



Giant Mine Environmental Assessment

IR Response

Round One: Information Request – Environment Canada IR #17

May 31 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: Environment Canada #17

Date Received:

February 28, 2011

Linkage to Other IRs

YKDFN #11, 12
Alternatives North IR #14

Date of this Response:

May 31, 2011

Request

Preamble: The DAR notes that regulatory compliance for arsenic will be to the Metal Mining Effluent Regulations (MMER) concentrations, with maximum monthly mean values of 0.5 mg/L and maximum grab concentration of 1.0 mg/L. The DAR states that the longterm average discharge concentration of 0.2 mg/L is achievable. The 2005 Senes report states that with the treatment option of oxidation and direct precipitation with iron, a well operated plant could meet an average discharge level of about 0.1 mg/L arsenic. Discharge effects predictions have been based on an annual average of 0.2 mg/L arsenic, and 0.4 mg/L maximum monthly average concentration.

The DAR does not propose ammonia be monitored in the effluent, however increasing the water levels in the mine workings may result in an initial increase in ammonia. Water quality and toxicity testing results may be affected by this.

Question: What discharge limits does the proponent anticipate meeting for the currently regulated list of parameters? The MMER provide minimum national standards, and represent discharge levels that have not been evaluated in this assessment and that would not be deemed desirable for year-round discharge to Yellowknife Bay.

Will effluent be non-toxic at end of pipe, given the TDS, arsenic, and ammonia? Please provide an assessment of the potential for increases in ammonia to compromise water quality results and affect predictions.

Reference to DAR (relevant DAR Sections):





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DAR, s. 6.8.6 Outfall and Diffuser

DAR, Figure 6.8.2

SENES Report August 2005 Water Treatment Update – Giant Mine Remediation Plan, p 5

DAR, Table 14.2.6

Reference to the EA Terms of Reference

s. 3.2.4. Development Description

Summary

The expected effluent quality from the new Water Treatment Plant (WTP) is provided in the response to Alternatives North IR #14. The Mackenzie Valley Land and Water Board (MVLWB) will ultimately decide on the effluent quality criteria in a future water licence for the WTP.

The analyses completed by SENES in 2006 included an upper bound scenario that modeled a 30% increase in arsenic loading from all sources, which is equivalent to a discharge of 0.52 mg/L from the WTP. The upper bound scenario resulted in an increase of only 0.0002 mg/L in arsenic levels in North Yellowknife Bay.

Acute toxicity testing will be carried out on effluent from the new WTP. Since the new WTP is expected to produce better quality effluent than the current plant and the current effluent is non-toxic at the end of pipe, the same is expected from the new WTP.

Ammonia has not been an issue in mine water or surface water at site over the past 10 years. There is no expectation for this to change. The management of ammonia will be part of the Environmental Management System in order to minimize loading to the mine water.

Response:

It is the Project Team's intention to design a Water Treatment Plant (WTP) that will produce a higher quality effluent (i.e. lower concentrations of contaminants) than the minimum national standard listed in the Metal Mining Effluent Regulations (MMER). A detailed listing of the expected effluent quality has been provided in the response to Alternatives North IR #14, question 1. Ultimately, the Mackenzie Valley Land and Water Board (MVLWB) will establish effluent quality criteria within its water license granted to the Project Team for discharge from the Giant Mine WTP. The water quality objectives to be met at the edge of the mixing zone consist of drinking water quality criteria and Canadian Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment (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). These criteria incorporate arsenic.





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Environment Canada correctly noted that the DAR did not explicitly include a risk assessment of effluent discharge at an arsenic concentration of 0.5 mg/L. However, the analyses completed by SENES in 2006 for a mean effluent discharge of 0.4 mg/L arsenic also assessed the effects of a range of arsenic loads with an “upper bound” increase in the total arsenic load of 30% on all sources, including the treated effluent load. This would be equivalent to an effluent discharge of 0.52 mg/L arsenic. The range in the arsenic loads incorporated in the assessment is documented in Table 4.1-1 of the SENES 2006 report. The results of the assessment, which are summarized in Table 6.1-1 of the SENES 2006 report, showed that the arsenic level in North Yellowknife Bay increased by only 0.0002 mg/L (i.e., from 0.0014 mg/L at a discharge of 0.4 mg/L to 0.0016 mg/L for a 30% increase in the loads from all sources). On this basis, there is no need to redo the Risk Assessment for an effluent discharge of 0.5 mg/L arsenic.

Page 14-27 of the DAR indicates that acute toxicity testing on rainbow trout and *Daphnia magna* will be conducted monthly for the first year of operating the WTP and quarterly thereafter. The effluent from the existing treatment plant is non-toxic at the end of pipe and the new WTP is expected to produce even better quality effluent. Therefore the effluent from the new WTP is expected to be non-toxic.

Of the water samples collected since 2000 from underground and surface sources (over 1400 samples) only one sample exceeded the value for ammonia set in the former water license. The average of these site-wide samples is roughly an order of magnitude less than the water license value (0.9 mg/L total ammonia-N versus 12 mg/L total ammonia-N, respectively). The past source of ammonia at the site, and the reason it was included as a parameter on the former water license, was the use of explosives underground. Since INAC became custodian of the mine, there has been very limited and sporadic use of explosives (e.g. adding a new access ramp in 2007, adding a new drift for the FOS in 2009). It is expected that future levels of ammonia will be similar to the levels seen over the past ten years, even during implementation of the freeze program when additional drifts may be required around the arsenic chambers. The management of ammonia will be part of the Environmental Management System in order to minimize loading to the mine water. This will be achieved through good ‘housekeeping’ practices on site. Ammonia compounds as part of the freeze program coolant systems are contained in closed-loop systems on surface and are not circulated underground, and thus have a very low risk of entering the environment.

