TECHNICAL REVIEW

OF

MEADOWBANK GOLD PROJECT
2018 ANNUAL REPORT

Prepared By:

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And

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Prepared For:

NUNAVUT IMPACT REVIEW BOARD

Executive Summary

Nunavut Tunngavik Inc. (NTI) and the Kivalliq Inuit Association (KivIA) have completed a technical review of Agnico Eagle Mines Limited's (AEM) "Meadowbank Gold Project, 2018 Annual Report". The review has outlined the following recommendations suggested by the KivIA.

Overall the information and conclusions presented in the majority of the 2018 Meadowbank Annual Report indicate that the project appears to be operating effectively, without adverse impacts to the receiving environment as per the project certification and water license is well done and informative. There are some sections of the report where that require additional background information or detail to help clarify or justify statements made. These considerations should be addressed in future annual reports for Meadowbank and Whale Tail and are related to:

- Water Management,
- Waste rock management,
- Spill management,
- Environmental monitoring,
- Evaluation of impact predictions, and
- Wildlife monitoring.

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1.0 Introduction

Nunavut Tunngavik Inc. (NTI) and the Kivalliq Inuit Association (KivIA) have completed a technical review of Agnico Eagle Mines Limited's (AEM) "Meadowbank Gold Project, 2018 Annual Report". The review has outlined the following recommendations suggested by the KivIA.

The KivIA and NTI, represent Inuit beneficiaries of the Nunavut Land Agreement at the regional and territorial levels, respectively. In particular, both organizations manage Inuit Owned Lands (IOL) with the main aim of promoting self-reliance and social well-being of Inuit now and in the future. Both organizations manage IOL in order to support sustainable economic development opportunities for Inuit as long as it is completed in an environmentally and socially responsible manner.

The review was completed using the following guidance provided the NIRB for interested parties reviewing the 2018 Annual Report. Specifically, the NIRB requested *"comments with respect to their jurisdiction and/or area of expertise… on the following:*

"1. Effects monitoring
- *a. Whether the conclusions reached by Agnico Eagle in the 2018 Annual Report are valid; and*
- *b. Any areas of significance requiring further supporting information or any changes to the monitoring program which may be required.*

2. Compliance monitoring
- *a. Provide a summary of any compliance monitoring and/or site inspections undertaken in association with the Project, including specifically;*
  - *i. Identify the Terms and Conditions from the Project Certificate which have been incorporated into any permits, certificates, licences or other approvals issued for the Project, where applicable;*
  - *ii. A summary of any inspections conducted during the 2018 reporting period, and the results of these inspections; and*
  - *iii. A summary of Sabina's compliance status with regard to authorizations that have been issued for the Project."*

2.0 Summary of 2018 Meadowbank and Whale Tail Gold Projects Activities

The Meadowbank Gold Project, 2018 Annual Report provides a summary of the status of the project, major activities undertaken, changes in infrastructure and monitoring activities in 2018.

AEM received key regulatory approvals relating to the Whale Tail Pit Project in 2018.The Meadowbank Project's Type A Water Licence No: 2AM-MEA 1526 was amended in July 2018 to include mining at the Whale Tail Pit site with the associated ore processing and tailings deposition at the Meadowbank mine site. DFO's Fisheries' Act Authorization was

also issued to AEM in July 2018. In November 2018, the Nunavut Water Board cancelled Meadowbank Type B Water Licences 8BC-AEA 1525 for the Amaruq Exploration Access Road Project and 2BC-WTP 1819, for the Whale Tail Pit and Haul Road Site Preparation Project, following a final compliance inspection by CIRNAC. This inspection concluded that the conditions of the two licences had been met and that their components would now be covered by the Type A Water Licence.

AEM indicated that operations exceeded production targets for a seventh consecutive year in 2018. Meadowbank produced a total of 248,997 ounces of gold and 170,696 ounces of silver. The mine is forecast to produce 65,000 ounces of gold in 2019, with production forecast to cease late in the second quarter of the year. The extension of mining into mid-2019 at Meadowbank has been possible due to additional production at the Vault and Phaser pits in 2018 and the Portage pit in 2018 and 2019, as well as through use of stockpiles in both years. Production is expected to begin at Amaruq in the third quarter of 2019, although open pit mining is already underway at the Whale Tail pit.

Construction activities at the Meadowbank mine focused on dikes, saddle dams and the North Cell Internal Structure in 2018. At Whale Tail, numerous construction activities were conducted in 2018:

- Widening of the haul road;
- Construction of service roads, haulage roads and pads at the mine site; and
- Construction of the water management infrastructure, including the Whale Tail Dike and a saline protection ditches system.

Environmental monitoring continued at both mine sites and the Baker Lake marshalling area in 2018. At the Whale Tail mine, there was a shift from background monitoring to impact monitoring as mine development progressed. A fishout of Whale Tail Lake North Basin occurred in August and September 2018.

3.0 Summary of Review and Suggested Recommendations

The following documents were reviewed:

1) Meadowbank Gold Project, 2018 Annual Report, 400 pages in total, and

2) Appendices 1 to 63.

This section is a summary of the XX (XX) comments with suggested recommendations. These are organized in sequence based on the section of the 2018 Annual Report and on the section within the Appendices being commented on.

3.1: Annual Report 4.2 Lake Level Monitoring, 4.2.1 Meadowbank Site.

AEM provides the baseline lake level for Second Portage Lake (133.1 masl), as well as its average and range for 2018. The baseline information is lacking for Third Portage

Lake and Wally Lake. Without this information it is not possible to evaluate whether changes in lake levels since mine activity are of concern.

The KivIA recommends that AEM include the baseline water levels for all three Meadowbank lakes for comparison to the range in the current monitoring year.

3.2: Annual Report 4.4.2 Water Balance Water Quality Model Reporting Summary, 4.4.2.1 Meadowbank Site.

The 2018 water quality forecast updates predictions on what parameters may exceed CCME guidelines in pits at closure, and thus require treatment. Twelve parameters are identified, including three that were not predicted in 2017: mercury, lead and total ammonia. AEM does not explain why these additional parameters are now predicted to exceed limits at closure.

The KivIA would like an explanation from AEM for why mercury, lead and total ammonia are predicted to exceed CCME guidelines in pits at closure.

3.3: Annual Report 4.4.2 Water Balance Water Quality Model Reporting Summary, 4.4.2.1 Meadowbank Site and 4.4.3 Predicted vs Measured Water Quality, 4,4,3,1 Meadowbank Site.

In Section 4.4.2.1, the 2018 water quality forecast predicts that no treatment will be necessary for Vault Pit during re-flooding. It is not clear how this conclusion was reached. Section 4.4.3.1 shows that most parameters have exceeded predicted water quality values by more than 20% in Vault Pit since 2012, and several parameters have exceeded CCME guidelines from 2014-2017 and in 2018. In particular un-ionized ammonia, ammonia nitrogen, fluoride, dissolved cadmium, nitrate.

The KivIA would like AEM to clarify why no treatment is predicted to be necessary for Vault Pit at closure, despite current and past exceedances of CCME guidelines in several parameters.

3.4: Annual Report 4.4.3 Predicted vs Measured Water Quality, 4.4.3.1 Meadowbank Site.

Vault Pit experienced 64% higher runoff volume in 2018 compared with the predicted amount. AEM suggests that this may have been due, in part, to *"a large ice wall…formed in the Vault pit over the winter months"* causing *"a higher seepage flow rate entering the pit that was not accounted for in the original water balance"* (p. 45). AEM does not indicate the cause of the ice wall, or whether it is likely to be a common occurrence. If it is, the water balance should be updated accordingly.

The KivIA would like an explanation from AEM on why the ice wall formed in the Vault pit in 2018 and whether it is likely to occur in future winters. Also, it is recommended that the water balance be updated if the ice wall is predicted to be a common occurrence and provide a discussion as to what changes to the water management plan may be required as a result of this ice wall.

3.5: Annual Report 4.4.3 Predicted vs Measured Water Quality, 4.4.3.1 Meadowbank Site.

The differences between measured and predicted values for many pit water quality parameters are greater than +/- 20%, the model prediction accuracy benchmark outlined in the Water Licence. AEM suggests that one reason for this is that *"some accredited laboratory water quality measurements have detection limits that are higher than the predicted values"* (p. 58), especially for dissolved metals (e.g., cadmium, iron, lead, nickel, molybdenum, selenium, thallium, zinc). The KivIA has highlighted this issue in previous reviews of Meadowbank Annual Reports for the years 2014 to 2017. It is important that parameter levels can be accurately analysed to determine if predictions are being met or exceeded.

The KivIA recommends that AEM find an accredited lab to analyze pit water quality that can reach the required detection limits for all parameters.

3.6: Annual Report 5.1 Geochemical Monitoring, 5.1.1 Meadowbank Site.

AEM states that no further quarry surface water sampling will be conducted *"unless there are significant changes during reclamation",* since "*follow-up water sampling has not provided evidence of geochemical issues in the quarries"* (p. 66). Water sampling data are not provided to support this conclusion.

The KivIA recommends that AEM summarize 2018 water quality monitoring results for Meadowbank quarries in the Annual Report.

3.7: Annual Report 7.1 Spill Summary.

AEM implemented a spill reduction action plan in 2016 following a increasong number of spills at Meadowbank from year to year (e.g., 422 in 2016). This appears to have reduced the number of spills at Meadowbank in 2018 to 243. A further 129 spills occurred at Whale Tail, for a total of 372 at both sites. According to Tables 7.2-7.4, many of the reportable and non-reportable spills at Meadowbank and Whale Tail relate to hydraulic oil and diesel leaks and are caused by hydraulic hose failure.

The KivIA would like an explanation from AEM as to why hydraulic hose failure occurs so frequently and what steps are being taken to rectify this problem. It is recommended that AEM propose steps beyond the current approach which includes routine visual inspections as part of AEM's preventative maintenance approach.

3.8: Annual Report 8.3 MDMER and EER Sampling 8.3.2 Whale Tail Site, 8.3.2.1 Whale Tail North Construction.

There were five non-compliance episodes with respect to MDMER regulation at Whale Tail in 2018. One was a failure to collect an effluent sample from the final discharge point, as required on July 27th or 28th. AEM does not explain why this sample was not collected.

The KivIA would like an explanation from AEM as to why the effluent sample was not collected from the final discharge point at the end of July.

3.9: Annual Report 8.3 MDMER and EER Sampling 8.3.2 Whale Tail Site, 8.3.2.1 Whale Tail North Construction.

There were five non-compliance episodes with respect to MDMER regulation at Whale Tail in 2018. One was a failure to analyse radium 226 on August 6. The lab did not provide a sample bottle for the parameter, and by the time AEM noticed the parameter was missing from analysis, discharge had already stopped. Discharge stopped August 27, three weeks after this sampling period. Proper QA/QC procedures should exist to avoid this mishap. In particular, the AEM staff responsible should check sample bottles prior to going out in the field to confirm that all necessary bottles have been sent by the laboratory, and if not, contact the laboratory immediately.

The KivIA recommends that AEM ensure proper QA/QC procedures are in place to avoid this non-compliance in future.

3.10: Annual Report 8.5 Mine Site Water Quality and Flow Monitoring, 8.5.3.1. Meadowbank Site.

Table 8.21 shows monitoring data for 2014-2018 for ST-16, NP2, NP1, Dogleg and Second Portage Lake. Values that correspond to half detection limits are bolded. It would be helpful to also highlight values that represent exceedances to the listed regulatory limits.

The KivIA recommends that AEM highlight exceedances to listed regulatory limits, in particular water license, MDMER and CCME, in tables reporting water quality data within the receiving environment.

3.11: Annual Report 8.5 Mine Site Water Quality and Flow Monitoring, 8.5.4 Sewage Treatment Plant, 8.5.4.3 Exploration Whale Tail Site.

Effluent from the Whale Tail sewage treatment plant was discharged to Whale Tail Lake North Basin. In 2018, there were several exceedances. The fecal coliform exceedance on January 29 was attributed to a faulty UV system; and two oil and grease exceedances, on May 14 and November 19, were attributed to a faulty kitchen grease trap system. AEM does not explain how these problems were fixed.

The KivIA would like an explanation from AEM on what mitigation measures were implemented to reduce the likelihood these effluent exceedances will be repeated.

3.12: Annual Report 11.7.2 Safety Incidents, 11.7.2.1 All Weather Access Road Meadowbank Site, 11.7.2.2 Whale Tail Haul Road.

AEM reports that three environmental spills occurred along the All-Weather Access Road (AWAR) in 2018, compared with 13 along the Whale Tail Haul Road, and 11 in eskers and quarries along the Haul Road. The KivIA is concerned that a disproportionate number of spills are occurring in relation to increased activity at the Whale Tail site.

The KivIA would like AEM to discuss potential reasons for much higher rates of spills along the Haul Road compared with the AWAR in 2018, and explain what steps will be taken to reduce the risk of spills along this route in future.

3.13: Annual Report Section 12 Post-Environmental Assessment Monitoring Program – Evaluation of Impact Predictions, 12.1 Aquatic Environment, 12.1.2.2 Water Quality.

Several parameters exceeded FEIS predictions in 2018. AEM states, however, that none of these had *"effects-based threshold values (i.e., CCME criteria)"* and *all "were below concentrations associated with adverse effects"* (p. 333). Consequently, water quality results were deemed as of low impact to the receiving environment, such as concentrations <1x CCME guidelines. It is not clear how these conclusions were reached for all exceedances of FEIS predictions, since:

(i) several of the listed parameters do in fact have CCME guidelines (e.g., fluoride, iron, nitrate, silver), and
(ii) no evidence is provided to support statement that exceedances will not have adverse ecological effects.

The KivIA would like clarification from AEM on why parameters with CCME guidelines that exceeded FEIS predictions were not evaluated against the impact scale described in the report. In particular, low impact = concentrations <1x CCME, medium = concentrations 1-10x CCME, high = < MDMER but > 10x CCME, very high = exceed MDMER standards.

The KivIA would like an explanation from AEM on why exceedances of FEIS predictions are not expected to have adverse ecological effects.

3.14: Appendix 8 Meadowbank 2018 Water Management Report and Plan, Section 2.2.1 Portage Pit Area, page 15. Section 3.1.6 Portage Pit, page 35. Appendix D 2019 Freshest Action Plan, Section 2.1.2 Portage Pit, page 10.

In Section 2.2.1 of Appendix 8, AEM states, *"Mining in Pits A, B, C, and D (representing the North and Central Portage area) is completed and these areas are currently subject to pit infilling operations with waste rock material (which will form part of fish habitat compensation)."* and in Section 3.1.7 AEM states *"Since the summer 2017, water pumped from Portage Pits is no longer transferred in the South Cell. This is aligned with the strategy of minimizing water storage in the South Cell. In 2018, water was transferred from the active Pit E to the mined out Pit A."* However, in Appendix D AEM states, *"A pumping station is located in pit B (not shown) and will be used to manage runoff water affecting the active mining production area in pit A. The water will be pumped to the South Cell Tailings Storage Facility (TSF)."* It is unclear if mining at Pit A has been completed and if water is being pumped to Pit A or the South Cell.

The KivIA would like AEM to clarify if mining at Pit A has been completed and if water is being pumped to Pit A or South Cell.

3.15: Appendix 8 Meadowbank 2018 Water Management Report and Plan, Appendix D 2019 Freshest Action Plan, Section 2 Mill Seepage, page 28.

AEM states, *"The monitoring program will be re evaluated (as is the case every year) at the end of 2018 to determine if any changes are warranted in 2019."* The 2019 Freshet Action and incident Response Plan report is dated March 2019, therefore the KivIA

assumes that at the end of 2018 AEM reviewed their monitoring program and determined if any changes were warranted for 2019.

The KivIA would like AEM to indicate if any changes to the monitoring program were deemed necessary and if so, describe the necessary changes.

3.16: Appendix 8 Meadowbank 2018 Water Management Report and Plan, Appendix D 2019 Freshest Action Plan, 2019 Snow Management.

AEM states, *"In past years when snow is being removed from road surfaces and pushed off the road or when snow is being removed from stream crossings there has been lots of excess road material pushed into the stream crossings."* The build up of excess road materials in stream crossings could impede fish crossings and alter flow within stream crossings.

The KivIA would like AEM to describe the management practices that are being completed to ensure the excess road material in stream crossings is not impeding fish passage or increasing the likelihood of over topping when clear span bridges have not been employed.

3.17: Appendix 16 Whale Tail Hydrodynamic Modelling for Mammoth lake, Section 5.4 Water Quality, pages 1 and 3.

AEM states, *"A second temporary increase in predicted total phosphorus concentrations occurs from inflow of WRSF seepage at the beginning of the post-closure (Figure 17). The WRSF runoff is predicted to have higher concentrations of total phosphorus than Mammoth Lake when the runoff begins at the start of the post-closure. The highest predicted total phosphorus concentration of the WRSF runoff during post-closure is 1.4 mg/L (Golder, 2018)."* A total phosphorus concentration of 1.4 mg/L represents hypereutrophic conditions and is much higher than background conditions. This value is not reflected in Figure 17 on page 3.

The KivIA would like AEM to clarify if the highest concentration of the WRSF runoff during post-closure is 1.4 mg/L. Please indicate the size of the mixing zone in which phosphorus concentrations will be elevated by at least one trophic level above that in the rest of Mammoth Lake.

3.18: Appendix 31 Meadowbank and Whale Tail 2018 Core Receiving Environment Monitoring Program, Section 2.3.1, page 28.

AEM states, *"The sequential extraction test results failed the QA/QC assessment in two rounds of analysis. In the original set of analyses, the samples were incorrectly processed (i.e., pulverized) by the laboratory prior to analysis using the sequential extraction procedure. The effect on the data was anomalously high concentrations of most metals in sequential extraction steps... Maxxam was conducting additional analyses on the sediment to determine the source of the error while the 2018 CREMP report was finalized. The sequential extraction test results were not included in the discussion of sediment metals bioavailability at TPE, WAL, or the Whale Tail study areas."* Since the study results were deemed inaccurate and the bioavailability of metals in the sediment of TPE, WAL and Whale Tail was not quantifiable, the KivIA

recommends that AEM complete another sequential extraction study once the source of the error is determined.

The KivIA would also like AEM to indicate if another sequential extraction study will be completed in 2019 to determine sediment metals bioavailability at TPE, WAL and Whale Tail since the 2018 results did not meet the data quality objectives.

3.19: Appendix 31 Meadowbank and Whale Tail 2018 Core Receiving Environment Monitoring Program, Section 3.3 Water Chemistry, page 39.

AEM states, *"Four water quality results were flagged as unreliable and excluded from formal analysis: (total copper in WAL-79 [May], dissolved Zinc in SP-111 [May], dissolved chromium in TSP-60 [May], and dissolved lead WAL-81 [July])."* The results were flagged as outliers during initial analysis of the data. The statistical method used to determine that these values were outliers was not indicated.

The KivIA would like AEM to indicate the statistical method used to determine the four values were outliers or direct the reader to documents describing the methodology used.

3.20: Appendix 31 Meadowbank and Whale Tail 2018 Core Receiving Environment Monitoring Program, Section 3.3 Water Chemistry, page 39; Appendix 37 Meadowbank 2018 Groundwater Monitoring Program Report, Section 2.5.2 Duplicates, field and trip blank; Appendix 38 Whale Tail 2018 Groundwater Management Monitoring Report, Attachment A 2018 Westbay Sampling Technical Memorandum, Section 5.0 Quality Assurance/Quality Control, page 10.

AEM states, *"The few exceedances of the established data quality objectives (DQOs) represent much less than 1% of the total QA samples and parameters measured – there were only nine out of over 1,200 field duplicate RPD values that exceeded 50%."* In the KivIA's experience, 50% is not a standard value for RPD analysis.

In Appendix 37 AEM states, *"USEPA (1994) indicates that an RPD of 20% or less is acceptable."* This reference is also included in Appendix 38 where AEM states, *"Per USEPA recommended methods (USEPA, 1994), an RPD of 20% or less was considered acceptable."*

The KivIA recommends that AEM compare RPD values to a standard value (e.g.: 20% as recommended by the USEPA) or provide a reference supporting the use of a 50% RPD for comparison.

3.21: Appendix 31 Meadowbank and Whale Tail 2018 Core Receiving Environment Monitoring Program, Section 4.3.2 Temporal and Spatial Trends, pages 49 - 53 and Figure 2-2.

AEM states, *"The Meadowbank project lakes (NF locations only) were screened against site-specific trigger and threshold values developed for the Meadowbank project lakes and Walley Lake."* AEM then indicates that conductivity/hardness exceeded trigger values in TPN, TPE, SP and WAL; calcium, magnesium, potassium and sodium exceeded trigger values in TPN, TPE, SP and WAL; TDS exceeded trigger values in TPN, TPE, SP and WAL; and alkalinity exceeded trigger values in SP and TPE. Furthermore, AEM states, "*the trends described above are clearly mine-related.*" and

indicates, "*The same list of parameters that exceeded the Meadowbank trigger values typically exceeded the concentrations predicted in the FEIS, namely ionic compounds (calcium and magnesium), hardness, and total alkalinity.*"

According to AEM's Management response plan for the Meadowbank Mine Aquatic Environment Monitoring Program Figure 2-2 an exceedance of an early warning trigger(s) requires an assessment of the magnitude of the change, the spatial scale of the change and the reversibility of the change. AEM has assessed the magnitude of the change and completed a literature review describing some of the possible effects of the increased concentrations.

The KivIA is concerned however, that AEM has not discussed the implications of these increasing concentrations on the community composition of phytoplankton, zooplankton nor benthic invertebrate. Changes in community composition at these lower trophic levels of the aquatic ecosystem may have implications for higher trophic levels.

The KivIA is further concerned that AEM has neglected to assess whether these trends in water chemistry are reversable nor have they determined their spatial extent.

The KivIA recommends that AEM complete the following:

i) Investigate the source of these parameter increases, their spatial extent and the reversibility of these trends.
ii) Discuss the implications of increased conductivity, calcium, magnesium, potassium, sodium, TDS and alkalinity at the near-field sites on lower trophic levels, specifically in terms of the community composition of phytoplankton, zooplankton and benthic invertebrates.
iii) In accordance with AEM Management Response Plan for the Meadowbank Mine Aquatic Environment Monitoring Program, that AEM increase monitoring frequency at the mid-field sites to determine the spatial extent of exceedances observed in the near-field during the open water season.
iv) Conduct an investigation of cause study for the observed changes in water chemistry and determine possible management strategies.

3.22: Appendix 31 Meadowbank and Whale Tail 2018 Core Receiving Environment Monitoring Program, Section 4.5.2 Temporal and Spatial Trend Interpretation, page 60, Section 4.6.3 Sediment Metals Bioavailability Study Results, page 67.

AEM states, *"TPE – Mean sediment chromium concentrations at TPE exceeded the trigger value in 2018 (mean value = 149.9 mg/kg; trigger value = 135 mg/kg; Table 4-7), but were substantially lower than 2017 (204 mg/kg). Chromium concentrations at TPE consistently trended higher between the onset of the mine development in TPE in 2009 i.e., change in status from "before" to "after") and 2013 (Figure 4-63), likely related to use of ultramafic rock for dike construction."* Since an early warning trigger value has been exceeded according to AEM's Management response plan for the Meadowbank Mine Aquatic Environment Monitoring Program Figure 2-2 an exceedance of an early warning trigger(s) requires an assessment of the magnitude of the change, the spatial scale of the change and the reversibility of the change. In 2018 only near-field sites had been sampled for sediment. The high mortality of H. Azteca in TPE sediment compared to laboratory and field control treatments supports the need for a source tracking study,

determining the spatial extent of the elevated chromium concentrations in the sediment and the need for an accurate sequential extraction test.

The KivIA recommends that AEM completet eh following:

i) Add mid-field and far-field sediment sampling to the 2019 field program to determine the spatial extent of the increased chromium concentration in TPE and discuss the reversibility of the trend.
ii) Conduct a source tracking study to confirm the source of the chromium. In addition to completing another sequential extraction test in 2019.

3.23: Appendix 31 Meadowbank and Whale Tail 2018 Core Receiving Environment Monitoring Program, Section 6.5.2 Temporal and Spatial Trend Interpretation, page 252.

AEM states, *"Arsenic was the only parameter to exceed site-specific trigger vales in 2018. However, the lack of any temporal trend suggests that this reflect an inappropriate trigger value rather than changes to sediment quality."* This statement does not provide rationale as to how an exceedance of a trigger value reflects an inappropriate trigger value.

The KivIA recommends that AEM provide rationale as to why exceedance of an arsenic trigger value for sediment quality reflects an inappropriate trigger value.

3.24: Appendix 31 Meadowbank and Whale Tail 2018 Core Receiving Environment Monitoring Program, Appendix B3 Water Chemistry – Baker Lake, pages 1 and 2.

According to Appendix B3 Water Chemistry – Baker Lake, water quality parameters are often used to identify fuel spills such as oil and grease were not included as part of the 2018 monitoring program. Since one of the major concerns for the Baker Lake monitoring sites is fuel water quality parameters associated with fuel should be included in the water quality monitoring program. This is particularly relevant given the recent expansion of the fuel storage area to accommodate operations at Whale Tail.

The KivIA recommends that AEM include water quality parameters (i.e. oil and grease) to assess possible fuel spills/leaks to the Baker Lake water quality monitoring program or provide rationale supporting their exclusion.

3.25: Appendix 34 Whale Tail Technical Memorandum on Avoidance of Serious Harm to Fish and Fish Habitat, Appendix B – Meadowbank & Whale Tail Project Blast Monitoring Program, 3.3 Blast Monitoring Stations at Meadowbank.

Blasts are monitored from three locations at Meadowbank, *"chosen to have the optimal distance between the blasts and the water (fish habitat)"*. It is not clear how optimal distance is determined. The minimum distance between the blast and fish habitat would seem the best measure.

The KivIA would like AEM to clarify how the optimal distance between the blasts and fish habitat is determined. In particular, does it represent the minimum, maximum or average distance.

3.26: Appendix 37 Meadowbank 2018 Groundwater Monitoring Program Report, Section 5, pages 18 and 19. Appendix A – 2018 Groundwater Factual Report, Section 5.1.3 Recommendations for future groundwater monitoring, pages 14 and 15.

SNC-Lavalin has provided a comprehensive list of recommendations for improving and ensuring the continued success of the groundwater monitoring program established in 2017 and 2018. In the groundwater monitoring plan AEM states, *"Agnico Eagle will make effort to put in place or use the innovative solutions and best practices when possible to improve the groundwater well installation and sampling program."* AEM also states, *"Agnico Eagle will seek new opportunities from forthcoming field campaigns at Meadowbank Mine to collect representative groundwater samples at new locations."*

The KivIA recommends that AEM:

i) be specific with regards to what recommendations provided by SNC Lavalin AEM is committed to following to ensure groundwater monitoring success.
ii) How these recommendations should be incorporated into the groundwater monitoring plan.

3.27: Appendix 38 Whale Tail 2018 Groundwater Management Monitoring Report, Attachment A 2018 Westbay Sampling Technical Memorandum, Section 2.1 Westbay Well Installation, page 2; Appendix 37 Meadowbank 2018 Groundwater Monitoring Program Report, Appendix A 2018 Groundwater Factual Report, Section 1.1 Background, page 1.

AEM states, *"The total dissolved solids (TDS) content in the Formation groundwater was determined to range between 2,198 mg/L and 4,042 mg/L (Golder 2016a)."* These values are for the Whale Tail Pit area collected at a lower depth than those obtained for the Meadowbank Mine site. Results obtained at the Meadowbank site are from shallower sites and measured TDS concentrations between 52 and 1727.7 mg/L.

SNC Lavalin was commissioned to review historical groundwater throughout the Meadowbank and Whale Tail project area; they provided the following recommendations:
"›De-icing salt and calcium chloride brine used to prevent the boreholes from freezing after drilling operation remains in groundwater for years despite intensive purging of wells after installation. When those products are used in boreholes without a dye tracer, it becomes impossible to establish background conditions of groundwater chemistry, despite extensive purging of the wells. Salinity, concentration of calcium and chloride dissolved in groundwater fluctuate from multiple order of maitude throughout the years and show no logical trend; The sampling methodology used to retrieve groundwater samples induce the sample to be either diluted (sample not collected in front of the well screen) or charged with parameters that come from fine particulates found in dirty water (sediment in suspension in a sample from sumps and horizontal well can induce false results because groundwater samples are collected in bottle with preservatives but are not filtered in the field before adding the water to the bottles with preservatives); and
› Important chemical parameters to establish background chemistry were missing from the data set (major ions dissolve in groundwater)."

The SNC Lavalin recommendations raise the question as to whether differences between measurements collected at Meadowbank and Whale Tail may indicate

differences in site specific groundwater chemistry, sample collection depth or methodological differences between SNC Lavalin and Golder that have confounded the results.

The KivIA recommends for the 2019 annual report that AEM provide a discussion of the implications of adopting SNC Lavalin's recommendations and whether observed differences between data gathered at Meadowbank and Whale Tail are due to site specific differences in groundwater chemistry, sample depth collection or methodological factors.

3.28 Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, Section 2.5, Overview – Report Objectives, page 9.

In the statement "*Evaluate the function and validity of implemented monitoring strategies*" on page 9. The term "validity" is unusual wording.

The KivIA would like AEM to clarify what this means.

3.29: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, Section 2.8, Overview – Mitigation Audit, page 10.

The proposed Mitigation Audit to begin in 2019 "*to evaluate the use and effectiveness of the mitigation, following principals of adaptive management, and to identify additional mitigation measures as required*" is a useful idea but as presented lacks detail.

The KivIA would like AEM to explain why only a summary of the audit will be provided in the annual report, and whether the Terrestrial Advisory Group (TAG) will review and advise on drafts of the audit.

3.30: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 3.0, Roads Surveys, page 23.

The results from the different monitoring methods are not integrated or correlated, nor are the sequences documenting the management actions recorded. There was no integration of the collar data with the road surveys, incidental sightings and HOL surveys. Although Tables 3.7–3.9 summarize road restrictions, the triggers (e.g., collar locations, road survey observations, HOL survey data, and/or incidental sightings) that led to road closures were not presented.

The KivIA recommends that the report more clearly show:

i) when and how the decision trees were followed,
ii) the sequence of monitoring which led to triggers and mitigation actions,
iii) follow-up monitoring to examine the efficacy of the mitigation.

The KivIA recommends that more information is needed other than the herd was 'close'. For example, the tables provided in S 3.6.5 Road-related Mitigation are useful giving the

frequency and duration of closures but should include the thresholds or sightings that triggered the closures.

3.31: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 3.0, Road Surveys.

Traffic data are an integral component of caribou (and muskox) management, and it is critical that daily mine traffic be presented from all roads. However, in the report traffic frequency data are lacking.

The KivIA recommends that AEM complete the following:

i) Annual graphs showing haul trucks, medium vehicles (e.g., watering or fuel trucks), and light vehicles (e.g., pickup trucks) compared against predicted traffic levels.

ii) Have the ATV traffic levels as recorded by security on AWAR presented in graphs as well.

3.32: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 3.0, Road Surveys– Objectives, page 11.

Under the stated objective "*Document wildlife utilization along the AWAR, Vault Haul Road, and Whale Tail Haul Road corridors*". The KivIA recommends that it would be more accurate (and measurable) to document wildlife distribution and abundance than wildlife utilization (meaning is unclear).

Under the stated objective "*Evaluate wildlife trends along the road corridors, including identifying areas where higher densities of wildlife are observed. Evaluate whether road-related operations preclude Caribou from using suitable habitats beyond 1,000 m. The threshold level along the roads is unnatural Caribou use patterns beyond 1,000 m*".

The KivIA requires clarification on how are 'unnatural' and 'suitable' defined, and how will it be determined that caribou are not able to use suitable habitats and demonstrate unnatural use patterns beyond 1 km distance from roads (and beyond 500 m for pits and mine site; s 4.2, pg 30).

The KivIA recommends that these criteria should be defined and added to the Methods and also to the TEMP.

3.33: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 3.0, Road Surveys– 2018 Results, AWAR, page 13.

The tables on the AWAR surveys (section 3.6.2) demonstrate annual trends and the seasonal numbers but the KivIA recommends that it should be cross-referenced to 3.6.5 Road-related Mitigation.

The figures in this report are very informative. For example, Fig. 3.1 suggests that over half of AWAR had high densities crossing in 2018, and Fig. 3.4 indicates that the highest caribou densities along the Whale Tail haul road in 2018 were observed between Km 5

and 19, and Km 50 and 55, which suggests much of the road needs to be designed as caribou friendly*.*

Figure 3.2 (cumulative caribou observations) is a good figure, but the KivIA recommends that it could show finer resolution than 5 km sections, perhaps 2 km for better resolution to focus mitigation efforts.

3.34: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 3.0, Road Surveys– Road-related Mitigation, page 21.

Table 3.7 in the Comments column refers to no caribou monitoring but the road was closed for caribou.

The KivIA needs AEM to clarify which, if any, closures were due to blizzards in Table 3.7.

3.35: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 3.0, Road Surveys– Road Related Wildlife Mortality, page 26.

Table 3.10 shows four Arctic hare road-related mortalities in 2018, but Table 3:11 (Cumulative road kill data) does not acknowledge any mortalities of small mammals or any wildlife in 2018.

The KivIA requests that AEM clarify this discrepancy.

3.36: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 3.0, Road Surveys– Management Recommendations, page 27.

The KivIA recommends that:

i) these suggestions should already be part of the report
ii) they should be written in such a way as to be measurable based on how and when they will be implemented.

3.37: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 4. Pits and Mine Site Ground Surveys– Incidental Wildlife Observations, page 32.

Table 4.1 (Wildlife Presence Requiring Action) shows nine instances of when a road was closed for caribou but with no details. Most of these observations and resultant closures are not captured in Tables 3.7-3.9: Summary of Road Restrictions.

The KivIA recommends that this separation of observations by techniques needs some rethinking and re-presentation – perhaps a section on mitigation by topic (road closures) with the different monitoring techniques. This would help evaluate which monitoring methodology is more efficient in coverage and utility, and where there may be gaps and duplications.

3.38: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 4. Pits and Mine Site Ground Surveys– Incidental Wildlife Observations, page 36.

Table 4.1 (Wildlife Presence Requiring Action) provides a summary of what appears to be a lot of deterrence of wolverine and wolf required at Meadowbank, especially in Jan-Feb 2018. Deterrence activities in 2018 for wolf and wolverine were the highest recorded over 4 years (Table 4.3). The Summary Report states that AEM employees are using "*Well-defined food-handling practices and employee awareness programs*".

The KivIA requires AEM to provide clarity on why there is a large requirement for deterrence. This unusual attraction may still be related to garbage or the kitchen facility

3.39: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 6. Caribou Satellite-Collaring Program - Objectives, page 50.

The Summary Report states as if the GN and AEM movement/ZOI studies were never done, but these reports were completed in 2017.

The KivIA requests that AEM clarify this discrepancy.

Figures 6.7 and 6.8 strongly suggest an influence of AWAR and the Whale Tail haul road for deflecting and delaying caribou road crossing, as acknowledged in the text (s 6.6, pg 61).

The KivIA recommends that the next steps should be:

i) quantification of these observations,
ii) better/finer scale reporting of monitoring, and
iii) mitigation to adaptively reduce the degree of deflection/delaying crossing.

3.40: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 7.0, Height of Land Monitoring.

The data as presented leads one to question whether HOL surveys are "*an effective 'early warning' system*" (pg 65).

The KivIA recommends the following:

i) Fig. 7.1 shows "*Maximum observable areas*" which are totally unrealistic – some appear to be >10-12 km. These should be capped at 4 km maximum as it is not possible to detect caribou beyond 3-4 km distance.
ii) Table 7.1 (Height-of-Land Survey Data) needs to be compared with road surveys and other triggers for intensified mitigation to see whether the HOL actually contribute to monitoring at distances beyond what the road surveys provide. Did the fall 2018 HOL surveys contribute to Whale Tail haul road monitoring and mitigation? This is not stated in the report.

3.41: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 8.0, Remote Camera Monitoring.

No results were provided from the remote camera monitoring and it is unclear how the remote cameras will contribute to monitoring.

The KivIA recommends that the Methodology section should state how the camera data will be used for monitoring and mitigation.

3.42: Appendix 45, Meadowbank and Whale Tail 2018 Wildlife Monitoring Summary Report, section 9.0, Caribou Management Decision Tree – Management Recommendations, page 74.

The KivIA strongly agrees with the management recommendation "*A dedicated log of decisions and outcomes [from the decision tree approach] should be kept in 2019 to facilitate future analyses of the effectiveness of this monitoring approach*".

4.0 Conclusions

Overall the information and conclusions presented in the majority of the 2018 Meadowbank Annual Report indicate that the project appears to be operating effectively, without adverse impacts to the receiving environment as per the project certification and water license is well done and informative. There are some sections of the report where that require additional background information or detail to help clarify or justify statements made. These considerations should be addressed in future annual reports for Meadowbank and Whale Tail and are related to:

- Water Management,
- Waste rock management,
- Spill management,
- Environmental monitoring,
- Evaluation of impact predictions, and
- Wildlife monitoring.