

REVIEW COMMENTS

PROJECT: BLM Red Devil Mine

DOCUMENT: Draft Treatability Study Workplan

DATE: 10/21/13

REVIEWER: Anne Marie Palmieri

PHONE: (907) 766-3184

Item No.	Location (page, par., sen.)	COMMENT	BLM Response
1.	General	The objective of the study should be revised. The currently stated objective, <i>'a pilot test to determine the effectiveness of solidifying arsenic-contaminated mine tailings'</i> does not include the concepts of design development or leachability.	The objective of the treatability study is to test the potential to reduce the leachability of arsenic so that it passes the TCLP hazardous waste criteria. Compression strength will be tested using a pocket penetrometer and the consistency of the mix will be visually documented. These last two points of data are being documented and are not considered to be objectives of the pilot study.
2.	General	It is unclear as to why only one methodology is present with the only variable being the water/cement ratio. Suggest using several variations to determine effectiveness, including with and without ferrous sulfate, material size fraction.	The summary report will state the variations in the solidification mixes. Half of the samples will contain ferrous sulfate with the other half being only OPC.
3.	General	It is suggested that a permeability (hydraulic conductivity) test and a durability test to mimic the freeze/thaw cycle also be conducted on the solidified mass.	The goal of the solidification process is not to create a monolith, but rather granular material that allows for easy material handling. Additionally, the solidified material will be placed in a repository thereby reducing the overall effects of weather.
4.	Page 1, Para 2	Soil samples were only collected from the post-1955 retort area. Soil with leachable arsenic exceeding TCLP criteria are also present at the pre-1955 area. How can we be certain that the treatability study results can be extrapolated to the pre-1955 area where a different retort and process was used to generate those tailings?	The treatability study is being performed on tailings. Collection of tailings samples from only the Post-1955 MPA for the planned treatability study for tailings/waste rock site-wide is acceptable, and likely conservative. Although there are some minor differences between tailings/waste rock present in the Pre- and Post-1955 MPA subareas, RI data indicate that for arsenic the total SPLP, and TCLP concentrations are higher for samples from the Post-1955 MPA than the Pre-1955 MPA. In addition, the grain size distribution and moisture content of the tailings/waste rock, important factors in determining if the treatability study is a success, are similar between the two areas.
5.	Para 2	Will analysis for arsenic be conducted on the soil fractions or on a reserved portion of the sample as a whole?	Total Ar and TCLP Ar will be analyzed for both in the raw and treated samples.

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6.	Para 3	TCLP should be run as well as total arsenic, and the sample selected which presents the highest value of arsenic in the leachate. We also suggest analyzing for mercury and antimony (both total and by TCLP) to give a broader view of what is present in the sample and the effectiveness of the solidification process.	Mercury will be incorporated in the suite of analysis for both total and TCLP.
7.	Para 3	Why are tailing from only one location being studied? 4 samples with varying water/cement ratios are being evaluated. This seems like a small study which could have significant ramifications on the project. Are replicate samples being conducted, and, if not, why?	The main objective of this study was to determine whether solidification could be implemented at the site so as to provide justification for including it in the FS. A total of 10 “treated samples will be submitted for analysis. No replicate samples are being submitted based on study objectivces.
8.	Page 2, para 3	It is noted that the type of material desired is a ‘ <i>granular-type mix</i> ’ as stated here. However, this seems to be in contrast to the ‘solid mass’ that will be produced as referenced on Page 4, paragraph 3.	The term solid mass was misused. The summary report will address this.
9.	Para 5	Please provide references for the use of ferrous sulfate to enhance solidification, as well as references for the molar ratio of 5:1-2:1. How will this ratio be refined during the treatability study?	The summary report will include a bibliography. A range of ferrous sulfate will be used with the resulting product being submitted for analysis. No additional tailings treatment is proposed.
10.	Page 3, sample prep 1.)	<i>Tailings greater than 1” will be removed from the treatability study.</i> What percentage of volume is this fraction in the field? What would be done with this fraction during the cleanup? Will you run TCLP on this fraction to determine if it is/is not hazardous waste?	The less than 1” is referenced since the samples will be prepared using hand mixing. An attempt will be made to break up these tailings. Tailings larger than one inch would still go through the solidification process when field implemented. Due to their large size, particles greater than 1” should not have a significant impact of feasibility of stabilization.
11.	Page 4, para 4	Why was a time period of 7 days selected? Typical curing is 1, 7, 14, or 28 days. If the sample is shipped to Test America on Day 7, on what day will it be analyzed by Test America?	The samples will be analyzed between days 7 and 14. A full cure is not considered to be critical. Should the samples pass TCLP, that means the acidic extraction process does not adversely affect the matrix.
12.	Para 5	A minimum hardness of 1 ton/ft ² was selected, this equates to 13.89 psi. Why was this value selected? EPA guidance recommends 50 psi. (OSWER directive #9437.00-2A)	This directive is for a cylinder, which is not the design intent. The intent is a granular material. Should additional compression strength is needed, additional OPC could be added to increase its strength.

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13.	Para 6	If replicate samples are used, how will the data be evaluated, i.e. individual samples, mean, maximum value? How would variability between sample results be considered? What would be concluded if one sample did not pass TCLP and the replicate(s) did?	Replicate samples are not being used.
14.	Figure 1	There were other areas where soil samples exceeded the arsenic TCLP limit, including the monofill 2 cap and in the pre-1955 facility area.	See response to item 4.
15.		--end--	