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EVALUATION OF OU 4 SILO 3 ALTERNATIVES (REVISED)

01/29/97

USEPA 9 COMMENTS

DOE-FEMP

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

K-0834

JAN 29 1997

REPLY TO THE ATTENTION OF:

SRF-5J

Mr. Johnny W. Reising
United States Department of Energy
Feed Materials Production Center
P.O. Box 398705
Cincinnati, Ohio 45239-8705

RE: Evaluation of OU 4 Silo 3 Alternatives (Revised)

Dear Mr. Reising:

The United States Environmental Protection Agency (U.S. EPA) has completed its review of the United States Department of Energy (U.S. DOE) draft final evaluation of Silo 3 residues alternatives.

This document was revised and submitted as a result of discussions at a October 30, 1996, meeting. As was stated at that meeting U.S. EPA is supportive of any activity which may expedite cleanup activities at the site.

Although this revision to the document is much improved, the document still fails to present the results of pilot plant testing, sulfate concentrations in the Silo 3 residues, and the recent pilot plant failure's impacts on vitrification implementability, schedule and cost. These activities have presented numerous concerns with the ability to implement vitrification of Silo 3 materials. However, the evaluation report continues to present the vitrification of Silo 3 materials as a viable, but complex option. The evaluation of the vitrification option must be changed to more accurately reflect existing data and knowledge of the process.

U.S. EPA has attached comments on the document. Considering the nature of the comments, recent pilot plant activities, citizen concerns, and independent review team discussions, U.S. EPA requests U.S. DOE not develop an Explanation of Significant Differences or a Record of Decision amendment document until all outstanding issues are resolved. Once U.S. DOE has reviewed the comments, U.S. EPA requests a meeting to discuss the issues, as well as a path forward to expedite Silo 3 remediation.

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Please contact me at (312) 886-0992 if you have any questions regarding this matter.

Sincerely,

James A. Saric
Remedial Project Manager
Federal Facilities Section
SFD Remedial Response Branch #2

Enclosure

cc: Tom Schneider, OEPA-SWDO
Jack Baublitz, U.S. DOE-HDQ
John Bradburne, FERMCO
Charles Little, FERMCO
Terry Hagen, FERMCO
Tom Walsh, FERMCO

TECHNICAL REVIEW COMMENTS ON "DRAFT FINAL EVALUATION OF SILO 3 ALTERNATIVES" VOLUMES 1 AND 2 FERNALD ENVIRONMENTAL MANAGEMENT PROJECT FERNALD, OHIO

GENERAL COMMENTS

Commenting Organization: U.S. EPA Commentor: Saric
Section #: Not Applicable (NA) Page #: NA Line #: NA
Original General Comment #: 1
Comment: Both Volumes 1 and 2, but especially Volume 1, contain numerous typographical and grammatical errors that detract from the clarity of the information presented. Both volumes should be carefully reviewed and edited to correct these errors.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
Original General Comment #: 2
Comment: Vitrification treatability testing of residues from Silo 1, 2, and/or 3 should address the presence of nitrates and urea in the feed to the melter, especially if ammonia is also present in the feed. Ammonia reacts with nitrogen oxides to form ammonium nitrate, an explosive. Ammonium nitrate could build up in the offgas system and cause serious problems if not removed. At the Savannah River Site's full-scale Defense Waste Processing Facility, a pretreatment unit was installed to reduce nitrates in the feed, and an ammonia scrubber was installed to control ammonia in the offgas.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
Original General Comment #: 3
Comment: Volume 1 fails to adequately incorporate the impacts of the high sulfate levels in Silo 3 materials and the ability to implement vitrification. Previously, based upon pilot plant testing information, U.S. DOE stated that vitrification of Silo 3 materials could only be successfully implemented if additional materials were blended with the Silo 3 materials to reduce sulfate levels. This would result in significant volume increases of material and costs. This information has not been incorporated in the evaluation of alternatives, to present the most probable path forward if vitrification of Silo 3 materials could occur. The evaluation report continues to compare

vitrification and cementation options assuming vitrification appears as an option that can be successfully implemented although U.S. DOE has failed to show that a vitrification facility can be implemented and operated efficiently.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
Original General Comment #: 4
Comment: Volume 2 eliminates Alternative (ALT) 4--removal, on-site blending of Silo 3 residues with operable unit (OU) 1 Waste Pit 5 material, and off-site disposal at a representative permitted commercial disposal facility--before it is fully evaluated. The report states that the Resource Conservation and Recovery Act does not recognize blending as a substitute for treatment and that implementation of ALT-4 would not be consistent with the Comprehensive Environmental Response, Compensation, and Liability Act's preference for permanent and significant reduction of volume, toxicity, or mobility of hazardous substances or contaminated materials. The Silo 3 alternatives evaluation report should fully evaluate ALT-4, including cost and schedule information.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
Original General Comment #: 5
Comment: The December 26, 1996, surrogate material leak from the melter, the subsequent videotaping of the corrosion and deterioration within the melter, and the path forward activities involving melter redesign proposed in Volume 1 indicate that a significant level of effort is needed to overcome the current melter's construction and operating deficiencies, as well as the viability of vitrification. The evaluation of Silo 3 alternatives should address these issues and discuss their impact on the OU4 overall remediation implementability, schedule and cost.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
Original General Comment #: 6
Comment: The cost and schedule comparisons presented in volumes 1 and 2 have not been agreed upon by U.S. EPA. Although they are acceptable for comparison purposes, U.S. EPA does not concur with these figures and schedules. Cost and schedule figures provided to the independent review team should be incorporated into the Silo 3 evaluation report, if they are more realistic.

SPECIFIC COMMENTS--VOLUME 1

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: ES-7 Lines #: 12-14
Original Specific Comment #: 1
Comment: The text states that treatability study results generated for the OU4 remedial investigation and feasibility study indicate that cement stabilization was more effective for immobilizing uranium and thorium isotopes than vitrification. However, comparable supporting analytical data are not presented in either the Executive Summary or subsequent sections. Volume 1 should be revised to include the supporting analytical data, or the text should be revised to reflect the limited nature of the data. Also, see Original Specific Comment 2.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.1 Page #: 2-1 Line #: NA
Original Specific Comment #: 2
Comment: The text states that comparison of toxicity characteristic leaching procedure (TCLP) data for uranium and thorium shows that "cement stabilization was better than vitrification in retaining uranium and thorium." However, Table 2-1, which summarizes TCLP data for vitrified and cement-stabilized Silo 3 residues, presents data for uranium and thorium in untreated and treated Silo 3 residues that do not support this statement. The text should be revised to make it consistent with the available TCLP data.

The text also states that both vitrification and cement-stabilization "performed equally well in the retention of hazardous constituents (lead for K-65; and arsenic, cadmium, chromium, selenium for Silo 3)." First, the reference to the K-65 waste TCLP result for lead should be deleted because Volume 1 focuses on the effectiveness of vitrification and stabilization of Silo 3 residues. Second, except for arsenic results, the TCLP results for the vitrified Silo 3 residues appear to be lower than those for cement-stabilized Silo 3 residues. The text should be revised to accurately reflect these results.

Commenting Organization: U.S. EPA Commentor: Saric
Table #: 2-1 Page #: 2-2 Line #: NA
Original Specific Comment #: 3
Comment: This table presents TCLP data for vitrified and cement-stabilized Silo 3 residues. The Formula 2 cement-stabilized residue TCLP result for total thorium is 0.013 milligram per liter (mg/L). However, Footnote f lists this value as

0.0013 mg/L. Also, the untreated Silo 3 residue extraction procedure toxicity concentration for arsenic is listed in the table as 45 mg/L. However, the correct value appears to be 42 mg/L. These discrepancies should be resolved. In addition, for each "not detected" (ND) entry, the detection limit should be provided in parentheses. This original specific comment also applies to Table 3-2.

Commenting Organization: U.S. EPA Commentor: Saric
Table #: 3-1 Page #: 3-2 Line #: NA
Original Specific Comment #: 4
Comment: This table presents a comparative cost analysis summary for Silo 3 alternatives VIT and ALT-1. Cost information for the VIT alternative was taken from the Vitrification Pilot Plant (VITPP) Analysis Report dated September 1996; cost information for the ALT-1 alternative was taken from Volume 2 of the Final Evaluation of Silo 3 Alternatives Report dated December 1996. According to Table 3-1, the total capital and present worth costs for the VIT alternative are $65.8 million and $61.1 million, respectively. However, Appendix C of Volume 2 presents total capital and present worth costs for the VIT alternative of $24.8 million and $20.4 million, respectively. The text or Table 3-1 should be revised to (1) explain why the capital and present worth costs in the September 1996 VITPP analysis report were used instead of those in Volume 2 and (2) resolve the apparent discrepancy.

Also, Table 3-1 lists the total capital cost for ALT-1 as $19.5 million. However, Appendix C of Volume 2 refers to this cost as the total life cycle cost. Table 3-1 should be revised to be consistent with Appendix C of Volume 2.

This original specific comment also applies to Table 3-8.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.1.2 Page #: 3-5 Line #: NA
Original Specific Comment #: 5
Comment: This section describes the ALT-1 alternative. The text states that Silo 3 residues would undergo stabilization and solidification (S/S) in which the residues would be mixed with portland cement and other additives to produce a waste product that meets the disposal facility's specific waste acceptance criteria (WAC). The text further states that the waste product would be a "monolithic waste cast into a [*sic*] metal boxes" and that it would be tested to determine whether it meets WAC.

First, the text should discuss the need for use of a sulfate-resistant portland cement (Type V) during S/S because of the relatively high sulfate levels present in the Silo 3 residues. Second, the text should describe proposed procedures for collecting samples of the monolith from its container for TCLP, WAC, and other testing. Third and finally, the text should address how the monolith's long-term integrity will be evaluated in addition to WAC testing.

Commenting Organization: U.S. EPA Commentor: Saric
Table #: 3-2 Page #: 3-8 Line #: NA
Original Specific Comment #: 6
Comment: See Original Specific Comment No. 3.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.3.3.1 Page #: 3-18 Line #: NA
Original Specific Comment #: 7
Comment: This section discusses Campaign 2 vitrification testing. The last sentence in the second paragraph refers to processing difficulties caused by high sulfate levels during Campaign 2 testing. However, the text does not present the sulfate levels in the residues undergoing vitrification testing in Campaign 2. The text should be revised to clearly summarize the sulfate level in each Campaign 2 waste residue undergoing vitrification testing and cite a reference for the sulfate levels.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.3.3.3 Page #: 3-22 Line #: NA
Original Specific Comment #: 8
Comment: This section discusses the implementation schedule for the VIT and ALT-1 alternatives. The text states that the expected completion date for the vitrification treatment operation is April 2002 and that decontamination and decommissioning (D&D) would not be completed until September 2003. However, Figure 3-4 indicates that the vitrification treatment operation would be completed by April 2003 and that D&D would be completed by September 2004. Volume 1 should be revised to resolve these discrepancies.

Commenting Organization: U.S. EPA Commentor: Saric
Table #: 3-8 Page #: 3-26 Line #: NA
Original Specific Comment #: 9
Comment: See Original Specific Comment No. 4.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.0 Page #: 4-4 Line #: NA
Original Specific Comment #: 10

Comment: The text discusses S/S and implies that Silo 3 residues are homogeneous. The text should be revised to distinguish between Silo 3 residue chemical constituents, which are expected to vary, and physical parameters such as moisture content and particle size, which are expected to be relatively uniform.

SPECIFIC COMMENTS--VOLUME 2

Commenting Organization: U.S. EPA Commentor: Saric
Table #: ES-1 Page #: ES-7 Line #: NA
Original Specific Comment #: 11
Comment: This table summarizes the comparative analysis of five Silo 3 alternatives: VIT, ALT-1, ALT-2, ALT-3, and ALT-4. The fifth column indicates whether each alternative reduces the toxicity, mobility, or volume of hazardous waste constituents through treatment. This column indicates that ALT-1 through ALT-3, the S/S alternatives, reduce the toxicity and mobility of hazardous constituents. However, Table 4.2-1 on Page 4-3 indicates that ALT-1 through ALT-3 reduce only mobility. Because S/S technologies immobilize but do not destroy or chemically alter hazardous constituents, the fifth column in Table ES-1 should be revised to delete reference to toxicity reduction for ALT-1 through ALT-3.

Commenting Organization: U.S. EPA Commentor: Saric
Table #: ES-3 Page #: ES-9 Line #: NA
Original Specific Comment #: 12
Comment: This table summarizes short-term mechanical and transportation risks for Silo 3 alternatives. The table and the associated text should be revised to include radiation risks and radon impacts, which are presented in Appendix D.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.2.4 Page #: 3-42 Lines #: 8-9
Original Specific Comment #: 13
Comment: This section discusses reduction of toxicity, mobility, or volume through treatment. Lines 8 and 9 state that reducing the mobility of radionuclides would also reduce their toxicity. This statement should be deleted from the text because treatment does not destroy radionuclides; it only reduces their mobility.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.2.6 Page #: 3-45 Line #: 29
Original Specific Comment #: 14

Comment: This section discusses risks associated with implementation of remedial alternatives for OU4. Line 29 indicates that 0.08 deaths are estimated during remediation. However, Appendix D, Table D.4-3 indicates that 0.09 deaths are estimated. This discrepancy should be resolved.

Commenting Organization: U.S. EPA Commentor: Saric
Sections #: 3.3.5, 3.4.5, and 3.5.5 Page #: 3-45 Line #: NA
Original Specific Comment #: 15
Comment: These sections discuss the short-term effectiveness of the remedial alternatives. The first paragraph of each section includes one sentence stating that risks were calculated as shown in Appendix D and were found to be acceptable. Later in the same paragraph, specific numbers of estimated transportation-related injuries and deaths associated with the remedial alternatives are presented, implying that the estimated number of injuries and deaths were found to be acceptable. To avoid this implication, the phrase discussing the acceptability of risks should be deleted.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: Appendix E, Section E-2-3 Page #: NA Line #: NA
Original Specific Comment #: 16
Comment: Appendix E discusses treatability study issues. One issue that should be discussed in this appendix is the relatively high sulfate levels in Silo 3 residues and the need for using a sulfate-resistant portland cement (Type V). Another issue that should be addressed involves long-term integrity testing of the treated Silo 3 residues in addition to WAC compliance testing. The text should be revised to address these issues.