

Prairie and Northern Region
Environmental Protection Operations
Environmental Stewardship Branch

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February 28, 2011

Teresa Joudrie
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INAC –CARD
Box 1500
Yellowknife, NT
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Dear Teresa Joudrie:

Please find below Environment Canada's information requests on the Giant Mine Remediation Project EA (EA 0809-001).

Thank you.

Sincerely,

Amy Sparks

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Environment Canada

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Environment Canada Review Team

Information Requests to Indian and Northern Affairs Canada - CARD EA 0809-001: Giant Mine Remediation Project

Environment Canada IR #1

Reference

DAR, s.7.2.4 Groundwater Quality

Terms of Reference Section

TOR, s. 3.2.3 Description of the Existing Environment

TOR, s. 3.6 Monitoring, Evaluation and Management

Preamble

The groundwater quality of Giant Mine has been assessed but never compared to guidelines and the DAR therefore does not report on the chemical quality of the groundwater. The DAR states that the groundwater concentrations measured on site are not compared to any guidelines as currently there are no regulatory criteria (guidelines) for groundwater in the Northwest Territories or the rest of Canada. The Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites were released by FCSAP in May 2010 for use on contaminated sites on federal land and should be used for comparison at Giant Mine.

Requests

Please compare the groundwater concentrations measured at Giant Mine to the Federal Interim Groundwater Quality Guidelines and provide the results of the chemical quality of the groundwater currently at the site. These guideline numbers should be used in the future to compare to sampled groundwater as well.

Environment Canada IR #2

Reference

DAR, s.6.6.6 Tailings Covers

Terms of Reference Section

TOR, s. 3.6 Monitoring, Evaluation and Management

Preamble

The plan for remediation of the Giant Mine site does not include plans to revegetate the tailings' covers. The covers will revegetate naturally over time; however, since the vegetation support layer is fairly shallow there is a risk that plants, shrubs, and/or trees that colonize the covers will have a negative effect on the tailings cover. If the root depth of the vegetation is greater than the depth of the vegetation support layer it could compromise the efficiency of the cover over the tailings.

Requests

Please provide a vegetation monitoring plan for the tailings' covers or a revised design plan for the covers that has a greater vegetation support layer depth so that the cover does not have the potential to be compromised by vegetation growth.

Environment Canada IR #3

Reference

DAR, s. 6.1.2 Summary of Post-Remediation Conditions

Terms of Reference Section

TOR, s. 3.2.4 Development Description

Preamble

The remediation and clean up of contaminated soil on some parts of this site will result in an end land use at this site that is appropriate only for industrial land uses. This eliminates the potential for specific activities to take place at this site and specific receptors to be present on this site. This greatly affects any potential development and use of the area in the future.

Requests

Please describe in the DAR the limitations of the land use at the end of the remediation program and what the land use is appropriate for. For example this land use is developed for areas where the primary activity involves the production, manufacture, or construction of goods, and little to no public access to the property is available. There will not be an appropriate level of protection on the remediated site for residential or parkland activities or protection for herbivores from ingestion of soil or contaminated forage.

Environment Canada IR #4

Reference

DAR, s.5.2.6 Boreholes

Terms of Reference Section

TOR, s.3.5.1 Water

Preamble

There are currently an estimated 27,000 boreholes such as exploration drillholes on the site, most of which are potential pathways for groundwater movement. As one of the goals of the remediation effort is to minimize the potential for groundwater movement in order to both prevent contaminant movement and maintain frozen conditions in the subsurface, effort should be aimed at sealing the boreholes.

Requests

Please provide information describing activities aimed at decommissioning and/or sealing existing boreholes or provide an explanation as to why this will not be done.

Environment Canada IR #5

Reference

DAR, s.5.2.2 Other Underground Arsenic Sources

Terms of Reference Section

TOR, s. 3.2.3 Description of the Existing Environment

Preamble

Geochemical testing of tailings samples was performed and yielded valuable information about the redox buffering capacity of the backfill. However, tests aimed at simulating mildly reducing conditions were not successful.

Requests

Please provide information on if there has been additional testing and attempts at this testing aimed at simulating mildly reducing conditions.

Environment Canada IR #6

Reference

DAR, s. 6.2.8.1 Influence of Groundwater

Terms of Reference Section

TOR, s.3.3 Arsenic Containment

Preamble

The proposed frozen block method is aimed at minimizing and eventually eliminating the possible movement of groundwater from the arsenic dust chambers and other storage areas. In section 6.2.8.1, the proponent states that the large number of underground workings are expected to be the primary conduits for any groundwater flow that occurs. The current proposed remediation plan should incorporate long-term secondary mitigation for these possible preferential pathways for groundwater movement. For example, would it be technically feasible to seal off exit pathways (stopes, shafts and other mine workings) below and around the frozen zone to further prevent or minimize groundwater movement within the mine under dewatered and flooded conditions. In other words, even if there was incomplete freezing and contaminated water did escape from the frozen zone, it would not be flowing freely within the workings but would be further confined by features such as adit plugs or backfilled and grouted workings.

Requests

Please describe if there are plans for long-term secondary mitigation for these possible preferential pathways for groundwater movement.

Environment Canada IR #7

Reference

DAR, s.5.5.2.5 Test Tailings Cover Plots

Terms of Reference Section

TOR, s. 3.6 Monitoring, Evaluation and Management

Preamble

An array of survey beacons is in place to monitor movement of a test cover plot of 32 m². Cover movement will be a function of the cover materials and the geotechnical characteristics of the underlying tailings and foundation materials (fine grained vs coarse grained, degree of saturation, freeze-thaw cycles). It has been observed at many mine sites in northern environments that the tailings surface can change significantly with time through heaving, frost action, weathering, erosion, etc. Therefore, determining tailings characteristics throughout the impoundments and monitoring movement of the tailings surface over time may provide valuable information about zones of concern and zones of greater movement.

Requests

Please indicate if there is currently and/or will be a surveying program to examine the current rate and patterns of tailings surface movement.

Environment Canada IR #8

Reference

DAR, s.5.7.1 Underground Mine Water

Terms of Reference Section

TOR, s.3.2.3 Description of the Existing Environment

Preamble

The DAR states that underground mine water flow is controlled by climatic conditions and that the Northwest Pond represents the largest input of seepage into the mine

Requests

Please provide monitoring data from the underground sampling locations to support this statement and to illustrate changes in flow over time.

Environment Canada IR #9

Reference

DAR, s.5.7.1.1 Minewater Quality

Terms of Reference Section

TOR, s.3.2.3 Description of the Existing Environment

Preamble

There is deep saline groundwater that enters the lower levels of the mine workings.

Requests

Please provide information describing any issues associated with this salinity in terms of water treatment.

Environment Canada IR #10

Reference

DAR, s.6.1.2 Summary of Post-Remediation Conditions

Terms of Reference Section

TOR, s. 3.5.2 Fish and Aquatic Habitat

Preamble

Treated water from the site is currently discharged to Baker Creek during the open water season. It is proposed that this effluent discharge point be relocated to a diffuser outfall which will be constructed in Yellowknife Bay. It is noted in the DAR that this will change the hydrogeological regime of Baker Creek and restore it to pre-mining conditions.

Requests

Please describe any significant negative impacts expected from this activity in terms of the reduction in summer flows.



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Environment Canada IR #11

Reference

DAR, s. 14 Environmental Monitoring and Evaluation Framework and Long-Term Environmental Monitoring

Terms of Reference Section

TOR, s. 3.6 Monitoring, Evaluation and Management

Preamble

The DAR is not clear or explicit about the laboratory procedures and laboratories that will be used for sample analyses. No description of on-site analytical capabilities were described in the document.

Requests

Please confirm that all samples will be sent to an accredited laboratory.

Environment Canada IR #12

Reference

DAR, s. 8.6.2 Air Quality

Terms of Reference Section

TOR, s.3.6 Monitoring, Evaluation and Management

Preamble

The quality of model predictions is dependant on the quality of the input data used in the model. The selection of model options and the configuration of model domains and grids can also affect the quality of predictions.

To provide confidence in the air quality model predictions provided in the DAR, all input data and selected model options and configurations must be reviewed.

Requests

EC requests that the proponent provide all input and control files used in the ISCST3 model to generate the air quality predictions presented in the DAR. All files should be in a format that can be used directly into the model. Please include all output files in the raw format.

Environment Canada IR #13

Reference

DAR, s. 8.6.2 Air Quality

Terms of Reference Section

TOR, s.3.6 Monitoring, Evaluation and Management

Preamble

Section 8.6.2.3 of the DAR provides a general description of emission sources used in the air quality modelling and air quality assessment. However, the DAR did not provide the actual emission estimates used in the assessment or how the emissions were calculated. Emission estimates are essential to any air quality assessment and need to be reviewed.

Requests

EC requests that the proponent provide a table of all emissions estimates used in the air quality modelling, and emission calculations including emission factors, load factors and any other assumptions used in the emission estimates. Please include the assumptions used to calculate arsenic emissions.

Environment Canada IR #14

Reference

DAR, s. 8.6.2 Air Quality

Terms of Reference Section

TOR, s.3.6 Monitoring, Evaluation and Management

Preamble

The grid spacing of receptors can greatly effect the predictions of air quality models such as ISCST3. Section 8.6.2.3 of the DAR describes the location of 5-discrete receptors but does not provide any information regarding the gridded receptors.

Power for the project will be supplied by the Jackfish Power Plant. The peak power requirement is 3MW (Section 8.6.2.3) and the power plant is expected to operate continuously doing the active freezing component of the project. Although emission estimates have not been provided, it is expected that the combustion emissions (NO_x , SO_2 , and $\text{PM}_{2.5}$) from the increased power demand at the Jackfish Power Plant would be much greater than from all of the sources at the Giant Mine Site. Predicted ambient concentrations of air pollutants presented in the DAR did not include areas that could potentially be impacted by increased emissions from the Jackfish Mine Site.

The air quality modeling presented in the DAR predicts that arsenic, TSP, PM_{10} , $\text{PM}_{2.5}$, NO_x , and SO_2 will exceed ambient standards outside of the boundary of the Site Study Area. In assessing the significance of these exceedances, it would be helpful to know the total area of exceedances outside of the mine site.

Requests

EC requests the following:

- A map of all of the gridded and discrete receptors including spatial extent and density used in the air quality modeling;
- An assessment of the potential air quality impacts from the increased load on the Jackfish Power Plant as a result of the project power demand; and
- Total area of exceedance outside the disturbed mine site for each species assessed.

Environment Canada IR #15

Reference

DAR, s. 14 Environmental Monitoring and Evaluation Framework and Long-Term Environmental Monitoring

Terms of Reference Section

TOR, s. 3.6 Monitoring, Evaluation and Management

Preamble

Chapter 14 outlines the Environmental Monitoring and Evaluation Framework (EMEF) and a Long-term Environmental Monitoring Program to meet the Terms of Reference established for the Giant Mine Remediation Project EA. The owner or operator of a mine is required to conduct environmental effects monitoring studies as a condition governing authority to deposit under the Metal Mining Effluent Regulations (MMER). No mention is made of environmental monitoring requirements under the MMER in Chapter 14.

Requests

Please provide information on effluent, water quality and biological monitoring that will be conducted to meet the requirements specified in the MMER of the *Fisheries Act* for environmental effects monitoring studies, and how the federal monitoring requirements fit into the EMEF and Long-term Environmental Monitoring Program.

Environment Canada IR #16

Reference

DAR, s. 6.8.6 Outfall and Diffuser

Terms of Reference Section

TOR, s. 3.2.3.6 Description of the Existing Environment

TOR, s. 3.2.4.9 Development Description

Preamble

Year-round discharge of treated effluent into Yellowknife Bay is proposed, and three potential discharge locations have been identified. The DAR states that “Further investigation of alternative diffuser locations...is still required”.

Two factors that need to be included in further studies are the effects of the diffuser under varying ice thicknesses and sediment disturbance due to turbulence associated with the diffuser. Ice thickness would be a factor in reducing the dilution at trapping depth, and it did not appear that this was taken into account. With respect to the sediment disturbance, we note that two of the locations (1 and 3) are within the area that was contaminated by historic tailings, with arsenic concentrations greater than 1000 mg/kg, and Location 2 appears to be outside the submerged historic tailings.

Request

Please outline what factors will be considered in the investigation, and how they will be weighted in the decision-making process. How will the proponent ensure that there will not be issues with varying ice thickness, and mobilization of contaminants through disturbance of existing sediments? What is the timeline for finalizing the diffuser location and design?

Environment Canada IR #17

Reference

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

Terms of Reference Section

TOR, s. 3.2.4. Development Description

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 long-term 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.

Request

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.