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OHIO EPA COMMENTS ON OU4 VITRIFICATION TREATABILITY STUDY WORK PLAN

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OEPA/DOE-F
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LETTER

OHIO EPA COMMENTS ON OU4 VITRIFICATION TREATABILITY STUDY WORK PLAN

General Comments

1. The discussion of vitrification in the work plan is too general. Also, several portions of the treatability study are not described at all. The work plan must include procedures and methods for off-gas collection during vitrification, determining the composition of the off-gas, determining the amount of radon emanated during vitrification, determining the emanation rate of radon from the vitrified residues, separating moisture from the off-gas, the modified TCLP, and measuring volume reduction.

2. This work plan is not consistent with the Treatability Study Work Plan for Operable Unit 4 (10/5/91). The vitrification treatability study work plan omits tests which will be done on the final solidified waste from cementation. Additional tests which should be conducted on the final vitrification waste form include 5-day Static Leach test, Durability tests (recommended by Ohio EPA 11/5/91), bulking factor, unconfined compressive strength, shear strength, permeability, etc.. In order to perform a competent comparative analysis in the Feasibility Report the tests conducted on all final waste forms should be the same.

Specific Comments

1. Page 1, line 32: Radium levels are quite high. No special monitoring or concerns are identified in this report. Due to the carcinogenic nature of radium, containment of the off-gases (radon, in particular) should be addressed in detail in this work plan.

2. Section 1.2, pg. 2, 2nd bullet: Correct sentence from "...hazardous chemicals" to read "...hazardous substances."

3. Section 1.3.1, pg. 3, lines 20-23: Objectives for the treatability study must include a reduction in the leachability of radionuclides and a reduction in the radon emanation rate as well as a reduction in the leachability of hazardous substances. The primary goal of these treatability studies should be to develop a stable waste form with minimal leachability of all contaminants.

4. Page 3, lines 27 and 33: There have been two failures using vitrification technology. One of these was a soil column at the N Reactor. The PNL model used at Hanford's N Reactor did

not correctly assess the amount of off-gassing or the volume expansion of the melt. What has PNL done to correct their model to estimate these procedures for the vitrification process?

5. Page 3, Lines 32 and 33: Define the chemistry of the metal oxide residue in more detail.

6. Page 3, line 38: Frequently, the off-gases from vitrification are quite corrosive. PNL should measure for strong acid radicals like NO-, CL-, and SO =. These ions can cause severe corrosion in the gas collection system if the proper materials of construction are not used.

7. Section 1.3.1, pg. 3, lines 41-43: Include "Characteristics of Fernald's Silos 1 and 2 Residue Before, During and After Vitrification" in the list of references. DOE should incorporate this report into the document by adding it as an attachment. The report contains information which would be helpful in understanding the proposed methods.

8. Section 1, Figure 1-1, pg. 4: In addition to MCLs as Remedial Action Objectives, non-zero MCLGs should be included. The NCP's support of MCLGs has been previously emphasized by Ohio EPA in our comments on a number of documents.

9. Page 7, line 4: All other acidic ions and radionuclides in the off-gas must also be measured in order to develop a material balance for this process. Material balance considerations, i.e., chemical composition, temperature, flow rate; must also be included in the testing program.

10. Section 1.3.1, pg. 7, lines 8-11:
a) Reference the source for the EPA limit of 20 pCi/m2-s.
b) The calculations for the conversion for 48 pCi/hr to 1.56 pCi/m2-s, should be in an appendix.

11. Page 8, Table 1-1, line 7: Define Other Ions - 3.4%.

12. Page 11, line 13: Define metal oxide technology.

13. Page 13, line 7: Please define what constitutes a "successful" vitrification run. What parameters are measured to indicate a "successful" run?

14. Section 1.3.4, pg. 13, lines 12-15: Specify that the independent laboratory is an approved laboratory for analysis under the QAPP by U.S. EPA.

15. Section 1.3.4, pg. 13, lines 18-20: The discussion of activities related to the liquid collected from the off-gas should be included in Section 4 of the work plan.

16. Page 13, line 19: How will the liquid and condensate be treated in the pilot studies?. This issue is glossed over in the report.

17. Page 13, line 40: See previous comment

18. Section 2.0, pg. 15, line 11: Change the typographical error "on" to "or".

19. Page 15, line 11: Does vitrification actually reduce volume? Field tests at Hanford showed that the soil column actually expanded about 10% across the base of the melt. Fernald - DOE should obtain test results from DOE - Hanford on the vitrification tests conducted in April 1990 at an N Reactor soil column.

20. Page 17, line 7: How will water be treated from Hydraulic Removal Unit?

21. Page 18, line 6: See previous comment.

22. Page 19, Figure 2-3: Flowsheet does not agree with description on page 16. Adjust write-up to accurately reflect process shown in Figure 2-3.

23. Section 3.1, pg. 23, line 23: State in the text that the primary waste streams are the K-65 waste and the metal oxide waste.

24. Section 3.1, pg. 23: Durability tests should be conducted on the final waste form. The following are justifications for these test:

    a) Through failure mechanisms such as: desiccation cracks, slope instability, settlement, piping, penetration, erosion cold climate, earthquakes, and construction errors, water can permeate through the facility. Therefore the waste can become saturated, causing the stabilized waste to erode and possibly contaminate the surrounding area. In order to determine what waste matrix is the most durable, a wetting and drying test is needed.

    b) The K-65 waste has a life expectancy over 1000 years. There is no data on the structural longevity of the low level waste facility. Since this remediation is to be a permanent solution, a durability test (resistance to

degradation) would provide data to help choose the most durable solidified waste matrix.

25. Section 3.1, pg. 23: This vitrification treatability study should at least include the same test and data quality objectives as the cementation treatability study. The following test should also be included: bulking factor, unconfined compressive strength of 500psi, shear strength, permeability, and durability tests.

26. Page 26, lines 4 and 5: Anions should be completely identified in off-gas for material balance.

27. Page 27, line 13: Metal oxide composition should be developed in earlier stages of the Work Plan.

28. Section 4.1, pg. 27, lines 15-18: The gamma scan and the list of analytes in Table 4-3 does not include all radionuclide isotopes present in the waste. One of the objectives listed for laboratory screening is to determine the concentration of radioactive isotopes in the wastes (see Section 3.1, pg. 23., lines 25-26). Describe how this objective will be accomplished.

29. Section 4.1, Table 4-3, pg. 29: There are numerous discrepancies between the list of isotopes in this treatability study and the risk assessment work plan. In the draft Risk Assessment Work Plan (10/15/91), Table 4-2 lists radionuclides and hazardous chemicals in environmental media or operable unit source terms. Radionuclides that were listed in the risk assessment but are not included in this treatability study are as follows: Actinium-227, Radium-228, Radon-220, Radon-222, Thorium-228, Thorium-232, Uranium-234, Uranium-235/236, and Uranium-228. Radionuclides that were listed in this treatability study but are not included in the risk assessment are as follows: Radium-223, Thorium-227, Lead-211, Lead-214, Bismuth-214, and Radon-219. DOE needs to discuss how it will address/assess these additional radionuclides in this treatability study. Additionally, DOE must develop a comprehensive/complete list of radionuclides for the specific operable units and be consistent in their use.

30. Section 4.1, Tables 4-1 and 4-2: Explain how these lists of analytes were selected.

31. Section 4.2, pg. 30, lines 23-26: Define "open system". In lines 29-30, define "partial system".

32. Section 4.2, pg. 32, Figure 4-1: Define "PNL criteria" and provide more information on what this encompasses.

33. Section 4.2.2, pg. 33: This section and the following ones should include tables defining the amounts and mixtures of "glass forming reagents" to be added. This information is essential to understanding the mechanism of the treatments as well as additional volumes which may be added to the waste stream.

34. Section 4.2.3, pg. 33: This section must define the ratios of bento-grout to be used during the vitrification tests. This comment and the previous one are asking for no more data than were provided in the cementation treatability study work plan.

35. Page 34, line 7: Fernald should obtain a copy of PNL's vitrification procedures and criteria. The author of the Work Plan seems to have implicit faith in PNL. Someone at Fernald DOE should become familiar with PNL data so that the data may be properly evaluated and challenged when necessary.

36. Page 34, line 22: What is the rationale of mixing K-65 and metal oxide materials for vitrification?

37. Page 35, line 20: What is "satisfactory" as related to Test 9? What criteria are used to determine this?

38. Page 36, line 24: Add condenser to remove moisture.

40. Page 39, line 7: What geochemical models are going to be used?

41. Page 40, line 14: Add power consumption meter.

42. Page 40, line 37: Add power consumption meter.

43. Page 41, line 34: Add total power consumption, kilowatt hours.

44. PNL-MA-70, QA Plan, Exhibit A, C.: C. Chapman should have a direct technical interface with PNL to fully understand the vitrification test data.

45. PAP-70-404 Rev. 1, C. Reports: PNL should explain all technical data generated and how it relates to vitrification.

46. PAP-70-404 Rev. 1, D. Records: Add section of off-gas test procedure.