**INFORMATION REQUEST RESPONSE**

**EA No: 0809-001** **Information Request No: Review Board #18**

**Date Received:**

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**Linkage to Other IRs:**

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May 31, 2011

**Request**

***Preamble:***
The ecological benefits of creating attractive breeding habitat for fish and other wildlife in the form of enhanced wetlands (p6-88) in highly contaminated areas of Baker Creek are unclear. Wetlands in Baker Creek will likely attract fish, water birds, and semi-aquatic furbearers. The DAR recognizes that fish in Baker Creek may be unsafe to eat, and that muskrat and mink will likely exceed toxicity reference values (p8-80). The DAR states that superior habitat is locally abundant. The DAR predictions on terrestrial wildlife recognize that habitat is not as valuable when it poses a chemical risk to the species using it.

***Question:***
Please explain the reasoning behind creating wetland habitat that is attractive to fish, water birds and fur-bearers in the contaminated setting of Baker Creek.

**Reference to DAR (relevant DAR Sections):**

S.6.1.1 Remediation Objectives #5: Restore Baker Creek to a condition that is as productive as possible

S.6.1.2 Re: Baker Creek: "The selected approach… will improve both the quality and quantity to habitat… expected to result in a gradual increase in numbers and diversity of fish, animals, wildlife and native vegetation in the drainage area of the creek. At the discretion of DFO, catch and release fishing could continue. Food fisheries may need to be discouraged, depending on the level of residual arsenic concentration.

S.6.9.3 p6-88: "Contaminated sediments are present throughout the creek, but there is evidence that reaches are biologically productive. The extent and severity of effects to the existing aquatic life in the creek from current contaminated sediment levels is unknown... A final determination has yet to be made whether removing and/or covering contaminated sediments will outweigh the disruptions to current biological functions…. Baker Pond contains tailings and contaminated natural sediments, but is

also believed to be an important source of nutrients and food for fish". INAC is considering creating or enhancing wetlands in Reach 5 and 6 of Baker Creek.

Baker Creek sediments contain thousands of parts per million arsenic, well over applicable criteria. Among the highest concentrations are in Reach 5 and 6 (DAR 7.1.4.3 p7-19 and Fig. 7.1.7). There is a potential for adverse effects from arsenic on both predator and forage fish within Baker Creek (DAR 8.9.4.2 p8-79). There is an abundance of superior habitat in the Local Study Area and Regional Study Area" (DAR 8.8.2.3).

**Reference to the EA Terms of Reference**

S.3.5.2 Fish and Aquatic Habitat: "Potential effects to fish and fish habitat were identified as issues of concern during the Review Board's scoping exercise. Public concern focused on the development's potential to contribute to the contamination of local fish stocks and aquatic habitat, including concerns about health impacts on traditional harvesters and other harvesters of fish"

**Summary**

Remediation will result in important improvements to the chemical quality of Baker Creek and also presents opportunities for improvements in the physical habitat of the creek. Although some chemicals (particularly arsenic) will remain at concentrations that are elevated relative to natural conditions, significant adverse risks to most aquatic species are not anticipated to occur. On this basis, Baker Creek has the potential to serve as viable and productive habitat, without significant risks to aquatic species. Notwithstanding this conclusion, the Giant Mine Remediation Project Team (Project Team) believes that decisions regarding the remediation of Baker Creek should be informed by additional input from interested parties. This will include consideration of preferences to both encourage and discourage habitat use within the design process for Baker Creek.

**Response**

One priority for any modifications to Baker Creek is to ensure that its hydrological characteristics are ideal for the long-term management of the site (e.g., to avoid surface and/or sub-surface flooding). A second priority of the Giant Mine Remediation Project (Project) is to manage potential risks to ecological and human receptors by reducing chemical loadings to the downstream aquatic environment (i.e., Great Slave Lake). This will be achieved through the remedial concepts presented in the following Sections of the DAR: 6.6 (capping of tailings and sludge areas), 6.8 (management of site waters – surface water and minewater), 6.9 (management of contaminated sediments in Baker Creek) and 6.10 (remediation of contaminated surficial materials).

In addition to the two priorities noted above, both of which are considered to be "mandatory requirements" of the Project, a third and optional priority for Baker Creek is the creation of new aquatic habitat. If desired, habitat creation could be achieved through the physical modifications that encourage the use of the creek by aquatic species during relevant life stages. Examples of such

improvements include the creation of deeper pools, riffle areas, spawning/rearing areas and establishment of appropriate food sources (i.e., aquatic invertebrates and vegetation).

The realignment of Reach 4 in 2006 serves as a case study of potential habitat improvements that could be achieved elsewhere in Baker Creek. In that case, a diverse community of worms, snails, mayflies, caddis flies, beetles and flies have colonized the rehabilitated portion of the creek, indicating good forage for hatching grayling and sucker. The benthic community present in Reach 4 was observed to include both pollution-tolerant and pollution-sensitive species that provide very good forage for the fish community. Furthermore, studies conducted since the realignment of Reach 4 have shown that the modifications markedly improved the spawning success of Arctic grayling within the Creek.

The realignment of Reach 4 illustrates that a wide array of aquatic species can be encouraged to use the creek through improvements to the physical habitat. However, even after remediation, some parameters (particularly arsenic) will remain elevated relative to background concentrations. As a consequence, species using Baker Creek will be exposed to risks that are higher than in a similar but "pristine" environment. In addition, it is expected that the current catch and release policy for those who fish in Baker Creek will remain in effect for many years.

As described in Section 8.9 of the DAR, the Ecological Risk Assessment results showed that arsenic concentrations in Baker Creek post-remediation are not expected to result in adverse effects to most aquatic species and to wildlife that have aquatic-based diets. These findings were based in part on the results of field surveys that have shown fish to be present and successfully reproducing in Baker Creek and Environmental Effects Monitoring carried out on resident fish species at the mouth of Baker Creek which indicated little difference in the health of species caught in Baker Creek versus a reference area. Field evidence from muskrat surveys carried out in Baker Creek in 2003 and 2004 demonstrated that muskrat were present, reproducing and appeared in good health despite the fact the risk assessment indicated that they may be at risk. The primary effect of current contaminant concentrations is on the diversity and abundance of benthic invertebrate species in areas with elevated arsenic levels in sediments. Improvement of habitat conditions (such as demonstrated in Reach 4) and reduction of the arsenic level in the creek water and sediments is expected to result in reduced risks to all species.

While it is acknowledged that superior habitat is available elsewhere in the Great Slave Lake watershed, Baker Creek has the potential to serve as viable and productive habitat, without significant risks to aquatic species. This position has been supported by government agencies with regulatory authority (e.g., DFO) and has been integrated throughout the remedial planning process. The alternative to creating new habitat would be to actively discourage use of Baker Creek by aquatic species. Such a philosophy would presumably extend to areas of the creek that are already serving as effective habitat (e.g., Reach 4). It is expected that the elimination of such habitat would not be acceptable to regulatory authorities.

Notwithstanding the conclusions noted above, decisions regarding the remediation of Baker Creek should be informed by additional input from interested parties. This will include consideration of preferences to both encourage and discourage habitat use within the design process for Baker Creek, where appropriate. The mechanisms through which this input will be incorporated into the Remediation Project are described in Section 13.12 of the DAR. In addition, the approaches that will be used to monitor and confirm the health of the aquatic environment are presented in Chapter 14.