3-B: Addendum Human Health and Ecological Risk Assessment Summary

Appendix 3-B – Human Health and Ecological Risk Assessment Addendum

Whale Tail Pit – Expansion Project

Submitted to:

Nunavut Impact Review Board

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Appendix 3-B – HHERA Summary

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3-B-1 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT UPDATE SUMMARY

The Human Health and Ecological Risk Assessment (HHERA) for the Expansion Project addresses the requirements of the EIS Guidelines for the Meadowbank Mine (NIRB 2004) in terms of assessing potential risks to human health, wildlife, and aquatic life as a result of changes to environmental quality from the predicted emissions and discharges from the Project, and reflects up-to-date predictions of changes to air and water quality as a result of the Expansion Project. Changes to environmental quality include direct effects to air quality and water quality, and indirect effects to soil quality, vegetation quality, and traditional food quality including fish and wild game, such as caribou. The predicted effects expected from the Expansion Project are largely similar to those of the Approved Project, with some exceptions for human health and aquatic life.

3-B-1.1 Human Health

The complete exposure pathways for Inuit and non-Inuit members of the public valued components (VCs) are as follows:

- inhalation of air;
- incidental ingestion and dermal contact with soil;
- ingestion and dermal contact with surface water; and
- consumption of country foods (e.g., caribou, fish).

For the Approved Project, changes to air quality that may affect human health via inhalation were acceptable for all chemicals and all human receptor locations assessed. For the Expansion Project, some marginal risks were associated with 1-hour nitrogen dioxide (NO_2) at Grave Site 30. However, given that this location is within the Project boundary and access to members of the public would be restricted during operations, NO_2 was not retained for further evaluation in the residual effects classification given that exposure is not expected to occur.

For both the Approved and Expansion Project, no significant changes to soil quality were predicted and as such human health risks due to incidental ingestion and dermal contact with soil and due to consumption of country foods that rely on soil-based organisms as a food source (e.g., caribou) were considered to be negligible.

For the Approved Project, changes to water quality that may affect human health via ingestion and dermal contact with water were acceptable for all chemicals and all human receptor locations assessed. For the Expansion Project, some marginal carcinogenic risks were associated with arsenic largely due to the post-closure phases at Mammoth Lake, Lake A15, Lake A12, Lake A76, and Whale Tail Pit, indicating that there may be carcinogenic health risks for members of the public should they rely on these waterbodies as their potable water supply for two weeks per year for every year of the life of the Project. However, these marginal risks were considered to be negligible and not significant given the conservative assumptions used in the water quality model that will tend to overestimate water concentrations, the conservatism in the toxicity information used to assess the potential risks due to arsenic exposure, that the exposure scenario considered is expected to be overly conservative (i.e., 2 weeks per year throughout adulthood), and that none of the existing water bodies are currently used for traditional or recreational purposes.

Similar to the drinking water pathway above, risks to human health were not predicted due to fish ingestion for the Approved Project. For the Expansion Project, some marginal carcinogenic risks were associated with arsenic largely due to the post-closure phases at Mammoth Lake, Lake A15, Lake A12, Lake A76, Whale Tail Lake (South Basin),

Downstream Node 2, Whale Tail Pit, and IVR Pit, indicating that there may be carcinogenic health risks for members of the public should they use these waterbodies for fishing purposes for two weeks per year for every year of the life of the Project. For the same reasons described above, these marginal risks were considered to be negligible given the conservative nature of the water quality model, the toxicity information used in the assessment, and the conservative exposure scenario which assumed that fishing would occur at locations where fishing does not currently occur. Therefore, potential effects to human health were considered to be negligible and not significant.

3-B-1.2 Wildlife

The complete exposure pathways for wildlife VCs (represented by barren-ground caribou, wolverine, peregrine falcon, common loon, Canada goose, rock ptarmigan, semipalmated sandpiper, Arctic hare, and Arctic ground squirrel) are as follows:

- incidental ingestion of soil;
- ingestion of surface water; and
- consumption of plants and animals as prey (e.g., sedges and forage fish).

For the Approved and Expansion Project, no significant changes to soil quality were predicted and as such wildlife risks due to incidental ingestion of soil and consumption of plants and animals as prey were considered to be negligible.

Additionally, for both the Approved and Expansion Project, no significant changes to water quality that may result in a potential risk for wildlife when used as a drinking water source were identified. Therefore, potential effects to wildlife were considered to be negligible and not significant.

3-B-1.3 Aquatic Life

Aquatic life was assessed with respect to direct contact with surface water and included the following representative VCs: algae, aquatic plants, aquatic invertebrates, and fish (Arctic Char, Arctic Grayling, Lake Trout, and Round Whitefish).

For the Approved Project, potential risks to aquatic life were identified in Whale Tail Lake (North Basin) due to aluminum and chromium during post-closure (late); potential risks were not identified for the Whale Tail Lake (South Basin) which was considered for the Expansion Project. However, these potential risks were considered to be negligible and not significant considering the conservatism in the water quality model, the conservatism in the selected toxicity benchmarks, and that aluminum has a relatively low toxicity for freshwater aquatic life for pH within the range of 6 to 8 (pH in Whale Tail Lake is approximately 6.5).

For the Expansion Project, potential risks to aquatic life were identified in Whale Tail Pit due to arsenic during post-closure (early). However, these potential risks were considered to be negligible and not significant considering the conservatism in the water quality model and the conservatism in the selected toxicity data that were the basis of the calculated site-specific benchmark. Therefore, potential effects to aquatic life were considered to be negligible and not significant.

3-B-1.4 Conclusion

The significance of the Expansion Project's residual effects is expected to be consistent with those predicted for the Approved Project (i.e., not significant). The assessment of the Expansion Project found that overall risks to human health, wildlife, and aquatic life due to predicted changes to air quality and water quality were negligible. No additional mitigation or monitoring commitments are required based upon the effects assessment carried out for the HHERA.

3-B-1.5 References

NIRB (Nunavut Impact Review Board). 2004. *Environmental Impact Statement (EIS) Guidelines for the Meadowbank Project*. February 2004.