlife Monitoring Summary Report**

**References:** S 3.6 Road Surveys; 2019 Results

**Comment:** The KIA appreciates the inclusion of the road density figures (Figs. 3.1–3.4) that Agnico Eagle presents, now showing a 2 km resolution of sightings along the roads.

**Recommendation 32:** N/A

**Agnico Eagle's Response:**

*Agnico Eagle acknowledges KIA's comment.*



### 3.2.2 Wildlife Monitoring Summary Report

**References:** S 3.6 Road Surveys; 2019 Results

**Comment:** 2019 was an exceptional year as the numbers of caribou individuals was much higher in 2019 (Fig. 3.5). While Figs. 3.1-3.4 display the density of caribou counted along the roads, their format makes it difficult to determine how the distribution (exposure) of caribou along the roads in 2019 at the 2 km scale differs from the average of the 2008 to 2018. The management recommendations (S 3.8, pg 38) note how caribou density can be used to track preferential migration corridors but the report did not explicitly identify these corridors or annual changes which is useful for mitigation.

**Recommendation 33:** Agnico Eagle should analyze how the 2019 seasonal migration distribution along the road differed from the longer-term distribution/exposure and how this relates to the location of berm engineered crossings proposed for the Whale Tail haul road widening.

**Agnico Eagle's Response:**

*Agnico Eagle has reported on the distribution of caribou interactions along the Haul Road based on multiple data sources as part of Whale Tail Project Commitment #8 (Golder 2019, updated in 2020). Data sources included collared caribou (1998 to 2019), caribou trails (2017), migration pathways identified by Inuit Qaujimagatuqangit (IQ) (collected in 2014), and haul road surveys (2018 to 2019). The outcome is to inform on areas to target for road enhancements to make the Haul Road more "caribou friendly". Community visits to finalize enhancement locations were planned for summer 2020 but have been delayed due to the COVID-19 pandemic. Community visits will be rescheduled when it is safe to do so.*

**References**

Golder (Golder Associates Ltd.). 2019. Lorillard collared caribou movements: Implications from interacting with the Whale Tail Haul Road and All-weather Access Road. Prepared for Agnico Eagle Mines Limited by Golder Associates Ltd. DRAFT Revision 1, November 2019. Victoria, BC.

Golder (Golder Associates Ltd.). 2020. Lorillard collared caribou movements: Implications from interacting with the Whale Tail Haul Road and All-weather Access Road. Prepared for Agnico Eagle Mines Limited by Golder Associates Ltd. DRAFT Revision 2, May 2020. Victoria, BC.

### 3.2.3 Wildlife Monitoring Summary Report

**References:** S 3.6.4 Road Surveys; Traffic Data and Caribou Movements

**Concern:** Agnico Eagle has presented traffic frequency data for 2019 showing monthly totals for haul trucks, medium and light equipment in table (Tables 3.7) and graphic (Fig. 3.6) format. These data are a useful addition as traffic data are essential to evaluating the effectiveness of caribou (and muskox) mitigation. Further benefits would be gained by clarifying whether the number of



vehicle trips are vehicle passages (one passing of a location road regardless of direction) or round trips (two passages of a location). November 2019 had the highest annual number of vehicle trips (Table 3.7) which at one trip/10 minutes is less than the predicted rate from the expansion review (a vehicle/6.4-7.6 minutes). This a concern as traffic levels will increase further with full capacity hauling, and even at these 2019 levels Appendix J (Whale Tail Haul Road - Remote Camera 2018/2019 Summary; S 3.3, pg 6) indicates caribou delayed crossing the haul road in fall 2018 by 1–90 minutes after a convoy vehicle.

**Recommendation 34:** Agnico Eagle should clarify whether traffic data presented (number of vehicle trips) are vehicle passages (one passing of a location road regardless of direction) or round trips (two passages of a location).

**Agnico Eagle's Response:**

*Please refer to Agnico Eagle's response on Section 1.3 above.*

### **3.2.4 Wildlife Monitoring Summary Report**

**References:** S 6 Caribou Satellite-Collaring Program

**Comment:** "In 2019, most Caribou appeared to migrate through the RSA and across the AWAR and Whale Tail Haul Road without major deflections. This positive result may be due to the number of road closures, timing of initial road closures and/or a combination thereof that were initiated in 2019 in response to Caribou presence" (S 6.6, pg 58). This statement has a number of qualifiers ("most caribou"; "appeared"; "major deflections"; "may be due to") which highlight the fact that there has been no analyses at the local scale to support the statement.

**Recommendation 36:** Agnico Eagle should conduct analyses at the local scale to quantify collared caribou movements through the mine sites and roads.

Agnico Eagle should also clarify that if the road closures were so successful at enabling caribou to move through the roads (as indicated by the statement), why is the company restricting the extent of road closures in TEMP Version 8, and what successful mitigation measures would road closures be replaced with.

**Agnico Eagle's Response:**

*Agnico Eagle has completed an analysis of collared Lorillard caribou movements (Golder 2020), which reflects revisions based on GN, KivIA and HTO comments. The analyses included examining the duration of movements within 4 km of the Haul Road to crossing the road and relative to how long the Haul Road was closed. The results show that the number of days the Haul Road was closed had no influence on the duration of collard*



*caribou movements. The results also demonstrated that caribou move quickly through this area and even a large reduction at the local scale is unlikely to be measurable at the scale of spring migration.*

#### **Reference**

Golder (Golder Associates Ltd.). 2020. Lorillard collared caribou movements: Implications from interacting with the Whale Tail Haul Road and All-weather Access Road. Prepared for Agnico Eagle Mines Limited by Golder Associates Ltd. DRAFT Revision 2, May 2020. Victoria, BC.

### **3.2.5 Wildlife Monitoring Summary Report**

**References:** S 7 Height of land monitoring

**Comment:** Height of land (HOL) surveys were designed to help trigger enhanced mitigation when caribou were within 4 km of the haul road, an early warning system for detecting caribou approaching the haul road. While significant numbers of caribou were observed in some seasons (Tables 7.1, 7.2; pgs 68-74), no indication of whether these surveys were used to trigger mitigation was provided and at what distance from road these triggers occurred. Tables 11.1 and 11.2 (pgs 106-108) indicate broad management responses by monitoring program, but provide no specific comparisons about the efficacy of the various programs.

**Recommendation 37:** Agnico Eagle should provide information linking monitoring with management actions.

#### **Agnico Eagle's Response:**

*The Height of Land (HOL) surveys referenced by the GN are no longer used because they were not effective, which was a decision supported by the TAG during meetings in January and November 2019, and has been integrated in the TEMP revision (TEMP Version 8; Agnico Eagle 2020). New roadside surveys were implemented in 2020 following a viewshed analysis that identified monitoring locations that achieved an approximate 4 km line-of-sight distance, which may improve distances at which caribou groups can be observed.*

### **3.2.6 Wildlife Monitoring Summary Report**

**References:** S 9 Caribou Management Decision Tree

**Comment:** Agnico Eagle acknowledges the importance of group size as a threshold (S 9.4, pg 78) as specified in TEMP Version 7. But group size frequencies are not used in Appendix C nor are derived from Table 3.4–3.6 which provide the average number of caribou during road surveys. It is a concern that analyses of the use of group size as a threshold for mitigation are not included.



**Recommendation 40:** Agnico Eagle should undertake analyses of caribou sightings relative to group size frequencies relative to thresholds,, for example as reported in EDI (2020<sup>3</sup>).

**Agnico Eagle's Response:**

*Agnico Eagle has undertaken analysis of road survey of caribou data as they related to the GST (Golder 2019 updated in 2020, EDI 2020, Agnico Eagle 2020).*

**References**

Agnico Eagle (Agnico Eagle Mines Limited). 2020. Meadowbank Division: Terrestrial Ecosystem Management Plan. Version 8, April 2020.

EDI (Environmental Dynamics Inc.). 2020. Caribou road mitigation - Technical Memorandum. Prepared for Agnico Eagle Mines Limited. February 2020.

Golder (Golder Associates Ltd.). 2019. Lorillard collared caribou movements: Implications from interacting with the Whale Tail Haul Road and All-weather Access Road. Prepared for Agnico Eagle Mines Limited by Golder Associates Ltd. DRAFT Revision 1, November 2019. Victoria, BC.

Golder (Golder Associates Ltd.). 2020. Lorillard collared caribou movements: Implications from interacting with the Whale Tail Haul Road and All-weather Access Road. Prepared for Agnico Eagle Mines Limited by Golder Associates Ltd. DRAFT Revision 2, May 2020. Victoria, BC.

### **3.3 Geophysical Technical Comments**

#### **3.3.1 WT WRSF Seepage**

**References:** Annual Report, Construction Earthworks; Section 3.0; pages 44-48; Appendix 10, pages 4, 11, 21-22; and Appendix C, pages 21-22.

**Comment:** One of the recommendations by SNC Lavalin regarding the TARP was to raise the alert level more rapidly once an anomaly is detected or inferred. This approach would have likely prevented the August 28th, 2019 discharge of contact water from the WRSF pond to Mammoth Lake. Especially given that ponding of water was noted downstream of the WRSF dam on June 28th, 2019; and on July 7th, 2019 the water level was at 155.86masl, which was 0.46masl higher than the operational water level of 155.4 masl.

**Recommendation 44:** The KIA would like to know how much more rapidly the alert level has been raised once an anomaly is detected or inferred at the WRSF, especially given the close proximity (ie. 50 metres) to Mammoth Lake.

**Agnico Eagle's Response:**

*Since the events in 2019 at the WRSF Dike, many measures have been taken to ensure early warning of rising water levels in the WRSF pond. A piezometer has been installed to allow constant remote monitoring of the water level, including alarms when critical and*



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*maximum operational levels are reached. Additional pumps and pipelines are also in place in case a rapid drawdown of the pond level is required. Frequent inspection of the area is performed by a variety of qualified personnel, especially during periods of high flow to the area (freshet, rainfall events, etc.). Pond operational guidelines integrated with the TARP of each structure have been developed for the lakes and ponds at the Whale Tail site to ensure the freeboard of the Dewatering Dikes and South Whale Tail Diversion Channel is respected. All pond operational guidelines will be included in the next revision of the Whale Tail Water Management Infrastructure OMS Manual.*

*Agnico would also like to clarify that an authorisation from the designer was obtained in 2019 to temporarily store water above the operational level of the structure and that the incident was not caused by a delay in raising the alert level of the structure. The designer at the time re-evaluated the maximum operational water level after freshet and identify that there was no risk to temporarily increase storage in the structure as the snowmelt period had passed.*

### **3.3.2 Blast Monitoring – Whale Tail**

**References:** Annual Report; Monitoring; Section 8.6 Blast monitoring, pages 390-392; Appendix 53.

**Comment:** Three (3) of the eight (8) PPV exceedances at Whale Tail were related to higher explosives quantity being used on the same delay for the pre-shear blast. These three exceedances occurred between May 17th and June 15th, 2019.

**Recommendation 45:** The KIA would like to know how the additional explosives may have impacted water quality in the contact water ponds for the open pits and WRSF. In particular, the ammonia content.

#### **Agnico Eagle's Response:**

*The amount of additional explosive in these three blast will have a negligible impact on the ammonia content and the water quality as it represents a very small portion of the total explosive content used during a year.*



## 4 Environment and Climate Change Canada (ECCC)

### 4.1 Meadowbank

#### 4.1.1 Pore Water Sampling

**References:** Appendix 23 Pore Water Quality Monitoring Program Section 4.1 Sample Collection and Frequency; Section 4.4 Data Analysis

**Comment:** The Pore Water Quality Monitoring Program (PWQMP) report Section 4.1 states that:

“Once Goose Pit has reached its full storage capacity, pore water samples will be collected directly from the in-pit tailings, once it is safe to do. Agnico will sample in-pit tailings for two

(2) subsequent years. If year two is within 20% or lower of year one, and within our prediction, then no further sampling in-situ will be performed.”

The purpose for the pore water sampling is to identify the potential for poor-quality water to migrate upwards through the tailings, primarily in connection with upwelling groundwater. Once the pit is filled and thus acting to reduce the hydraulic head of the groundwater, this will limit the potential for groundwater to flow into the bottom of the pit. It is not clear how far ahead of the pit reaching its final water fill elevation that the tailings deposition will be finished. If there is still the potential for groundwater upwelling to move pore water upwards during pit re-watering, the monitoring should continue. Two years of such monitoring may not be sufficient to identify changes and impacts.

Section 4.4 Data Analysis notes that the chemistry of the tailings effluent pore water and reclaim water will be compared to Water Licence effluent limits, to identify potential risks for impacts to biota during closure and post closure. Acknowledging that there will be a delay in obtaining in situ pore water quality data, it would be useful to outline how that data will be used. The front-end information will help with flagging parameters of concern, but the purpose of the monitoring program is to identify the risk to biota at closure; that will require ongoing monitoring of pore water quality and movement, and a focus on changes in chemistry at the tailings-water interface.

**Recommendation 4:** ECCC recommends that the proponent base the duration of pore water monitoring on the potential for further movement of contaminants, as well as monitoring results, rather than a fixed time frame.

ECCC recommends that the PWQMP include a description of the purpose and data analysis for the future in situ pore water monitoring data.



**Agnico Eagle's Response:**

Agnico Eagle agrees with ECCC that the monitoring should be based on expected conditions and not a fixed timeframe. The sampling program will only stop if water quality is meeting the prediction and a significant (i.e. 20% or more) decreases in constituent concentrations are observed in the pit. If there is only a small decrease in concentrations (i.e. 10%), or conditions deviate from the prediction, then monitoring will continue.

As noted in the Pore Water Quality Sampling Plan, Section 3.1, the worst-case water quality that could be in the pit will be the mill effluent. This lower end bracket of water quality will provide the earliest possible indication of water quality in the pit as geochemical weathering of the tailings will not occur underwater. Any upwelling of porewater by groundwater will only be at a lower concentration than the mill effluent water quality.

The pit will be full prior to the installation of any instrumentation in the pit that can sample porewater directly. As a result, the hydraulic head is expected to be at a steady state once in-situ sampling begins and the in-situ sampling program is unlikely to miss potential water quality risks.

#### **4.1.2 Recommendation(s) for future groundwater monitoring**

**References:** Meadowbank Gold Project 2019 Groundwater Monitoring Report

**Comment:** Section 6.2 (Recommendations for future groundwater monitoring) provides a number of technical recommendations for future groundwater monitoring

**Recommendation 6:** ECCC recommends that the proponent include a discussion of whether the recommendations provided in Section 6.2 (Recommendations for future groundwater monitoring) of the 2019 Groundwater Monitoring report will be implemented in the next groundwater monitoring report.

**Agnico Eagle's Response:**

*Section 6.2 (Recommendations for future groundwater monitoring) mainly provides equipment requirements for the 2020 groundwater sampling campaign. As such, Agnico will implement most of these recommendations for the 2020 groundwater sampling campaign. As for the last recommendation about additional parameters to analyse, the addition of new parameters to the existing list of analysed parameters would only be done to investigate specific issues if arising. For the 2020 groundwater sampling campaign the analytical parameter will be the same as in 2019.*





#### **4.1.3 References to Canadian Council of the Ministers (CCME) of the Environment Guidelines**

**References:** 2019 Water Management Report and Plan, Section; 2.3 North and South Cell TSF Reclaim Ponds (ST-21); 2.3.1 Measured vs Forecasted Concentrations

**Comment:** This section variously refers to the CCME guidelines as “discharge guidelines” or criteria for discharges. Table 2-2 refers to the CCME guideline for copper as a discharge criterion (footnote 4), and refers to the various parameters’ CCME guidelines as a “limit” in the text, on the figures, and in Table 2-3.

**Recommendation 7:** For clarity, the proponent should refer to the CCME guidelines as guidelines rather than limits or criteria, which implies a regulatory basis. As guidelines or objectives, the CCME concentrations provide a yardstick for the evaluation of parameters of concern. Also, they should be kept in the context of being receiving environment guidelines.

**Agnico Eagle’s Response:**

*Agnico Eagle will ensure the CCME guidelines are referred to as guidelines in future Annual Reports.*

#### **4.1.4 Reclaim Water Treatment**

**References:** 2019 Water Management Report and Plan V. 8 Appendix C. Meadowbank Water Quality Forecasting Update for the 2019 Water Management Plan, SNC Lavalin, Apr. 2020

**Comment:** Section 3.2 of the Forecasting Update notes that “The main source of cyanide, copper, iron, selenium, other metals, ammonia (i.e. via the hydrolysis of cyanate), nitrate, chloride, sulfates and total dissolved solids in the TSF Reclaim Pond is the Mill Effluent.” Many of the parameters were observed to be substantially higher than originally predicted due to the geochemistry of the Amaruq ore, and the mill effluent concentrations have been adjusted to account for this. The modeled predictions presented in Section 4.3 indicate that treatment may be required for heavy metals, fluoride, arsenic, selenium and total nitrogen, as well as for suspended solids. The report states that treatment could be done of water in the pit at the end of tailings deposition, or in the TSF South Cell Reclaim Pond.

Treatment processes may involve the use of reagents (e.g. aluminum sulphate, ferric sulphate) which can increase sulphate, which is already predicted to exceed objectives at closure. If the full volume of reclaim water is to be treated at closure, then treatment residuals should be factored into the predicted pit water quality to be managed. The proposed use of ion exchange treatment to remove TDS (chloride, sulphate) is suggested in the report as an option at closure. However,



this technology is costly and has volume limitations. Planning for treatment at closure may have obstacles that could be reduced with earlier treatment implementation.

Figure 4.21 outlines the Water Treatment Decision Flow Process for implementing treatment, and includes the option of treating reclaimed water during operations. This has not been presented in the 2019 Annual Report as an option being actively considered. However, it would make sense in respect of reducing contaminants at source rather than treating much larger water volumes later at closure. In addition, given that the Amaruq expansion will be proceeding there may be higher loadings of the contaminants of concern over the remaining life of mine, and earlier treatment reductions would reduce that environmental liability.

**Recommendation 8:** ECCC requests that the proponent provide a discussion of the feasibility of treating reclaimed water earlier in the mine operations, e.g. segregating high-concentration water and treating to remove contaminants.

**Agnico Eagle's Response:**

*The main contaminants that reports to the reclaim water comes from the processing of the ore in the mill. Thus, the focus of treatment should be on the mill effluent discharged with the tailings to the pit.*

*As part of the development of the treatment strategy for closure, one avenue that could be explored is to evaluate the feasibility of performing treatment during operation. Treatment of the mill effluent could be considered using existing equipment in the mill. Treatment of the reclaim water stored in the pit could also be considered.*

*However, before moving forward with such an approach, bench scale testing should be planned and undertaken at site to evaluate suitable water treatment approach that could be implemented during operation and/or at closure.*

*A more detailed discussion on water treatment of the mill effluent, and any other individual streams, during operation shall be provided in the 2020 Annual Forecast Report.*

#### **4.1.5 CCME Guidelines – Dissolved Manganese and Zinc**

**References:** Appendix 22 Meadowbank predicted water quantity and quality (2012-2019)

**Comment:** The proponent has provided predictions for the dissolved form of metals for comparison to measured dissolved metals, with reference to the CCME guidelines (for total fractions) for comparison. Dissolved zinc (<http://ceqg-rcqe.ccme.ca/download/en/360>) and



manganese (<http://ceqg-rcqe.ccme.ca/download/en/361>) guidelines are now available and would be relevant to include in the tables.

**Recommendation 9:** ECCC recommends including the dissolved guidelines for zinc and manganese in the tables in Appendix 22.

**Agnico Eagle's Response:**

*Agnico Eagle acknowledges ECCC's comment and will include CCME guidelines for dissolved zinc and manganese in the comparison table in next year's report.*

## **4.2 Whale Tail**

### **4.2.1 Hydrology Model**

**References:** Whale Tail Water Management Plan, Version 4 (March 2020); Appendix C: 2019 Water Balance Report (Golder, March 2020); Appendix A Project Design Document; Table 22: General Assumptions and Limitations of the Hydrogeology Model

**Comment:** Table 22 states that the proponent provided hydrogeology model predictions for the 'EA Scenario' but does not provide a description of the EA Scenario. This description should be included in the report for ease of reading.

**Recommendation 16:** ECCC recommends that future annual water balance reports provide a definition of "EA Scenario" to clarify the prediction scenario used for the hydrogeology model.

**Agnico Eagle's Response:**

*Agnico Eagle will ensure that future Water Balance Reports provide a definition of "EA Scenario".*

### **4.2.2 Water Quality Predictions**

**References:** Whale Tail Water Management Plan, Version 4 (March 2020); Appendix D: Whale Tail water quality forecast update (Mine Site and Downstream Receiving Water Quality Predictions - 2019 Annual Report; Golder Associates Ltd., March 2020); Section 3.0 Water Quality Predictions

**Comment:** Water quality model results for on-site facilities and downstream lakes during operations, closure, and post-closure are discussed in Section 3.0 (Water Quality Predictions), and are presented in Appendix C. However, the report does not describe the prediction scenario used to develop the water quality predictions.

**Recommendation 17:** ECCC recommends that the Proponent:



- Describe the prediction scenario that was used to develop the water quality predictions presented in Appendix D: Whale Tail water quality forecast update (Mine Site and Downstream Receiving Water Quality Predictions - 2019 Annual Report; and
- Include a description of the prediction scenario for future water quality prediction reports.

**Agnico Eagle's Response:**

*The prediction scenario used to develop the water quality predictions presented in Appendix D is reflective of the Approved Project and is based on an average climate condition. It is anticipated that future water quality prediction reports will also be based on average climate conditions and will account for the Whale Tail Expansion Project water management scenario.*

#### **4.2.3 Water Quality Model**

**References:** Whale Tail Water Management Plan, Version 4 (March 2020); Appendix D: Whale Tail water quality forecast update (Mine Site and Downstream Receiving Water Quality Predictions - 2019 Annual Report; Golder Associates Ltd., March 2020); Section 2.2.2 Changes to the Approved Model

**Comment:** In Section 2.2.2 Changes to the Approved Model, Table 2 lists changes in surface facility assumptions that are used in the approved annual reporting model, and the reasoning. Several of these assumptions may be less conservative, for example using a 0.3 m interaction depth for runoff on the waste rock storage facility (WRSF) rather than 1m, or assuming no loadings from the pit walls.

**Recommendation 18:** ECCC recommends that future model reviews in the Annual Reports include confirmation that the changes in assumptions are supported by monitoring and model calibration.

**Agnico Eagle's Response:**

*The changes in assumptions that were implemented in the Water Quality forecast are based on refinements that were undertaken during the regulatory process for the Whale Tail Expansion Project. These refinements were based on additional modelling, additional geochemical testing, and observations from site. The intention was to align the model assumptions used for the Annual Report with the model assumptions used in the regulatory process for the Expansion Project.*

*As per the water licence (Part E, Item 6 and 8), updates to the model, and calibration if necessary, will be completed on an annual basis based on new information and site monitoring. Monitoring programs included in the Waste Management Plan, Water*



*Quality and Flow Monitoring Plans, WRSF Instrumentation Plan, and the Adaptive Management Plan, will serve to validate the assumptions that have been made in the Water Quality Model and the supporting models.*

## **5 Transport Canada (TC)**

### **5.1 Oil Handling Facility**

**Comment:** The oil handling facility at Baker Lake/Meadowbank is in compliance with regulatory requirements as per part 8 of the Canada Shipping Act, 2001. Under the Environmental Response Regulations, the facility is required to submit their Oil Pollution Emergency plan and Oil Pollution Prevention Plan to Transport Canada by July 10, 2020

**Agnico Eagle's Response:**

*An updated combined Oil Pollution Emergency Plan and Oil Pollution Prevention Plan was submitted to Transport Canada on July 9, 2020.*

## **6 Fisheries and Oceans Canada (DFO)**

### **6.1 Meadowbank Site**

**Reference:** Section 8.5.1 Meadowbank Site (p.212)

**Comment:** DFO-FFHPP notes that Agnico is operating under several Fisheries Act Authorizations for the Whale Tail Pit and Meadowbank projects. As a general condition of Fisheries Act Authorization, Agnico is required to report on their compliance with the Fisheries Act Authorizations through annual reporting that includes (but is not limited to):

- Stand-alone reports to DFO that indicate whether the measures and standards to avoid and mitigate serious harm to fish were conducted according to the conditions of the authorization; and,
- An Whale Tail Pit Fish Habitat Offset Monitoring report to DFO (and interested parties) following the construction of the offsetting habitat which summarizes the effectiveness of the offsetting measures. Agnico are required to provide the Whale Tail Pit Fish Habitat Monitoring Report until DFO indicates the requirement has been met;

DFO-FFHPP will determine Agnico's compliance status once the reviews of the requisite Fisheries Act reports have been completed.

DFO-FFHPP notes that discussion are currently being undertaken surrounding modifications to this Authorization.



**Agnico Eagle's Response:**

*Agnico Eagle acknowledges DFO's comment.*

## **6.2 Meadowbank Site Habitat Compensation Monitoring Program**

**Reference:** Section 8.5.6.1 and 8.8.1 Meadowbank Site Habitat Compensation Monitoring Program (p.302 & 397) reference Appendix 40 (Habitat Compensation Monitoring Report)

**Comment:** Under this section the proponent references Fisheries Act Authorization NU-0191.2, NU-03-0191.3, NU-03-0191.4 and 14-HCAA-01046 stating: "Monitoring was conducted in 2019 for the constructed spawning pad, located at stream crossing R02 along the all-weather access road... as well as onsite habitat compensation features constructed to date (East Dike exterior, Bay-Goose Dike exterior, Dogleg Ponds)"

DFO-FFHPP acknowledges Agnico's commitment to conducting monitoring and acknowledges the submission of the 2019 HCMP report (Appendix 40). DFO will review those reports, and has no further comments at this time.

**Agnico Eagle's Response:**

*Agnico Eagle acknowledges DFO's comment.*

## **6.3 Technical Memorandum on Avoidance of Serious Harm to Fish and Fish Habitat**

**Reference:** Section 8.5.1.2 Whale Tail Site (p. 213) reference Appendix 20 (2019 Technical Memorandum on Avoidance of Serious Harm to Fish and Fish Habitat- Whale Tail Project)

**Comment:** Under this section the proponent references Fisheries Act Authorization 16-HCAA-00370 Condition 3.1 stating that the 2019 Technical Memorandum of Avoidance of Serious Harm to Fish and Fish Habitat- Whale Tail Project was submitted to DFO on April 21st, 2020.

DFO-FFHPP acknowledges Agnico's submission and will review the report to determine whether potential impacts to fish and fish habitat have been mitigated and avoided. DFO-FFHPP has no further comments at this time.

**Agnico Eagle's Response:**

*Agnico Eagle acknowledges DFO's comment.*