TECHNICAL REVIEW

OF

WATER MANAGEMENT PLAN
FOR
THE WHALE TAIL PROJECT

Prepared By:

KIVALLIQ INUIT ASSOCIATION

October 14, 2018

Prepared For:

NUNAVUT WATER BOARD

Executive Summary

The Kivalliq Inuit Association (KivIA) have completed a technical review of Agnico Eagle Mines Limited's (AEM) Water Management Plan for the Whale Tail Project, NWB License No. 2AM- WTP1826.

The review has outlined the following two areas where longer term monitoring may be required. The KivIA would appreciate further clarification on the impact of the above two issues on the post closure monitoring requirements.

1.0 Arsenic has a relatively high solids water partitioning coefficient and the small concentrations in the water will result in high concentrations in the Lake sediments. Even after the arsenic concentrations decrease in the water column, sediment concentrations can remain elevated for much longer periods before recovering. There is a potential that arsenic concentrations below the surface water quality objective of 0.025 mg/L could result in sediment concentrations that exceed chronic toxicity thresholds for some organisms. Therefore, the monitoring program should include sediment sampling to assess arsenic uptake in sediments.

2.0 Well monitoring of lake water is proposed and appropriate, the "failure" of the seepage mitigation system represented by the cover on the waste rock storage facility, may occur over longer time periods than that in the predicted model. Therefore, the monitoring program should be extended to an appropriate time frame that reflects the life of the cover on the waste rock storage facility. Mitigation of elevated concentrations within Mammoth Lake will likely involve collection and management of seepage waters from the waste rock storage facility. This may represent a long term mitigation program and represents a greater effort and a potentially higher cost, if required, then that for mitigating arsenic concentrations in the pit.

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1.0 Introduction

The Kivalliq Inuit Association (KivIA) have completed a technical review of Agnico Eagle Mines Limited's (AEM) Water Management Plan for the Whale Tail Project, NWB License No. 2AM- WTP1826.

The KivIA, represent Inuit beneficiaries of the Nunavut Land Agreement at the territorial and regional levels. The KivIA supports sustainable economic development opportunities for Inuit as long as it is completed in an environmentally and socially responsible manner.

The following documents were reviewed during this technical review:

- Whale Tail Pit – Agnico Eagle Mines Ltd., Water Management Plan, Version 2, September, 2018.

- Whale Tail Pit Project – Golder, Mine Contact Water Modelling Commitments, July 26, 2018.

2.0 Technical Review Summary

The KivIA's two main concerns are related to predicting arsenic concentrations in water and are summarized below.

2.1 Arsenic in the pit lake as a result of diffusion from pit walls.

The results of the pit lake modelling appear to be reasonable based on the assumption that arsenic would be released from the rock by diffusion of available dissolved arsenic in the rock. The modelling suggests that the overall mass load from the wall rock to the water in the pit will be moderate to small and will diminish with time. In addition, should the predictions be incorrect and future concentrations are higher than predicted, the confinement of water within the pit will allow for mitigation. For example, the arsenic in the pit water can be treated within the pit for ice free conditions. Therefore, the low risk of arsenic exceeding the water quality objective can be mitigated, if required.

2.2 Arsenic concentrations in Mammoth Lake as a result of effluent discharge during operations and seepage from the waste rock storage facility after closure.

The arsenic concentrations in Mammoth Lake were predicted using a hydrodynamic Model where the arsenic concentrations in the lake were predicted and compared to the surface water quality objective for arsenic. The concentrations in the lake were predicted for operations as a result of effluent discharge and for closure and post closure conditions as a result of seepage from the waste rock storage facility (WRSF). The WRSF was assumed to have a four-meter thermal cover layer constructed of waste rock with a low arsenic leaching potential. The sensitivity analysis provided shows the effect of lower seepage rates than expected as well as a cover layer containing a small amount of high arsenic leaching rock.

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The predicted arsenic concentrations during the operation remained below the surface water quality objective of 0.025 mg/L. The results for the ideal condition for the covered waste rock and no contamination of the cover material with high arsenic leaching rock has suggested that concentrations in Mammoth Lake would remain below the surface water quality objective for the expected seepage rate and 50% of the expected seepage rate. However, with only 2% of high arsenic leaching rock in the cover material, the arsenic concentrations in Mammoth Lake were predicted to be well above the surface water quality objective. For expected seepage rates, the arsenic concentrations would remain above the objective seasonally in perpetuity. At 50% of the expected seepage rate the predicted arsenic concentrations were above the objective for two years and remained close to the objective, likely within the range of uncertainty, afterward.

The results of the arsenic concentration predictions indicate that there is a risk of exceeding the surface water quality objective for arsenic in Mammoth Lake if the cover materials used for the waste rock storage facility are less than ideal in terms of arsenic leaching potential. Similarly, this also implies that there may be risks associated with leaching of the waste rock in the storage facility should the thermal cover not perform as expected and seepage from the covered rock occurs into Mammoth Lake. In addition, an aspect of arsenic in the lake that was not considered is that related to the sediments. Arsenic has a relatively high solids water partitioning coefficient and the small concentrations in the water will result in high concentrations in the Lake sediments. Even after the arsenic concentrations decrease in the water column, sediment concentrations can remain elevated for much longer periods before recovering. There is a potential that arsenic concentrations below the surface water quality objective of 0.025 mg/L could result in sediment concentrations that exceed chronic toxicity thresholds for some organisms. The sediment issue also requires consideration in this case. At the very least, the monitoring program should include sediment sampling to assess arsenic uptake in sediments.

Well monitoring of lake water is proposed and appropriate, the "failure" of the seepage mitigation system represented by the cover on the waste rock storage facility, may occur over longer time periods than that in the predicted model. Therefore, the monitoring program should be extended to an appropriate time frame. Unlike the open pit in which arsenic can be treated in the pit, it is not likely possible to treat arsenic in Mammoth Lake. Mitigation of elevated concentrations within the Lake will likely involve collection and management of seepage waters from the waste rock storage facility. This may represent a long term mitigation program and represents a greater effort and a potentially higher cost, if required, then that for mitigating arsenic concentrations in the pit.

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3.0 Summary of Recommendations

3.1 Arsenic has a relatively high solids water partitioning coefficient and the small concentrations in the water will result in high concentrations in the Lake sediments. Even after the arsenic concentrations decrease in the water column, sediment concentrations can remain elevated for much longer periods before recovering. There is a potential that arsenic concentrations below the surface water quality objective of 0.025 mg/L could result in sediment concentrations that exceed chronic toxicity thresholds for some organisms. Therefore, the monitoring program should include sediment sampling to assess arsenic uptake in sediments.

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The KivIA would appreciate further clarification on the impact of the above two issues on the post closure monitoring requirements.

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