



Giant Mine Environmental Assessment

IR Response

Round One: Information Request - Review Board #16

June 17, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: Review Board #16

Date Received

February 14, 2011

Linkage to Other IRs

Review Board IR #02, 05, 07, 12, 14

Date of this Response

June 17, 2011

Request

Preamble:

Stability of the chambers during freezing is an important part of the proposed project. The DAR identifies that possibility of crown pillar collapse in some chambers. The Board needs to evaluate the risks related to freezing and structural stability. Presumably expansion of the cavity by freezing saturated dust will exert pressure on the wall. Further description is required of the effects on unstable crown pillars and bulkheads during freezing and during possible thawing in the future. Further description is also required of potential changes to surface drainage patterns due to changes related to freezing.

Question:

1. Please verify possible deformations during the freezing process, such heave, differential freezing etc.
2. Please compare deformations to natural drainage patterns and check alterations.
3. Please describe potential impacts of instability or failure of crown pillars and bulkheads due to differential expansion and other changes that may occur during freezing.
4. Please describe potential impacts of instability or failure of crown pillars and bulkheads due to thawing and reductions of pressure.

Reference to DAR (relevant DAR Sections)

Document J (page 6) recognizes deformation of the rock mass, and states on page 34 "If necessary, water would be added in stages to control the effects of expansion caused by freezing."





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Reference to the EA Terms of Reference

S.3.2.5 Accidents & Malfunctions

"The developer is required to:

- Analyze risks for this development, including components, systems, hazards, and failure modes.
- Assess likelihoods and severity of each risk identified."

Summary

Freezing the ground around and within the chambers should increase the strength of the bedrock and overburden once frozen. However, the water present inside fractures and voids will expand when freezing and could increase the stresses along those fractures and voids. Such stress could propagate cracks within the bedrock, or trigger structural instabilities. The final methodology of wetting of the chambers will take into account the expansion effects of water during freezing.

The locations of the chambers are shown in relation to the current drainage patterns on site. All of the chambers with a possible risk of crown pillar collapse are located within a catchment reporting to the B1 Pit. Prior to freezing, the voids in these chambers are to be backfilled and the B1 pit filled.

The risks and impacts of freezing and thawing leading to failure of a crown pillar or a bulkhead is described in the response to the Review Board Information Request #07 and Review Board Information Request #05.

Response 1

The water present inside fractures within the bedrock will expand during freezing and could increase the stresses along those fractures. The increased stress could cause the fractures to propagate, potentially triggering local failures of crown pillars, sill pillars or access drifts. Local failures within access drifts, such as spalling of the drift walls, are not expected to be problematic because the drifts will be plugged prior to freezing. The potential for larger failures, for example of crown or sill pillars, will need to be considered in design. The current plan is to backfill voids below pillars that are questionable. The backfill would provide support in the event of a weakening of the bedrock. No upward heaving is expected in the bedrock.

Wetting of the dust is described in Section 6.2.6 of the Developer's Assessment Report (DAR) and is further discussed in the response to Review Board Information Request #02. Currently, the wetting method remains in concept and additional assessments are planned as part of further design. The importance of freeze expansion and the methods for dealing with it will depend on the wetting process. For example, if a "bottom-up" wetting method were used, freezing water would be free to expand upward into the dust, minimizing the pressure exerted on the wall.





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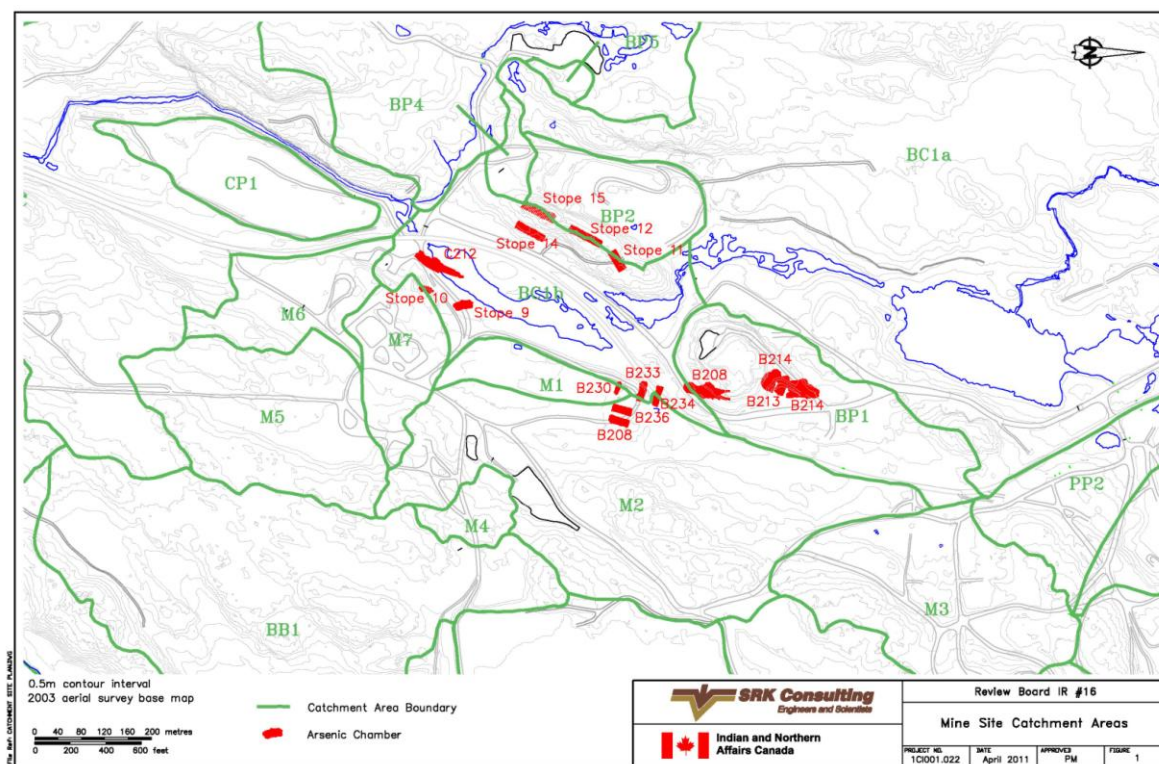
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Response 2

The figure below shows the location of the chambers in relation to the current drainage patterns on site. The catchment areas correspond to those used in the water and load balance reported in Supporting Document M1 of the Giant Mine Remediation Plan. Table 5.1.7 of the DAR discusses concerns about the stability of crown pillar over stopes B208, B212, B213 and B214. All of those stopes are located in the B1 Pit catchment area. Even a complete crown pillar failure would have no impact on drainage patterns outside this catchment area. Drainage patterns within the B1 Pit catchment will be significantly modified by the pit backfilling, and any required re-grading could be accomplished at that time. It should be noted however that the plan is to backfill the voids beneath the crown pillars in order to prevent crown pillar failure.



Response 3

The risks and impacts of the failure of a crown pillar or a bulkhead due to freezing is described in the response to the Review Board Information Request #07.

Response 4

Risks and impacts of the failure of crown pillars and bulkheads due to thawing are discussed in the response to the Review Board Information Request #05.

