Water Resources Division
Resource Management Directorate
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Your file - Votre référence
2AM-MEA1530 & 2AM-WTP1830
Our file - Notre référence
GCDocs# 96607401

July 26, 2021

Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
E-mail: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada Review of the 2020 Annual Reports and Appendixes for two Type A water licence projects prepared by Agnico Eagle Mines Ltd on the Meadowbank Gold Mine site (2AM-MEA1530) and the Whale Tail Pit Mine located on the Amaruq property (2AM-WTP1830)

Dear Mr. Dwyer,

Thank you for the June 14, 2021 invitation to review the Annual Reports prepared by Agnico Eagle Mines Ltd. for two Type A Water Licences No. 2AM-MEA1530 and 2AM-WTP1830 for the Meadowbank and Whale Tail mine projects.

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) examined the application pursuant to its mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Crown-Indigenous Relations and Northern Affairs Act*. Please find CIRNAC comments and recommendations in the attached Technical Memorandum.

If there are any questions or concerns, please contact me at 306-501-4047 or Andrew.Keim@canada.ca.

Sincerely,

Andrew Keim,
Industrial Coordinator
Water Resources, Nunavut Regional Office
Crown-Indigenous Relations and Northern Affairs Canada

Canada

Technical Review Memorandum

Date: July 26, 2021

To: Richard Dwyer, Manager of Licensing, Nunavut Water Board

From: Andrew Keim, Industrial Coordinator

Subject: **Crown-Indigenous Relations and Northern Affairs Canada Review of the 2020 Annual Reports and Appendixes for two Type A water licence projects prepared by Agnico Eagle Mines Ltd on the Meadowbank Gold Mine site (2AM-MEA1530) and the Whale Tail Pit Mine located on the Amaruq property (2AM-WTP1830)**

Region: ☐ Kitikmeot ☒ Kivalliq ☐ Qikiqtani

A. BACKGROUND

The Meadowbank Gold Mine (Meadowbank) is located approximately 110 kilometres by road north of Baker Lake in the Kivalliq Region of Nunavut, Canada. The complex consists of the Meadowbank mine and mill, and the Amaruq satellite (Whale Tail) deposit, which is located 50 km northwest of Meadowbank. The Project is governed by the current Water Licence No: 2AM-MEA1530.

No mining at Meadowbank occurred in 2020. The mill and associated infrastructure including water retention dikes constructed from mined waste rock, a tailings storage facility, Camp Buildings and waste facilities at Meadowbank all remain on site. The mine facilities at Meadowbank commenced processing Whale Tail ore in 2019 with in-pit tailings disposal in Goose Pit on 5 July 2019. Processing of the ore continued in 2020 and in-pit tailings disposal in Portage Pit E commenced on 20 August 2020.

The Whale Tail deposit was first licenced by the Nunavut Water Board (NWB) in 2018 following a full environmental review completed in March 15, 2018. The project includes the construction, operation, maintenance, reclamation, closure and monitoring of two open pits and one underground gold mine connected to the Meadowbank site by a 50 Km all weather road.

In 2018, Agnico Eagle Mines Ltd. (AEM) proposed an expansion project to increase gold production from the original Whale Tail Pit Project by expanding mining activities at the Whale Tail Pit and development of the IVR open pit and Underground. Following licensing, additional infrastructure to support the Whale Tail and IVR pits were built at the site including, truck shop/warehouse, fuel storage and camp facilities.

The NWB Water Licence amendment process for the Whale Tail Pit Expansion Project was completed on 12 May 2020 and Water Licence Amendment No. 2AM-WTP1830 was issued. Commercial production under the Whale Tail Pit Expansion Project began December 2020.

CIRNAC with the assistance of Arcadis Canada Inc. provide the following comments and recommendations pertaining to the application package. A summary of the subjects of recommendations can be found in Table 1. Documents reviewed as part of this submission can be found in Table 2 of Section B. Detailed technical review comments can be found in Section C.

Table 1: Summary of Recommendations

Recommendation Number	Subject
R-01	**Reclamation / Capping Thickness and Freeze Back**
R-02	**Reclamation / Thermal Monitoring of Tailings and Waste Rock piles**
R-03	**Progressive Reclamation**
R-04	**Geotechnical Design Process**
R-05	**Meadowbank WRSF Seepage Quality**
R-06	**Meadowbank; Chromium in third Portage Lake Sediments**
R-07	**Whale Tail Pit Project Nutrient Sources**
R-08	**Whale Tail Pit Project Mercury Monitoring**
R-09	**Reporting of Mean Data**
R-10	**Meadowbank Post Closure In-Pit Water Quality**
R-11	**Meadowbank In-Pit Tailings Cover**
R-12	**Thermal Performance of Meadowbank WRSF Covers**
R-13	**Fuel Management**
R-14	**Fuel Management/ Quarry 22 Hydrocarbon Clean-up Criteria**
R-15	**Incinerator Stack Testing / Licence Conditions**
R-16	**Waste Rock Geochemical Data Analysis Results**

B. DOCUMENTS REVIEWED AND REFERENCED

The following table (Table 2) provides a summary of the documents reviewed under the submission and any references used.

Table 2: Documents Reviewed and Referenced

Document Title	Author, File No., Rev., Date
Meadowbank Complex - 2020 Annual Report	AEM, April 2021
Appendix 1: Meadowbank and Whale Tail Commitments	AEM, 2021
Appendix 2: Meadowbank KVPL08D280 2021 Mine Plan	AEM, January 2021
Appendix 3: Whale Tail KVPL17D01 2021 Mine Plan	AEM, January 2021
Appendix 4: Whale Tail Haul Road KVRW15F01 2021 Work Plan	AEM, January 2021
Appendix 5: Whale Tail KVCA15Q01 2021 Work Plan	AEM, January 2021
Appendix 6: Whale Tail KVCA15Q02 2021 Work Plan	AEM, January 2021
Appendix 7: Whale Tail KVCA18Q01 2021 Work Plan	AEM, January 2021
Appendix 8: 2020 Annual Report NIRB 11EN010	AEM, March 2021
Appendix 9: Meadowbank and Whale Tail 2020 Annual Geotechnical Inspection	Golder, February 2021
Appendix10: Meadowbank 2020 Annual Pit Slope Performance Review	Tetra Tech, January 2021
Appendix 11: Meadowbank 2020 Water Management Report and Plan Version 9	AEM, April 2021
Appendix 12: Whale Tail 2020 Water Management Plan Version 6	AEM, April 2021
Appendix 13: Meadowbank MDRB Report No.28	MDRB, March 2021
Appendix 14: Whale Tail MDRB Reports No.26-27-28A	MDRB, Aug & Sep 2020
Appendix 15: Meadowbank and Whale Tail 2020 Geotechnical Inspection Implementation Plan	AEM, 2020

Document Title	Author, File No., Rev., Date
Appendix 16: Whale Tail Landfill and Waste Management Plan Version 4	AEM, March 2021
Appendix 17: Meadowbank and Whale Tail Bulk Fuel Storage Facility: Environmental Performance Monitoring Plan Version 6	AEM, March 2021
Appendix 18: Meadowbank 2020 Quarry 22 Report	AEM, March 2021
Appendix 19: Baker Lake 2020 Bathymetric Survey	AEM, 2020
Appendix 20: Meadowbank predicted water quantity and quality (2012-2020)	AEM, 2020
Appendix 21: Whale Tail Operational ARD-ML Sampling and Testing Plan Version 6	AEM, November 2020
Appendix 22: Meadowbank Mine Waste Rock and Tailings Management Plan Version 11	AEM, April 2021
Appendix 23: Whale Tail Waste Rock Management Plan Version 7	AEM, April 2021
Appendix 24: Meadowbank 2020 Thermal Report	AEM, February 2021
Appendix 25: Whale Tail 2020 Thermal Monitoring Report	AEM, February 2021
Appendix 26: Meadowbank 2020 Hazardous Manifest	AEM, 2020
Appendix 27: Meadowbank and Whale Tail Spill Contingency Plan Version 13	AEM, March 2021
Appendix 28: Meadowbank 2020 GN spills reports	AEM, 2020
Appendix 29: Whale Tail 2020 GN spills reports	AEM, 2020
Appendix 30: Meadowbank 2020 Landfarm Report	AEM, March 2021
Appendix 31: Meadowbank and Whale Tail Emergency Response Plan Version 16	AEM, March 2021
Appendix 32: Meadowbank Oil Pollution Emergency Plan Version 13	AEM, April 2021
Appendix 33: Meadowbank and Whale Tail 2020 Core Receiving Environment Monitoring Program Report	AZIMUTH, March 2021
Appendix 34: Meadowbank Addendum to EEM Cycle 3 Interpretative Report	AEM, 2020

Document Title	Author, File No., Rev., Date
Appendix 35: Meadowbank EEM Cycle 4 Study Design	Portt, Kilgour, March 2020
Appendix 36: Meadowbank Addendum to Cycle 4 Study Design	AEM, 2020
Appendix 37: Whale Tail Addendum to First Biological Monitoring Study Design	AEM, 2020
Appendix 38: Whale Tail 2020 Report on the Implementation of Measures to Avoid and Mitigates Serious Harm	AEM, April 2021
Appendix 39: Whale Tail 2020 Water Quality Monitoring Report for Dike Construction and Dewatering	AEM, March 2021
Appendix 40: Meadowbank and Whale Tail Blast Monitoring Program Version 6	AEM, March 2021
Appendix 41: Meadowbank and Whale Tail 2020 Blast Monitoring Report	AEM, 2020
Appendix 42: Meadowbank 2020 Groundwater Monitoring Report	Golder, March 2021
Appendix 43: Whale Tail 2020 Groundwater Management Monitoring Report	Golder, April 2021
Appendix 50: Meadowbank Closure Water Treatment Strategy	SNC, March 2021
Appendix 51: Whale Tail Interim Closure and Reclamation Plan Version 4	AEM, July 2020
Appendix 53: Meadowbank and Whale Tail Executive Summary Translation	AEM, 2020
Appendix 54: Meadowbank and Whale Tail Quality Assurance/Quality Control (QA/QC) Plan, Version 6	AEM, July 2020
Appendix 55: Meadowbank and Whale Tail Hazardous Materials Management Plan Version 6	AEM, July 2020
Appendix 56: Agnico Eagle 2020 Sealift Season	AEM, 2020
Appendix 58: Meadowbank Landfill Design and Management Plan Version 5	AEM, March 2021

Document Title	Author, File No., Rev., Date
Appendix 59: Water Quality Monitoring and Management Plan for Dike Construction and Dewatering Version 3	AEM, March 2020
Appendix 65: Whale Tail Open Pit - 2020 Annual Inspection	Knight Piesold, Oct. 2020
Appendix 66: Update on Implementation of Commitments	AEM, 2020
Other Reports	
NWB Amended Water Licence No: 2AM-MEA1530 (Meadowbank Gold Mine)	NWB, 23 July 2015
NWB Amended Water Licence No: 2AM-WTP1830 (Whale Tail Pit Project)	NWB, 29 May 2018
CIRNAC Correspondence, Technical Review Comments on 2019 Meadowbank Whale Tail Annual Report	
NWB Correspondence, re Intervenor Technical Review Comments on 2019 Meadowbank Whale Tail Annual Report	NWB, 24 August 2019
Agnico Eagle's Response to NWB re Intervenor Technical Review Comments on 2019 Meadowbank and Whale Tail Annual Report	AEM, 28 October 2020

C. RESULTS OF REVIEW

1. Reclamation / Capping Thickness and Freeze Back

Comment:

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 have been integrated into the closure planning process. The 2020 Annual Report provides limited information regarding the results of these initiatives. Specifically, no information is provided to confirm that the conceptual plans for thermal encapsulation of the tailings and waste rock storage facilities will be or are effective in preventing and controlling deleterious seepage over the long-term. This is particularly important given the fact that AEM has already progressively reclaimed some mine wastes. Detailed and updated assessments are required to confirm that these progressively reclaimed areas will perform as intended.

Recommendation:

(R-01) CIRNAC recommends that future Annual Reports must include detailed, updated assessments be provided to confirm that these progressively reclaimed areas will perform as intended.

1.1 Meaningful discussions and evaluations of the results from the thermal monitoring.

1.2 Clearly presented comparison of prior predictions of freeze back with monitoring results.

1.3 Updated modeling results to verify if conceptual plans for thermal encapsulation of all mine wastes remain effective to prevent and control deleterious seepage over the long term.

1.4 If results show discrepancies from the initially predicted values, AEM should discuss the management actions that will be implemented to address the risk.

2. Progressive Reclamation

Comment:

CIRNAC notes that the 2020 Annual Report includes limited information regarding progressive reclamation activities on either site that have been implemented in the reporting period. Details regarding progressive reclamation must be provided to confirm that closure strategies are implemented as per designs and that the reclamation is performing as intended.

Recommendation:

(R-02) CIRNAC recommends that future Annual Reports and Interim Closure and Reclamation Plans (ICRPs) include:

Details on planned progressive reclamation activities to be undertaken over the next reporting period. Details on progressive reclamation implemented to date and within the reporting period. Such details should include but not be limited to: facilities covered in the prior year, total areas covered to date, volumes associated with these areas, monitoring results, construction reports, as-built drawings, all signed by an engineer licenced to work in Nunavut.

3. Whale Tail Project: Geotechnical Design Process of Water Retention Structures

Comment:

The 2019 performance of multiple water management structures at the Whale Tail site deviated significantly from their design intent. AEM stated that a "lessons learned" assessment was performed on water management in winter 2020 to improve operational procedure related to water management. The 2020 Annual Report did not include any documentation regarding the lessons learned assessment, nor did it describe what actions AEM has taken to strengthen the design process for geotechnical structures. The underlying factors that led to multiple dams failing to meet their design intent warrants a rigorous review. Further, the findings of such a review should be placed on the public record.

Recommendation:

(R-03) CIRNAC recommends that AEM provide within 60 days to the NWB:

3.1 Documentation of its "lessons learned" assessment of geotechnical design issues experienced by the Whale Tail Pit Project water retention structures in 2019.

3.2 Descriptions of modifications AEM has made to its design and management processes to mitigate the geotechnical design issues experienced in 2019.

4. Meadowbank Waste Rock Storage Facility (WRSF) Seepage Quality

Comment:

The closure strategy for the Meadowbank WRSF is based on thermal encapsulation of waste rock. The cover system is designed to keep the active layer in the non-acid generating (NAG) material to ensure there is no acid-rock drainage (ARD) generation. Based on modelling and monitoring results collected to date, AEM has concluded that seepage from the Meadowbank WRSF will not result in impacts to water quality during the post-closure phase.

AEM initially reached similar conclusions regarding seepage from waste rock storage facilities associated with the Whale Tail Pit Project. However, during Nunavut Impact Review Board (NIRB) and the Nunavut Water Board (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. AEM's revised modelling indicated there would be a significant spike in seepage quantity and a reduction 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 seepage from the Whale Tail WRSFs will require management or treatment in the future.

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

Recommendation:
(R-04) CIRNAC recommends that AEM provide the following within 60 days to the NWB:

4.1 Confirmation that long-term modelling of seepage from the Meadowbank WRSFs is of sufficient duration to characterize seepage after breakthrough.
4.2 If not, that AEM extend the temporal scope of its WRSF seepage modelling to ensure that potential seepage impacts after breakthrough are accurately characterized and provide this information in the next Annual Report.

5. Meadowbank: Chromium in third Portage Lake Sediments

Comment:
AEM detected and reported on elevated chromium concentrations in Third Portage Lake (TPL) sediments. AEM concluded that the concentrations were caused by the use of ultramafic waste rock with elevated metal leaching potential as a construction material. Following several years of monitoring and assessment, AEM determined that further assessment of chromium in TPL sediments is not justified and that no supplemental mitigations are necessary.

Recommendation:
(R-05) CIRNAC recommends that AEM provide within 60 days the following to the NWB:

5.1 An integrated analysis of all relevant data to support the conclusion that additional assessment and mitigation of chromium in TPL sediments is not required.
5.2 An explanation of why rock with elevated metal leaching potential was used as a construction material.

5.3 Descriptions of any changes made to AEM's waste rock management practices to ensure leachable materials used to date in the Meadowbank or Whale Tail sites do not result in similar adverse impacts in the future.

5.4 Descriptions of changes made to AEM's waste rock management practices to ensure leachable materials are not used in further construction practices to prevent this from occurring again.

6. Whale Tail Project: Nutrient Sources

Comment:

The Final Environmental Impact Statement (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. 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) and similar results were observed in 2020.

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 however that explosives use represents another potential source of nutrient loadings to the watershed that may be affecting primary productivity. 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:

(R-06) CIRNAC recommends that future Annual Reports include:

6.1 A section that describes and quantifies AEM's use of explosives relative to assumptions used in the FEIS modelling.

6.2 A re-assessment or justification for AEM's prior conclusion that a change in trophic status in Mammoth Lake will not impact fish productivity when potential impacts of explosives residue is considered.

7. Whale Tail Project: Mercury Monitoring

Comment:

Monthly mercury water quality data are collected as part of the routine Core Receiving Environment Monitoring Program Report (CREMP) for the Whale Tail Project. Monitoring results from 2019 and 2020 are significantly elevated relative to pre-development conditions.

While less pronounced, similar changes were observed for methylmercury, but less consistently across stations. Notably, similar trends were also observed at control stations, suggesting the possibility of an unexplained regional change in mercury concentrations. Due to logistical challenges related to COVID-19, components of the mercury assessment and reporting could not be completed prior to issuance of the 2020 Annual Report (e.g., fish tissue analysis). CIRNAC has concluded that additional efforts are required to address this issue on a priority basis.

Recommendation:

(R-07) CIRNAC recommends that AEM provide the following within 60 days to the NWB:

An update on the status of mercury studies, including all work originally scheduled for completion in 2020. The update should include;

7.1 An assessment of factors that resulted in the elevated mercury concentrations observed to date; and

7.2 An assessment of potential human and ecological health impacts associated with the elevated mercury concentrations.

8. Averaging of Water Quality Results per Water Body for Assessments

Comment:

The 2020 CREMP report 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:

(R-08) CIRNAC recommends that future Annual Reports:

Use a modified reporting approach to ensure that comparisons between monitoring data and applicable criteria reflect the temporal and spatial variability inherent in these natural systems. Specifically, reporting should not be based solely on mean data for entire water bodies.

9. Meadowbank: Post Closure In-Pit Water Quality

Comment:

Water quality data presented in the 2020 Annual Report indicate elevated concentrations of multiple contaminants are present in the reclaim water of the Meadowbank pits used for in-pit tailings disposal (Goose and Portage). These elements are likely to require treatment prior to closure of the site. Contaminants requiring treatment may include, but are not necessarily limited to: aluminum, arsenic, cadmium, chromium, copper, iron, lead, nickel, selenium, thallium, chloride, fluoride, sulphate, and total ammonia/total nitrogen equivalent (Appendix 11: Section 4).

Appendix 50 of the 2020 Annual Report presents a preliminary "Meadowbank Closure Water Treatment Strategy" for the reclaim water. The strategy identifies reclaim water treatment concepts and maps out a process for finalizing reclaim water treatment requirements and methods. CIRNAC concludes that the strategy establishes a logical framework for determining treatment needs for reclaim water.

CIRNAC notes that the water treatment strategy focuses only on reclaim water prior to closure and does not extend into the post-closure phase when the pits have been re-flooded (i.e., after the reclaim water has been treated and discharged). Instead, the strategy states that: "Water quality forecast will be performed during the flooding period" (Appendix 50: Section 2.2). Similarly, the predictive modelling presented in Appendix 11 of the 2020 Annual Report does not predict long-term water quality in the re-flooded pits during the post-closure phase.

Lack of an up-to-date post-closure water quality prediction for the re-flooded pits creates uncertainty regarding the long-term environmental quality of the site after closure has occurred. CIRNAC recognizes that a number of unknowns complicate efforts to predict water quality in the re-flooded pits (placement of an in-pit cover, flux of metals from the flooded tailings into the pit lakes, etc.). Nonetheless, estimates should be developed to better inform closure planning processes.

Recommendation:

(R-9) CIRNAC recommends that AEM:

9.1 Conduct a modelling exercise to predict post-closure water quality in the re-flooded Meadowbank mine pits (Goose and Portage).

9.2 Incorporate the findings of the modelling into the next iteration of the Meadowbank ICRP. Specifically, the findings should be used to inform the design of relevant closure components, including but not limited to: capping of the in-pit tailings and post-closure

water management, water treatment facility designs, sludge generation and disposal, requirements as well as expected treatment duration.

10. Meadowbank: In-Pit Tailings Cover

Comment:

There is currently uncertainty regarding what conditions might warrant the placement of a granular cover over the in-pit tailings. CIRNAC presumes that the final decision will be based on a range of site-specific risk assessments and considerations including but not limited to: aquatic habitat, sediment resuspension, contaminant flux into the water column and constructability.

AEM indicates that they will be reviewing potential closure concepts during the development of the Final Closure and Reclamation Plan and they have initiated several studies to inform the decision-making process (e.g., tailings pore water assessments).

In the opinion of CIRNAC, selection of a preferred cover concept will require extensive study and should be integrated with decisions regarding other closure components (e.g., management of re-flooded pit water). On this basis, the planning process for the selection of a preferred cover concept for the in-pit tailings is likely to require multiple years and should begin as soon as possible.

Recommendation:

(R-10) CIRNAC recommends that AEM:

10.1 Describe the strategy that will be used to evaluate cover requirements and methods for the in-pit tailings (e.g., water covers, coarse/fine granular covers, construction/leave a submerged berm at the connection to the pit). The strategy should be initiated in 2021 and an update should be provided in the 2021 Annual Report.

10.2 Identify the preferred closure concept for covering in-pit tailings in the next iteration of the Meadowbank ICRP.

11. Thermal Performance of Meadowbank and Whale Tail WRSF Covers

Comment:

The WRSF cover design for the Meadowbank Mine consists of a 4 m thick layer of non-acid generating (NAG) rockfill to contain the active freeze/thaw layer within the cover. The depth of cover was selected based on thermal modelling and instrumentation to assess the probable thickness of the active layer at closure, including climate change. As of 2020,

approximately 90% of the WRSF has been progressively reclaimed. Additional thermal monitoring and analysis is being performed by AEM to verify the performance of the cover system against the design intent.

CIRNAC notes that the WRSF cover concept for the Whale Tail Project is generally similar to the concept used at the Meadowbank Mine. The only notable difference is that thermal modelling for the Whale Tail site determined that WRSF covers should have a total thickness of 4.7 m (4.2 m active freeze/thaw zone and a 0.5 m buffer). Modelling for the Whale Tail site also predicted that the freeze/thaw zone may penetrate deeper than the 4.7 m design thickness of the WRSF covers under the most conservative climate change scenario.

Given the similarities between the Meadowbank and Whale Tail sites (climate, topography, mine wastes, etc.), it is unclear to CIRNAC why the WRSF cover thicknesses between the two sites are different.

Recommendation:

(R-11) CIRNAC recommends that AEM:

Describe the technical rationale for using different WRSF cover thicknesses at the Meadowbank Gold Mine and Whale Tail sites. Any notable differences in the design assumptions for the two sites should be provided in the rationale. This information should be presented in the next iteration of the Meadowbank ICRP.

12. Fuel Management

Comment:

Table 7-2 of the 2020 Annual Report indicates that fuel was observed in the secondary containment of fuel tanks 5 & 6 during a routine inspection of the Baker Lake Fuel Farm and a “small leak” was subsequently identified (Spill Number 2020-351). The total volume of fuel released from the tanks into the Secondary Containment area was estimated to be 100,000 L, which was mixed with an additional 403,000 L of water (presumably precipitation/snow melt). AEM identified no evidence suggesting that the fuel/water mixture breached the secondary containment of the fuel tanks. Further, according to AEM’s spill report, both the fuel and water were retrieved from containment and managed as appropriate; there were no releases to the environment and no off-site impacts to receiving watercourses.

CIRNAC also notes there have been several instances where tank farm inspections have identified deficiencies that have not been mitigated between inspections. To illustrate, the Meadowbank and Whale Tail 2020 Annual Geotechnical Inspection (Appendix 9, Table 2) noted the ongoing presence of standing water within secondary containment, as well as

evidence of animal burrows that may be impacting the integrity of liner systems. These deficiencies were identified during prior inspections but have yet to be addressed by AEM.

Based on the volume of fuel noted above, there was a potential for environmentally significant impacts if there was a breach in secondary containment of the fuel tanks. In this regard, CIRNAC notes that the 2020 Annual Report (Appendix 9, Section 9.1) indicates that several holes have been identified in tank farm liner materials during recent geotechnical inspections. While the 100,000 L fuel leak was not released to the environment in the current case, the presence of liner holes elsewhere in the tank farm suggests there is a credible risk of releases in the future.

Recommendation:

(R-12) CIRNAC recommends that AEM:

Perform a comprehensive review of its tank farm facilities to identify and mitigate all potential failure modes (including accidents and malfunctions). The findings of the review should be provided in the 2021 Annual Report and should:

12.1 Consider increasing the frequency of tank farm inspections and implementation of mitigative actions within a reasonable timeframe if/as recommended.

12.2 Address the issue of water management within the secondary containment areas in general, and in particular, how approximately 400,000 L came to be within the containment area at the time of the leak.

13. Meadowbank: Quarry 22 Hydrocarbon Contaminated Soil Clean-up Criteria

Comment:

AEM has used Quarry 22 on the All-Weather Access Road to store petroleum hydrocarbon (PHC) impacted soils prior to the construction of the Land farm at Meadowbank in 2012. Attempts at remediation have occurred including;

- In-situ scarifying was attempted in 2019, cancelled due to falcons nesting in the quarry,
- A second attempt made in 2020 but postponed to September 2020, again due to falcons nesting.

The results of PHC soil testing completed at the site have reported only F3 fraction concentrations above the CCME industrial criteria. AEM plans to continue scarifying where elevated results were reported (sample location Q22-1 and Q22-2). It is not clear to CIRNAC why the less conservative set of criteria (Industrial Criteria) were used to evaluate the results of PHC testing.

Recommendation:
(R-13) CIRNAC recommends that AEM:

Clarify why it is using the less restrictive (Industrial) CCME standards for PHC F3 fraction when more restrictive standards could and should be used for the quarry which is located on the tundra.

14. Incinerator Stack Testing Licence

Comment:
In 2020, a total of 3,229.5 m^3 of waste was burned in the Meadowbank incinerator, of which approximately 50% was food waste; the other 50% was dry waste comprised of food containers, cardboard boxes, paper and absorbent rags. Section 6.2 of the 2020 Annual Report also discusses incineration at the Meadowbank site including stack sampling, as well as ash and waste oil monitoring. The section identifies and discusses issues related to two incidents where the incinerator temperature did not reach 1000 degrees C and an issue with ash analysis that AEM believes is related to the laboratory.

Section 6.2 also discusses the fact that AEM did not carry out the annual stack testing as AEM believed that based on results of the previous five years, the annual sampling frequency could be changed to bi-annually. At the end of June, AEM requested approval from ECCC to move to a bi-annual sampling frequency but was directed by ECCC to the NIRB. AEM received a NIRB recommendation to continue carrying out annual sampling on 3 December 2020 at which time AEM stated it was too late to organize for the sampling.

While CIRNAC has no concerns with respect to the technical information provided in the annual report, CIRNAC is concerned that AEM would presume that a change in an existing monitoring and sampling program would be acceptable prior to receiving confirmation in that regard and ultimately not be able to carry out a sampling obligation as required in 2020.

Recommendation:
(R-14) CIRNAC recommends that AEM:

14.1 In future adhere to any existing requirements until AEM receives written approval from the appropriate authority to change, modify, or waive an existing requirement.
14.2 Formally acknowledge agreement to recommendation 1) above in response to these comments.

15. Waste Rock Geochemical Data Analysis Results (Whale Tail and IVR)

Comment:

In Section 5.1.2. of the Annual Report, Table 5-3 presents a summary of waste rock classification by pit (Whale Tail and IVR) for the period 2018-2020.

In 2020, AEM sampled approximately 25% of blast holes corresponding to 29,718 samples from the Whale Tail Pit and 8,081 samples from the IVR Pit, and analyzed the percentages of sulphur and carbon to differentiate between potentially acid generating (PAG) and non-potentially acid generating (NPAG) materials.

Other than Table 5-3, in the main report or an appendix there is no further geochemical data collected in 2020 that was used as the basis for classifying the waste rock.

In Section 5.1.2 AEM notes that "In 2020, to validate the method used by Agnico, approximately 392 samples from Whale Tail Pit were sent to an accredited commercial lab (external lab) for acid base accounting (ABA) analysis using the Modified Sobek Method for determination of NP/AP, metal leaching using the Shake Flask Method, bulk metals analysis and for whole rock analysis.

No samples from IVR Pit, due to both pits sharing common lithologies, were sent externally". AEM notes that the results from the external laboratory confirmed Agnico's methodology and results to differentiate PAG/NPAG rock, but none of the geochemical data noted above were found in the main document of the report or in an appendix to confirm these conclusions.

AEM stated that the results of the NPAG-PAG classification confirmation are logged in the Meadowbank LIMS database and also stored as models in MineTrust but due to the large volume of data, the results are not included in the annual report but can be provided upon request.

Recommendation:

(R-15) CIRNAC recommends that AEM:

15.1 Provide the necessary supporting evidence and data with respect to the 2020 geochemical sampling data that were used to classify waste rock from the Whale Tail Pit and IVR Pit.

15.2 Provide the supporting evidence and statistical summaries of the geochemical data from the accredited external laboratory that were used to confirm that AEM's methodology and results used to differentiate PAG/NPAG rock are appropriate.