Indigenous and Northern Affairs Canada | Affaires autochtones et du Nord Canada

February 5, 2018

Dr. Kathleen Racher
Chair
Giant Mine Oversight Board
Box 1602, 5015 - 50th Avenue
YELLOWKNIFE NT X1A 2P2

Dear Dr. Racher:

This letter is in response to the report commissioned by the Giant Mine Oversight Board and prepared by Arcadis Canada in August 2017 entitled “GIANT MINE STATE OF KNOWLEDGE REVIEW: Arsenic Dust Management Strategies”. We appreciate to opportunity to review the report, and had our Technical Advisor, SRK Consultants, also provide input, which we have attached for your consideration.

SRK, as the lead technical advisor for the Giant Mine Remediation project for many years, has a unique insight into the factors that went into the initial screening of solutions for the arsenic trioxide waste at Giant Mine. The attached review includes some points of clarification and some recommendations for your consideration, as well as some key considerations for any future research or options analysis that may be performed. We would be happy to discuss any of the comments in the attached if further clarification is required.

The Project team appreciates the contribution of the Board to the Project, and the Board’s efforts to identify a more permanent solution for the arsenic trioxide waste at the Giant Mine site. Should the Board have any questions or need clarification on this letter or the attached, don’t hesitate to contact the undersigned at 819-997-0660 or craig.wells@canada.ca, or Natalie Plato at 867-669-2838 or Natalie.plato@canada.ca.

Sincerely,

Craig Wells
Director
Giant Mine Remediation Project
Indigenous and Northern Affairs Canada

c.c.: Ms. Lisa Dyer, Director, Environment Division, Government of Northwest Territories
Natalie Plato, Deputy Director, Giant Mine, Northern Contaminated Sites Branch, Northern Affairs Organization, INAC

Canada

Priority

- 1: Comment for information/clarification
- 2: Recommendation for revision to deliverable
- 3: Recommendation for evaluation / inclusion in next phase of project

Reviewer Comments		Priority	Author Response to Comment	TRC Direction
Page/Section	Comment	1 – 2 - 3		
Plain Language Summary Page 1	We consistently used the terms “purpose-built chambers” and “mined out stopes”. They are very different in terms of dust removal, so we think it is important to keep the terms clear. The use of “previously mined out chambers (stopes)” introduces a potential for confusion.	3		
Executive Summary ES-1	Same as above	3		
Report – General comments	In general, the report does a good job presenting background and assessing the current state of alternatives. It is perhaps too optimistic about mining methods, and insufficiently critical of vendor claims that ex situ treatment processes have been adequately tested or demonstrated elsewhere. But those limitations might reflect the stage of the study. In our earlier reviews, the full extent of problems with mining and conversion technologies only became evident when they were subject to more detailed study. Perhaps that point should be stated clearly in the summaries; i.e. options that look good at this level of review are likely to look worse, not better, upon more detailed assessment. Such a statement might also help limit the damage that could be done by technology vendors telling local people there is a much better method than the one they will have to live with for the next 100 years. This is not an imaginary problem – we have	2, 3		

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Page/Section	Comment	1 – 2 - 3		
	seen it several times, including once when the vendor approached YKDFN commercial development office with a "really really good deal".			
Page 9	This history leaves out the step where the project team went back to the public with the best in situ alternative and the best ex situ alternatives, then held a workshop that resulted in the choice of the in situ option (frozen block).	1		
Page 10	The choice of dry freezing over wet freezing involved many considerations other than time, including reversibility, a concern that was raised by Parties to the EA process.	1		
Section 3.3, pages 36-46	The discussion of dust extraction / mining fails to consider removal of the last few percent of the dust. This was a big issue in our earlier reviews. There are (and were) many mining methods that can extract most of the dust. But the high solubility of the arsenic trioxide means that it will contaminate the groundwater even if only a fraction of it is left behind. In the earlier review, it was concluded that guaranteeing removal of all of the dust would require human miners to enter the (unstable) stopes and physically remove the dust from the last "corners and crevices". The safety risk in that part of the extraction was always determined to be very high, both because of the physical instability and the exposure to arsenic.	2, 3		
Page 36-37	The comment about choosing the implementation time to get lower costs is naïve. Every mine in the world would like to do that. Very few succeed, and mostly by coincidence rather than foresight.	2, 3		
Section 3.4 Ex situ Dust Stabilization and	These sections neglect the question of conversion/capture efficiency. Again the high solubility of the arsenic trioxide plays	2, 3		

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Page/Section	Comment	1 – 2 - 3		
Processing	an important role here. It means that if the arsenic trioxide is not 100% converted or captured, the "stabilized" material will leach arsenic at concentrations of environmental significance.			
Vitrification, Page 56	The statement that a vendor is "in the process of scaling up" vitrifaction of arsenic trioxide dust needs to be challenged. What exactly is in process? Is the process in any way meaningful prior to full results?	2		
Page 57	Here the statement is "It has also been successfully implemented at pilot scale with an arsenic dust with a similar chemical profile" but no supporting references are provided. And "successfully" is not defined. This is especially problematic when this technology is later recommended as the best ex situ method.	2		
Page 56-58	Several problems are mentioned here. The high water content of the dust will make vitrification costly and difficult to control. Impurities will also deleteriously affect quality (the dust is 65% arsenic, the rest is "impurity" by this definition). Power will be very expensive.	3		
Page 59	This section includes another complicating factor that was seen as very problematic in our earlier review. Vitrification require heating, and heating will create arsenic gases that will need to be captured, potentially creating a secondary discharge or additional waste. Have technologies improved or is this still a potential fatal flaw?	3		
3.4.4 Mineral precipitation	Despite being used for over twenty years, addition of ferric iron to "precipitate" arsenic is still under active research. It is not	3		

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Page/Section	Comment	1 – 2 - 3		
	clear whether one can produce a mineralogically stable form (scorodite) at a high conversion efficiency. Our understanding is that current methods produce a mixture of scorodite and iron oxyhydroxides that co-precipitate or adsorb arsenic, and the long-term stability is not agreed. The cited reference site deals with MUCH lower concentrations and quantities, and it is debatable whether it meets all the claims initially made by its proponents.			
3.4.5.1.1 Ex Situ Biological Precipitation	SRK is not aware of any case where "this technology has been demonstrated at the industrial scale". This level of statement MUST come with a supporting reference. Then people can check the reference and determine whether it is really operational at full scale, and more importantly whether the conditions at that site are in any way relevant to those at Giant Mine.	2		