INFORMATION REQUEST RESPONSE

EA No: 0809-001 **Information Request No: Review Board #21**

Date Received

February 14, 2011

Linkage to Other IRs

City of Yellowknife IR #11
YKDFN IR #20

Date of this Response

May 31, 2011

Request

Preamble:
It is assumed that the assessment of human health risks is based partly on surface water quality. The project proposes to release arsenic through a diffuser year round into Yellowknife Bay or Back Bay. People swim in many locations in those bays. Ingestion of water by users of the bays is not limited to clear water, but includes sediment in turbid water. Arsenic loading of sediment in Back Bay and Yellowknife Bay is recognized in the DAR. This should be reflected in the assessment of human health risks.

Question:

1. Does the measurement of surface water quality in the LSA include arsenic on sediment in turbid water, to indicate total arsenic in the water column, or was analysis conducted only after particulates from sediment had settled?

2. Do the health and human safety assessments include accidental ingestion of, and topical exposure to, sediments in Ndilo, Latham Island, Back Bay, Yellowknife Bay (houseboat community) and Dettah? If not, please include it in a revised assessment.

Reference to DAR (relevant DAR Sections):

DAR 7.1.2.3 p7-9 Surface water quality-Local study area
DAR 8.9.5 Arsenic Intakes by Human receptors

Reference to the EA Terms of Reference

ToR 3.4.2 Health and Human Safety

ToR 3.5.1 Water
ToR 3.5.2 Fish and Aquatic Habitat

Response 1 Summary

The sampling and analytical techniques follow standard protocols for collection and analysis of surface water samples.

Response 1

The sampling and analytical techniques for surface water follow standard protocols for collection and analysis. Surface water samples were not collected from areas where bottom sediments were deliberately disturbed and suspended in the water column. Rather, samples were collected from locations with ambient conditions at the time of sampling. The water samples were not filtered to remove any suspended solids (i.e., sediments) before analysis, and therefore any potential contribution of suspended sediments to the resulting total arsenic concentration would have been accounted for in the analysis.

Response 2 Summary

In addition to the risk assessment, a supplementary exposure assessment was conducted in which various pathways were assessed to evaluate dermal exposure and inadvertent ingestion of sediment solids. These pathways will contribute negligibly to the total arsenic intake and will not result in any increased risk and therefore a revised assessment is not necessary.

Response 2

The risk assessment considered ingestion of drinking water and medicinal teas, consumption of fish and wild game, berries, and garden produce, incidental ingestion of soil, and inhalation. Incidental ingestion of and topical exposure to sediments were not included. In all cases, the drinking water source was assumed to be the City of Yellowknife municipal drinking water supply. The assessment results showed that ingestion of water and consumption of soil only accounted for 1% and 0.5% to 3%, respectively, of total arsenic intake. Ingestion of wild game and supermarket food was estimated to account for a majority (i.e., 67% to 90%) of arsenic exposure.

In preparing the response to this information request, a supplementary exposure assessment was undertaken for an individual who was assumed to come in contact with sediments in Back Bay. The analysis was done for both dermal exposure and inadvertent ingestion of sediment solids. For the analysis, a mean arsenic concentration of 875 mg/kg in Back Bay sediment was used to determine the reasonable maximum exposure that an individual would experience. For the dermal exposure assessment it was assumed that the individual spends 2 hours per week over a 3 week period each summer in Back Bay. The calculated dermal exposure to 875 mg/kg arsenic in sediments was estimated

to result in a risk of 9×10^{-7} (i.e. 9 people in 10 million), which is well below the Health Canada "negligible" risk value of 1×10^{-5} (1 in 100 thousand). Assuming that the individual inadvertently ingests approximately 20 mg of sediment (equivalent to the amount of soil an adult is assumed to ingest daily), the risk from exposure to arsenic in the sediments was estimated to be approximately 1.8×10^{-8} (i.e. 1.8 people in 100 million) which again is well below the Health Canada "negligible" risk value of 1×10^{-5} (1 in 100 thousand). In conclusion, the risks from direct and indirect exposure to lake sediments (solids and porewater) to an individual from the Yellowknife area (e.g. someone from N'dilo, Latham Island, or the City of Yellowknife) would be expected to be negligible. Hence, there is no justification for redoing the risk analysis.