



Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #04

June 17, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: CityYK #04

Date Received

February 28, 2011

Linkage to Other IRs

Date of this Response

June 17, 2011

Request

Preamble:

The section discusses what will be done or proposed to be done regarding water treatment, sludge management, discharging the treated water and arsenic impact on Yellowknife Bay in general terms, which doesn't alleviate the concerns of the City but in turn raises more concerns.

Question:

1. Please provide a description of the technology that is intended to be used to treat the contaminated water.
2. Please provide clarification by the statement "best available" does this mean the latest technology on the market or what is readily available in terms of delivery?
3. The DAR discusses the need for a small surface disposal facility to handle the sludge, please provide specifications for synthetic and natural cover materials and the sources for the natural materials.
4. Please provide information regarding water temperatures that will be discharged into Yellowknife Bay at any given time of the year. While reference is made regarding "Trapped Zones" will this discharge have any impact on the formation of ice or the quality of ice that eventually forms? Will any pilot projects be conducted to help determine the optimal design of the diffuser? If not, please provide justification as to why this wasn't given any consideration.
5. The DAR also neglects consideration that the City may revert to using Yellowknife Bay as its main water source, given this possibility and the fact that the Federal Government paid for the original submerged pipeline used to draw water from the Yellowknife River why wasn't the replacement of the existing pipeline included in this section or for consideration.





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Reference to DAR (relevant DAR Sections)

- S 6.8.5 Treatment Plant and Process
- S 6.8.5 Sludge Management
- S 6.8.6 Outfall Diffuser
- S 6.8.7 Predicted Arsenic and Water Balance

Reference to the EA Terms of Reference

- s 3.4.2 Human Health and Safety
- s 3.5.2 Fish and Aquatic Habitat

Response 1 Summary

Conceptual descriptions of the preferred water treatment option are provided in Section 6.8 of the DAR and Supporting Document L1. As part of the detailed design phase, some refinements to the technical design are likely to occur. However, this is not anticipated to result in substantive changes to the treatment process or its performance.

Response 1

An overview of the water treatment process concept is presented in Section 6.8 of the DAR. As described therein, the preferred treatment option for this application was determined to be precipitation of arsenic with iron, separation and dewatering of the sludge by thickening and filtration, and disposal of the dewatered sludge in an engineered landfill. A conceptual process flow chart is provided in Figure 6.8.3. Background information on the selection of the preferred treatment option is presented in Supporting Document L1 (provided in Appendix B of the DAR). That document also includes further technical details regarding the preferred treatment option.

The Project Team is currently beginning the detailed design phase of the Remediation Project, which will include refinements to some of the technical details associated with the preferred treatment option. However, this is not anticipated to result in substantive changes to the treatment process or its performance (i.e., treatment efficiency).

Response 2 Summary

Best Available Proven Technology (or “Best Available Technology” – BAT as it is commonly labeled) takes into consideration a wide array of factors. These include: evidence of effective performance under similar conditions; availability of sufficient information to allow the system to be engineered; cost; and an ability to produce an effluent that is not acutely toxic.



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Response 2

The Wikipedia encyclopedia defines “Best Available Technology” (BAT) as a term that is applied with regulations on limiting pollutant discharges with regard to the abatement strategy. Similar terms are “best available technique”, “best practicable environmental option” or “best applicable proven technology”. Regardless of the descriptor used, the approach is often applied during the selection process for industrial technologies.

In the case of water treatment, a wide array of technologies exist that can be applied to treat contaminated waters, ranging from simple natural degradation ponds to advanced physical/chemical/biological treatment processes. Through the application of these technologies, it is possible in concept to achieve virtually any effluent quality desired, provided cost is not a constraint. An important factor in the selection of a treatment process is proven reliability under a range of operating conditions. For example, processes subject to chemical or biological upset and failure would not be considered BAT.

Factors that were relevant during the selection of the preferred water treatment option for the Giant Mine included:

- The full scale demonstration of the technology in treating mining wastewaters under northern climate conditions;
- The availability of reliable data on the performance of the treatment process. This provides an assessment of confidence in the ability of the technology to consistently meet a given effluent limit;
- An adequate technical basis to allow the system to be engineered;
- The system has reasonable capital and operating costs; and
- The technology train is capable of producing a non-acutely toxic effluent.

Response 3 Summary

The specifications for clay and synthetic liners are being evaluated during preliminary design, and will follow applicable guidelines. Cover materials will be obtained locally where available. It is expected that a combination of clay and liner will be used to build an engineered cap over the sludge cell.

Response 3

The specifications for synthetic and natural cover materials are currently being evaluated during preliminary design. The landfill will have a specific cell designated for sludge disposal.

There is a lack of clay soil / local materials at the Giant Mine site. Local clay sources are being investigated for the cover materials. It is expected that a combination of clay soil and liner will be used to build an engineered cap for the sludge cell.



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Response 4 Summary

Water discharge temperatures in the winter generally range from 2-8°C and the diffuser location will be deep enough as to have little impact on ice formation and quality. Modeling will be conducted on the diffuser to study the impact of discharge on ice formation. An ice thickness monitoring program will be put in place to verify modeled thickness. Operation modifications to prevent discharge during the ice formation period will also be considered.

Response 4

The winter water discharge temperatures should range from 2-8°C based on the temperature data of the mine water currently being discharged to the existing Northwest Pond. The average winter water discharge temperature to the Northwest Pond is 6°C. Assuming that the average winter water temperature is entering the plant at 6°C, the temperature will rise a couple of degrees due to the retention time within the process. Therefore, it is possible that the winter water temperature at the diffuser will be in the range of 8°C.

It is anticipated the diffuser will be located at a depth where there is little impact on ice formation and quality, and ice monitoring will be performed to confirm this. Should modeling show that ice formation is impacted, there are two options currently being evaluated:

- The location of the diffuser can be relocated to reduce or eliminate the impact. This may result in increased pipe length and insulation to prevent freezing.
- The plant operations can be modified to eliminate discharge during ice formation. This may include:
 - treating mine water only when it is safe to continuously discharge, resulting in a major change to equipment sizes and rapid short term changes to mine storage , or
 - year-round treatment with storage in a large retention pond during months when it is unsafe to discharge.

Response 5

Replacement of the City's drinking water intake is not within the scope of the Giant Mine Remediation Project. However, the Project Team will engage the City with respect to proposed diffuser locations, to ensure that the selection of a diffuser location does not affect the municipal water intake. The Preliminary design work for the diffuser is in progress and the City's input on site locations would be welcome at this time.