INFORMATION REQUEST RESPONSE

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Linkage to Other IRs

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Request

The DAR says that treatment methods that were even in early stages of development were assessed, and that more attractive treatment options may present themselves in the future. Several alternative methods of dealing with the arsenic trioxide issue are discussed, but there appears not to have been any serious evaluation of biotreatment in situ. Please explain why this alternative is not mentioned. Also, please explain whether the biotreatment of Giant mine waste could be done in the same manner as is to be done at the Nor Acme Mine in Manitoba (just announced), and which has been already successfully done at the Youanmi Mine in Western Australia and the Beaconsfield Mine in Tasmania.

If the shell of the frozen chambers is frozen first, then the contents frozen second, what is to prevent the dust from expanding as it freezes and breaking the shell?

If the borehole method of wetting the dust before freezing is used, is there a risk that the hydraulic pressure can crack, burst, or wear holes in the frozen shell?

Reference to DAR (relevant DAR Sections):

S. 6.2.1 Key Concerns

Reference to the EA Terms of Reference:

S.3.3 Arsenic Containment

Summary

In situ biological treatment methods were considered in the assessment of alternatives and found to be infeasible. The examples from Youanmi and northern Manitoba are not an *in situ* process, and their purpose is to recover gold from arsenopyrite. To our knowledge the process has not been tested on arsenic trioxide.

The term 'shell' in the description of the frozen block method is used to refer to the frozen bedrock zone around the arsenic chamber. This frozen zone will be over 10 m thick and consist of frozen bedrock. If a borehole method of wetting the dust using a high pressure nozzle is used, there is no risk of damage to the surrounding bedrock. The final methodology of wetting of the chambers will take into account the expansion effects of water during freezing.

Response

In-Situ Biotreatment

The selection of a method to manage the arsenic trioxide dust storage areas has been a long and careful process, involving dozens of scientific and engineering studies, as well as extensive consultation with local residents. The assessment methodology is discussed in Section 6.2.2 of the Developer's Assessment Report (DAR) and in further detail in Section 5 of the "Arsenic Trioxide Management Alternatives – Final Report" (SRK, 2002).

In-situ biological treatment was considered in the initial assessment and is included in Table 5.1 - Methods Considered for Management of Giant Mine Arsenic Trioxide Dust in the 2002 report. The method was determined to be feasible only for relatively low concentrations of arsenic, such as occur in some contaminated soils. It is not at all applicable for arsenic trioxide dust or for the volumes present at the Giant Mine.

The Youanmi Mine in Western Australia used a biooxidation process in a stirred-tank operated at 50 to 52 ^{o}C to process 120 tonnes of ore per day.[1] The term successful in that case referred to the economical recovery of gold, and not the removal of arsenic.

The same method has recently been proposed for application at the Snow Lake mine in northern Manitoba.[2] We could find no reference to a similar application at the Nor-Acme site. The company proposing to apply the process to the Snow Lake arsenopyrite stockpile makes reference to Beaconsfield Mine on its web pages but no clear description of that project was found.

[1] Source: Biotechnology for Clean Industrial Products and Processes: Towards Industrial Sustainability. (http://www.bio-economy.net/reports/files/oecd_biotech_for_clean_industrial_products.pdf)

[2] Source: BacTech Submits Proposal to Clean up Snow Lake Arsenopyrite Stockpile. (http://www.bactechgreen.com/s/NewsReleases.asp?ReportID=442464)

The biotreatment process applied at Youanmi and proposed at Snow Lake is a gold recovery process. It starts with arsenopyrite rich gold ore and uses microbes to liberate the gold. It is not an arsenic treatment system, but rather an alternative to the roasting process that was used for gold recovery at Giant Mine, or the pressure oxidation process used more recently at Con Mine. To our knowledge it has not been tested on arsenic trioxide dust.

Frozen Shell Strength

The term 'shell' in the description of the frozen block method is used to refer to the frozen bedrock zone around the arsenic chamber. This frozen zone will be over 10 m thick and consist of frozen bedrock.

If the borehole mining machine were used to wet the dust, there would be no risk of significant damage to the surrounding bedrock. Because the dust is a much weaker material than the bedrock, the pressures used will be much lower that what would be required to damage the bedrock.

Wetting of the dust is described in Section 6.2.6 of the DAR and is further discussed in the response to Review Board IR #2. The final methodology for wetting the chambers will take into account the expansion of water during freezing.