INFORMATION REQUEST RESPONSE

EA No: 0809-001 **Information Request No: AltNrth #08**

Date Received:

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Linkage to Other IRs

Review Board IR #7, 5

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May 31, 2011

Request

Preamble:
Although INAC chose the frozen block method for managing the underground arsenic to afford greater redundancies in protecting against uncontrolled releases, the frozen shield method (without injecting water into the arsenic chambers) may provide another alternative that may be easier to intentionally thaw.

INAC has also not yet chosen the preferred method of the implementing the frozen block as it may involve a hybrid or non-hybrid system. This choice may have implications for the reversibility of the frozen block method.

Question:
Please discuss the methods, risks (including probabilities and severity of potential effects), costs, advantages and disadvantages of each of the following with regard to reversibility:

1. frozen block versus frozen shield methods of containing the underground arsenic
2. hybrid versus non-hybrid systems for the frozen block method
3. backfill alternatives for the current arsenic storage chambers as discussed in the DAR (i.e. coarse rock, cemented aggregate and foam cement, pg. 6-12)
4. secondary coolant options as discussed in the DAR (i.e. brine, ethylene glycol and propylene glycol, pg. 6-26)

Reference to DAR (relevant DAR Sections):

S.6.2 Arsenic Containment (Pg. 6-5 to 6-46)

Reference to the EA Terms of Reference:

S.3.3.9 Arsenic Containment

Summary

Methods and risks of a planned thaw of a frozen block are discussed in the response to the Review Board's IR#5.

Choices of hybrid vs. non-hybrid systems, and secondary coolant have no impact on the reversibility of freezing. Cemented backfill would be preferable to uncemented backfill.

Response 1

Methods and risks of a planned thaw of a frozen block are discussed in the response to the Review Board's IR #5. As noted in that response, a number of assumptions need to be made before the method of thawing frozen blocks can be described. The most important assumption is that the purpose of the thawing would be to allow extraction of the dust. When the thawing and extraction methods are seen in combination, the risk profile is very different than one might expect from considering only thawing.

Over the long term, temperatures inside the frozen shells would end up being very similar to those within the frozen blocks. The only difference would be that much of the dust within the frozen shells would be drier than that within the frozen blocks. The difference would be a result of the wetting step that is part of the frozen block option, but would not be part of a frozen shell option.

The consequence of the differences in frozen water content is that less energy would be required to thaw the dust. Another is that there would be less water available for escape during thawing.

However, as also noted in the response to the Review Board's IR #5, extraction of the thawed dust would require the use of water and energy. Therefore, assuming that the purpose of the thaw is to allow extraction, there would be less difference between the frozen block and frozen shell options than the initial water content would suggest. There would be need for energy addition in both cases, and there would be a need to control water in order to prevent releases of dissolved arsenic. The relatively small differences in the amounts of energy and water involved will not lead to significant differences in risk.

Response 2

The hybrid system is an alternative to active freezing, and this would be used only during the creation of the frozen blocks. Once the frozen blocks have been established, the plan would be to convert either the hybrid or the active system to a passive system. As a result, there would be no difference in how a planned thaw would proceed.

Response 3

As noted in the response to the Review Board's IR #5, the use of uncemented backfill would add to the cost and risk associated with a controlled thaw. The use of cemented backfill, either cemented tailings or cemented aggregate would not add costs or risk to a controlled thaw. Foam backfill would not be sufficiently strong to resist the water jet that would be used in dust extraction.

Response 4

Secondary coolant will only be used during the creation of the frozen blocks. Therefore the choice of coolant will not affect a controlled thaw.