

**Giant Mine Remediation (EA0809-001)**  
**Information Requests – Round #1**

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**xix. Source: Yellowknives Dene First Nation**

**To: Department of Fisheries and Oceans**

**Subject: Foreshore Historical Tailings Remediation**

**Preamble:**

Riprap and geotextile has been used as a cover over the historical foreshore tailings located on North Yellowknife Bay above the waterline. The underlying tailings contain elevated levels of arsenic, zinc, copper and lead. The proposed remediation plans to extend the riprap and geotextile cover over the submerged tailings (i.e., below the waterline).

The proposed riprap and geotextile cover aims to reduce tailings erosion and to minimize the amount of arsenic leaching into the water column. There are limited engineering design and construction details provided in the DAR regarding the riprap and geotextile cover. As such, there is uncertainty in whether the cover will be effective in achieving erosion control of the tailings below the waterline, limiting re-suspension of tailings below the waterline, and reducing the leaching of arsenic from the tailings into the water column.

The DAR suggests that the riprap and geotextile cover will make a suitable environment for fish rearing, feeding, and spawning and invertebrate benthic life production. The water quality in near proximity to the cover, or on the cover, was not detailed in the DAR. As such, it is unclear if the cover environment is suitable or not for aquatic life.

**Request:**

- a. It is requested that the Department of Fisheries and Oceans comment on the acceptability of implementing a submerged tailings cover and its ability to induce marine wildlife to live in close proximity to tailings that contain elevated levels of arsenic and metals.

**Department of Fisheries and Oceans (DFO) Response:**

Since 1988 there have been several studies undertaken on the area of historical mine tailings deposition in Yellowknife Bay. A review and summary of these studies was conducted by SRK in 2004. The most recent investigation of the historic tailings in Yellowknife Bay was completed by Golder Associates Ltd. in 2005. These reports are part of the supporting documents to the Giant Mine

Remediation Plan and are available on the Mackenzie Valley Land and Water Board Registry under Water License application MV2007L8-0031.

The results of these studies were used to evaluate the distribution of submerged tailings in the bay and to determine the chemical and biological conditions of the sediments of North Yellowknife Bay. The studies showed that over the years the submerged tailings have been carried and re-distributed along the western side of North Yellowknife Bay by wave action and lake currents. The studies also showed that the benthic invertebrate community was adversely affected in the area of the tailings deposit due to the presence of elevated arsenic concentrations in the sediments.

In 2001, a study conducted by Golder Associates suggested that groundwater flows moving upward through the on-land beach tailings 50 to 75m beyond the shoreline were carrying arsenic to the lake. This seepage from the on-land tailings was a primary source of arsenic to Yellowknife Bay. In order to address this issue, reclamation activities in the fall of 2001 were undertaken to improve upland drainage and construct beach protection works using geotextile over the re-graded beach tailings along with a gravel and rip-rap cover. Monitoring conducted in this area in 2003 showed a substantial decrease in levels of arsenic contamination in water reporting to the lake.

In 2005, DFO reviewed the draft Giant Mine Remediation Plan, as part of the Federal Contaminated Sites Action Plan (FCSAP). Investigations conducted on the historic tailings in Yellowknife Bay showed that overall the impacts of arsenic in sediments do not affect the entire Yellowknife Bay and that the water column above the submerged tailings currently meets the federal Canadian Council for Ministers of the Environment (CCME) water quality guidelines for protection of freshwater aquatic life. However, as also noted in previous studies of the area, the results indicated that there was a continued effect to the benthic invertebrate community structure exposed to elevated arsenic concentrations in the sediments. The studies also documented that lake sediments made up predominantly of tailings offered poor habitat for fish spawning and rearing.

Based on the results of the investigations on the historic foreshore tailings, DFO recommended that options should be investigated to remediate the foreshore area which has been affected by the deposit or migration of tailings. This included not only extending the existing rip-rap cover to just below the lake surface, but also covering the tailings where they occur in the littoral zone. The extension of a geotextile liner and a rip-rap cover over the submerged tailings would assist in preventing erosion and exposure of tailings (i.e. in low water years) and minimize the potential for continued migration of tailings. Provided it fully neutralizes the potential contaminant mobilization from the tailings, the cover would eliminate the direct exposure of the benthic community to elevated arsenic levels in the sediment and provide a clean substrate layer for benthic

invertebrates. Depending on the extent of the area to be covered and the size of the rip-rap material to be used, it could also improve habitat available to fish in the area.

The objective of the Giant Mine Remediation Project is to minimize the release of contaminants from the site to the surrounding environment. The geotextile and rip-rap cover would serve to reduce the exposure of aquatic organisms to contaminants in the sediments, therefore providing improved environmental conditions and habitat for aquatic organisms using this area of North Yellowknife Bay.

Monitoring of the stability of the submerged tailings cover, as well as monitoring of chemical and biological parameters on the new substrate provided by the tailings cover would evaluate its effectiveness in achieving erosion control and limiting tailings re-suspension, as well as its ability to provide suitable habitat for aquatic life.