



# Giant Mine Environmental Assessment

## IR Response

Round One: Information Request Alternatives North #14

May 31, 2011

### INFORMATION REQUEST RESPONSE

**EA No: 0809-001**

**Information Request No: Alternatives North #14**

#### **Date Received**

February 28, 2011

#### **Linkage to Other IRs**

Review Board IR #24  
Environment Canada IR #16  
NSMA IR #8  
YKDFN IR #12

#### **Date of this Response:**

May 31, 2011

#### **Request**

##### ***Preamble:***

The DAR discusses the design of the proposed new water treatment plant, its outputs and the year-round use of an outfall and diffuser into Yellowknife Bay. The following quotes from the DAR highlight some of the issues raised in this IR:

- The new plant will use best available technology for the separation of precipitates from the treated water and, therefore, the final effluent quality is expected to be slightly better, on average, than achieved in the existing system. (pg. 6-75)
- Further investigation of alternative diffuser locations and the associated on-land and offshore pipeline alignments is still required. The design of the diffuser will be dependent on the results of these investigations. (pg. 6-77)
- The fish habitat has been characterized as marginally to moderately suitable spawning habitat for northern pike, white sucker, longnose sucker, and possibly lake trout and lake whitefish. There is considerable tailing (silt) deposits from earlier mining activities in the substrate which may affect spawning activities and fish egg survival. (pg. 8-21)

##### ***Question:***

1. Please provide data and predictions on the water quality at end of pipe discharge for the old versus new water treatment plant for the chemical and physical parameters currently measured at the Giant Mine.
2. Please provide some discussion and predictions regarding the potential for stirring up the contaminated sediment near the diffuser and how far those effects are expected to spread.





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- It appears that some fish habitat will be destroyed through the construction, placement and operation of the outfall and diffuser. There will also be a mixing zone where the effluent will be above water quality guidelines for the protection of fish. Is INAC of the view that a Fisheries Authorization is required for this part of the Development? Have there been any discussions to date on this issue with the Department of Fisheries and Oceans? If so, please describe any outcomes to date.
- Please provide further details on the research for the design of the diffuser and when it is expected to be completed.

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

S.6.8.5 Water Treatment and Sludge Disposal

### Reference to the EA Terms of Reference:

S.3.2.4 (9)

### Response 1 Summary

The discharge from the existing effluent treatment plant meets the requirements outlined in its former Water License N1L2-0043, and the new water treatment plant is expected to meet and surpass these requirements at the end of pipe discharge location.

### Response 1

The following table summarizes the water quality from the existing effluent treatment plant between 2009 and 2010, and the predicted water quality from the new water treatment plant (WTP). For comparison purposes, the Mine's former Water License N1L2-0043 is shown in the table. Total arsenic, TSS, and pH values within the effluent from the new WTP are predicted to improve as compared to the existing plant. Further, parameter concentrations in effluent from the new WTP will be substantially less than regulatory requirements outlined within the former Water License N1L2-0043.

Parameter	Unit	Existing License Maximum Average Concentration <sup>(a)</sup>	Existing License Maximum Concentration of Any Grab Sample	Existing Treatment Plant Effluent (2009-2010 data)	New Treatment Plant Effluent (Predicted)
Ammonia	mg/L	12	N/A	0.005 – 0.067	No change
Arsenic (total)	mg/L	0.5	1.0	0.205 – 0.418	0.2 target
Total Suspended Solids	mg/L	15	30	<1.0 - 14	<5 (target)





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Nickel	mg/L	0.5	1.0	0.0234 – 0.0687	No change
Cyanide	mg/L	0.8	1.6	<0.002 – 0.0145	No change
Copper	mg/L	0.3	0.6	0.0054 – 0.0162	No change
Lead	mg/L	0.2	0.4	<0.0001 - <0.00025	No change
pH	units	6.0-9.5	6.0-9.5	6.24 – 8.96	7.5 – 8.0 (target)
Zinc	mg/L	0.2	0.4	0.0028 – 0.0713	No change
Oil & Grease	mg/L	5	5.0	0.005 - <2.0	No change

(a) Maximum rolling average of four consecutive results

The design of the new WTP will be based on the best available technology, which will produce high quality effluent better than the maximum average concentration values as shown in the table. It is expected that the new water treatment process will be able to treat the influent contaminated water so that the average effluent arsenic concentrations at end of pipe are 0.2 mg/L or less 90% of the time, 0.4 mg/L or less 95% of the time and 0.5 mg/L or less 100% of the time.

### Response 2 Summary

The diffuser will be configured to minimize entrainment of bottom sediment.

### Response 2

The diffuser exit ports will be located above the bottom of the bay (1 to 1.5 m above) to minimize sediment entrainment. With the ports at this height, velocities generated by the diffuser near the bottom of the bay would be very small or negligible. Movement of sediment (i.e. lifting of the sediment followed by settling), if any, would occur only within a few meters surrounding the diffuser. An analysis will be conducted during the detailed design stage to determine the optimum distance above the bottom of the bay for the diffuser ports to minimize sediment entrainment.

### Response 3 Summary

Discussions will be undertaken with regulatory authorities on the mixing zone defined for the project, potential impacts from the construction of the diffuser, and mitigation measures to minimize the effect of the project on fish and fish habitat.

### Response 3

The mixing zone defined for the Giant Mine Remediation Project will be provided to regulatory authorities for review and approval. The construction method for the diffuser has not yet been finalized but will consider a number of factors including the effects on fish and fish habitat. The final diffuser construction method will be discussed with DFO to determine if an Authorization is required under the *Fisheries Act* and will include mitigation to minimize the effects of the project on fish and fish habitat.





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### Response 4 Summary

The diffuser design includes several tasks, for which the results will be summarized in the preliminary design report expected for the fall of 2011.

### Response 4

Tasks undertaken for the preliminary design of the diffuser have consisted of 1) determining the required dilution of the effluent in order to meet water quality criteria that includes drinking water quality criteria and CCME criteria for the protection of freshwater aquatic life, or being within 10% of ambient water concentrations (i.e., when ambient concentrations of a given substance is above drinking water and CCME criteria); 2) establishing the characteristics of the effluent and ambient waters (*e.g.*, effluent volume, water depth in the bay, water currents, water temperature and chemistry); 3) modeling several diffuser configurations to allow selection of a configuration that will achieve the required dilution of the effluent; and 4) determining the alignment and hydraulic characteristics of the pipeline connecting the proposed new water treatment plant to the diffuser. The water quality criteria must be met by the diluted effluent within a mixing zone in Yellowknife Bay, and the design of the diffuser would minimize this mixing zone. Results will be presented in the preliminary design report expected for the fall of 2011.

