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DEC 05 RECD 89 GLW

December 4, 1989

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REPLY TO ATTN OF: A7-70

Marvin J. Furman
U.S. Department of Energy
P.O. Box 550 (A6-80)
Richland, Washington 99352

Re: EPA Technical Review of Treatability Test Work Plan for the 116-B-6A Crib Demonstration Project

Dear Mr. Furman:

Our review of the referenced work plan is enclosed. The enclosure consists of comments from EPA and its contractors and the Washington State Department of Ecology.

I have set up a meeting with Syd Koegler in my office at 9:30 a.m. on December 6, 1989, to discuss these comments. This should provide the technical staff with a better understanding of the comments and, hence, a technically adequate resubmittal. Although this is a primary document, there is no specified time for submittal of your response to comments and the revised document, since the Work Plan was submitted on a voluntary basis. However, it is necessary to have a fully approved work plan prior to conducting the actual test. At this time, the tentative schedule for the test is early February. In order to meet that date, I would encourage you to respond to these comments and submit a revised document as early as possible.

If you have any questions, please contact me after today, at (509) 376-6623.

Sincerely,

Paul T. Day
Hanford Project Manager

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Enclosure

cc: (with enclosure)

S. Wisness, DOE
S. Koegler, PNL
[redacted]
R. Freeberg, DOE
G. Hofer, EPA
L. Goldstein, Ecology
D. Lacombe, PRC
W. Staubitz, USGS

Adm. Record - 100-BC-1 operable Unit

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EPA Technical Review of Treatability Test Work Plan (September 1989)

Hanford Site -- 116-B-6A Crib ISV Demonstration Project

December 4, 1989

1. **Comment:** Section 1.4, Table 1.2, p. 1.7

The data provided in the "count" column is unclear. The counts per minute at 25 feet is listed as 30 and explained in the text as background. While at 0, 5, and 10 feet it is listed as less than 100 and explained as essentially no radioactivity. Provide clarification.

2. **Comment:** Section 1.4, paragraph 3, p. 1.9

The text states, "Selected radioactive strontium and cesium analyses are shown in Table 1.4." However, results for selected radioactive strontium and cesium analyses are not shown in Table 1.4. Clarify this discrepancy.

3. **Deficiency:** Section 1.4, p. 1.12 and Table 1.4

The text states that the lateral distribution of the contaminants from the crib appears to be limited, however, there is no basis for this statement. The 14 foot depth of BH-3 shows that significant contamination from chemical constituents has migrated from the crib. The base of the crib is also at a depth of approximately 14 feet. Since there is presently no soil data further from the crib than BH-3, it is premature to describe the lateral extent of contamination.

Recommendation:

Revise the text to be consistent with the data in Table 1.4. Describe any additional steps that will be taken to determine the three-dimensional extent of contamination in the unsaturated zone.

4. **Comment:** Section 2.0, paragraph 2, p. 2.3

The work plan states, "The off-gas treatment system and post-decontamination operations result in 12 HEPA filters and approximately 6000 L of scrub solution that will require disposal." Does this volume account for the estimated contaminants in the 6000 to 9000 pounds of wood timbers?

5. **Comment:** Section 3.0, p. 3.1

The second bullet describes an objective to evaluate the performance of the off-gas containment system. This performance can not be fully evaluated unless monitoring occurs around the outside perimeter of the hood during the test. Several months ago, EPA suggested that soil gas monitoring be conducted outside the hood area during the test, to determine whether the hood was effective in capturing all of the off-gas. Since there are organics in the wood timbers, periodic soil-gas monitoring outside the hood appears to be the best way of assessing the efficacy of the hood. This is particularly important since DOE hopes to use this demonstration to support the ISV technology as a feasible alternative at other units. The documentation of as much information as possible will help to achieve this goal.

6. **Deficiency:** Section 3.0, p. 3.1

The last sentence in the third objective listed states that background levels of radionuclide contamination in soil are reached at "about 20 ft deep." However, the data in Table 1.3, p. 1.10, suggests that background levels are reached at approximately 24 feet at BH-1 and 28 feet at BH-2.

Recommendation:

Revise the text to correspond to the data.

7. **Comment:** Section 5.1, p. 5.1

The last paragraph refers to a "fiber-optic, depth-monitoring array" is proposed to be installed. It is unclear what the purpose of this is. Additional explanation on this process is needed.

8. **Comment:** Section 6.2.1, p. 6.1

There appears to be a typo on the sixth line from the bottom of the page -- "10 s".

9. **Deficiency:** Section 7.1, p. 7.1

As stated in the work plan, the direction of ground-water flow is largely uncertain, yet no ground-water-level measurements are proposed in the work plan to determine the direction of ground-water flow at the time of the ISV demonstration.

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Recommendation:

Measure ground-water levels in wells MW-1, MW-2, and MW-3, and in surrounding wells within the 100 BC Area shown in Figure A4. Be sure that the water-level measuring points (i.e., top well casing) are surveyed to a common elevation datum, and measure ground-water levels in the wells immediately before the ISV demonstration and 1 or 2 days thereafter. This data should indicate the local direction of ground-water flow and determine whether wells MW-2 and MW-3 are indeed located "down gradient" of the 116-B-6A crib and therefore capable of intercepting any contaminant plume originating from the ISV demonstration testing.

10. **Deficiency:** Section 7.1, P. 7.1

Ground-water samples will be collected only once and within 2 days of the ISV demonstration test "to assess the ground-water quality in the general area of the 116-B-6A crib." A single sample taken from two wells 50 feet from the ISV demonstration test within 2 days of the test may indeed assess the general water quality; however, it will likely not detect a contaminant plume resulting from the test. Although the hydraulic characteristics of the aquifer in the vicinity of the 116-B-6A crib are unknown, the hydraulic conductivity of the Hanford Formation has been reported to be within the range of 500 - 20,000 ft/day, and with a hydraulic gradient of approximately 0.001 (between wells 199-B4-4 and 199-B3-1) shown in Figure A4, the travel time of ground water in this area should be somewhere between 0.5 and 20 ft/day. Therefore, a contaminant plume in ground water directly below the ISV demonstration test may not reach the "down gradient" monitoring well for 2 - 100 days.

Recommendation:

Take more than one post-test water sample from the down gradient monitoring wells. Collect water samples from MW-2 and MW-3 and analyze for an abbreviated target compound list 10, 25, and 50 days after the ISV demonstration test and a full target compound list at 2 and 100 days after the test. A follow-up sample analyzing for the abbreviated target compound list at 180 and 360 days would be informative as well. An abbreviated target compound list should include, at a minimum, all contaminants presently known to be in the groundwater and soils (including the crib). In addition, the abbreviated target compound list should include all contaminants found in the off-gas system.

11. **Comment:** Section 7.1, P. 7.1

In the first sentence, Figure 5 is noted. This should be Figure 1.5.

12. **Deficiency:** Section 7.1, p. 7.1

The first sentence states that groundwater monitoring wells will be installed "approximately along the direction of the groundwater flow gradient established by groundwater levels ... in the 100-B Area." Much uncertainty exists locally in the area of the crib. The term "established" infers little uncertainty.

Recommendation:

Clarify the text by using "estimated" instead of "established."

13. **Deficiency:** Section 7.1.1, p. 7.1 and elsewhere

Sample collection procedures referenced (PNL 1989) are not included in this document. It is assumed that these procedures are not cleared for public review. This has been the subject of extensive discussion between EPA, Ecology, DOE, and Westinghouse Hanford Company during the review of RI/FS Work Plans and has resulted in the delay of approval for such Work Plans. This issue comes up in subsequent portions of this Work Plan, but will not be identified in each case. EPA will not approve a Work Plan until all referenced procedures are available to the public. This may involve expedited clearance of such procedures or revising the procedures as they apply to this Work Plan and submitting as stand alone procedures.

Recommendation:

Contact the DOE Project Manager or WHC staff to see how this issue is being managed for RI/FS Work Plans. Throughout this Work Plan, delete all references to internal procedures and supply those procedures that are applicable to this project.

14. **Deficiency:** Section 7.1.2, p. 7.1

It appears that sampling for radionuclides has not been included in the groundwater sampling plan.

Recommendation:

Specify that analyses for radiological contaminants known to be in the groundwater and in the crib will be conducted and that the appropriate level of QA will be utilized (EPA level V). As an alternative to specifying levels IV and V, it is acceptable to specify the performance based criteria that is being used by DOE and WHC in the RI/FS Work Plans.

15. **Deficiency:** Section 7.2, p. 7.2

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The general discussion on post-test soil sampling is vague. The reviewer can not determine whether the soil sampling program will be adequate to meet the needs of this demonstration project.

Recommendation:

The sampling plan must specify the proposed number of samples to be taken, the locations, and the depths. In addition, any proposal for compositing of samples must be included.

16. **Deficiency:** Section 7.2, p. 7.2

The possible formation of crystalline phases developing in the vitrified mass is not discussed.

Recommendation:

Discuss the possibility of crystalline phases and their significance to this demonstration project.

17. **Deficiency:** Section 7.2, p. 7.2

Paragraph 4 states that soil samples will include "only those samples identified in the analyses of the pretest samples". This may not be representative of those compounds formed during the test. Table 7.1 is inconsistent with the text, in that Appendix 9 constituents are shown on the table, but Appendix 9 includes constituents in addition to those identified during pre-test sampling (e.g., volatile organics).

Recommendation:

Modify the text to include soil analysis for any constituents that may be found in the off-gas system, as well as the those constituents identified during the pre-test soil sampling.

18. **Deficiency:** Section 7.2, paragraph 3, p. 7.2

The first sentence discusses soil sampling "according to the relative position of isotherms achieved during processing." The explanation of this sampling approach is vague.

Recommendation:

Clarify the proposed procedure for soil sampling, data acquisition, and analysis.

19. **Comment:** Section 7.2.1, p. 7.2

On line 4 of this section, delete "/or".

20. **Deficiency:** Section 7.2.2, p. 7.2

It should be noted early in the first paragraph that the sampling method being discussed is split-spoon sampling. Also, on p. 1.9 it was noted that samples from BH-2 and BH-3 were collected using a drive barrel because the coarseness of the material encountered precluded the use of split-spoon sampling. With so little success, why is split-spoon sampling proposed?

Recommendation:

Clarify the discussion of split-spoon sampling and delete if it will not really be used.

21. **Comment:** Section 7.2.2, paragraph 2, p. 7.3

Since soil samples will be analyzed for organics, decontamination of the split spoon sampler should include a rinse with a solvent, such as hexane.

22. **Comment:** Sections 7.2.3 and 7.2.4, p. 7.3

Decontamination procedures should be described for all sampling equipment. Decontamination, or using dedicated, clean sampling equipment, must be described and used to prevent cross-contamination of samples.

23. **Comment:** Section 7.2.5, paragraph 1, p. 7.4

The Work Plan states, "ISV vitrified samples will be analyzed for mechanical properties and chemical leachability." The types of analyses for mechanical properties and chemical leachability must be specified. This is a primary element of the project.

24. **Comment:** Section 7.2.5, paragraph 2, p. 7.4

The last sentence states, "Samples submitted to the CLP laboratory will be selected by the results of the XRF and total organic carbon analyses." The specific meaning of the phrase "selected by the results" is not clear. Clarify the meaning of this phrase. Additionally, EPA has not yet seen an acceptable correlation between approved laboratory methods and XRF analyses for metals. Table 1.6 does not demonstrate that a good correlation exists. Until such a

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demonstration can be made, the use of XRF as a substitute for EPA approved methods can not be accepted.

25. **Deficiency:** Section 7.2.6, p. 7.5

Labelling and recording of sample collection in the drill log is described; however, the labelling and recording of the collected samples is not described.

Recommendation:

Include descriptions of the labeling and recording of the samples collected, i.e., collection date and time, parameters, location, etc.

26. **Deficiency:** Section 7.3, P. 7.5

It is not noted to what depth the soil samples from immediately below the block will be sampled nor the interval at which these cores will be subsampled. What contingencies will be made if the split-tube samples are not successful in collecting a sample from below the block?

Recommendation:

Describe soil-sampling below the block in more detail.

27. **Deficiency:** Section 7.3, p. 7.5

In reference to the selection of vitrified product sampling locations, the text states, "The location of the cores is not critical due to the natural mixing of the molten glass achieved during processing." The extent of mixing achieved during a treatability test scale demonstration is not clear. Convection cells may develop within the vitrified mass creating dead zones of little or no flow.

Recommendation:

Clarify the extent of mixing expected within the mass during processing and address the development of convection cells.

28. **Deficiency:** Section 7.4 and Table 7.2, pp. 7.5 & 7.6

This section is vaguely written. As stated above, reference to PNL-approved procedures is not acceptable. Table 7.2 is difficult to understand. Some columns, abbreviations, and units are not clearly defined. Further, it is not clear how what is being measured relates to the operation of the process or to the demonstration.

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Recommendation:

Expand the discussion contained in Section 7.4 to describe what activities will actually be conducted. Provide the PNL-approved procedures for sample collection and documentation. Modify Table 7.2 to make it more understandable.

29. **Comment:** Section 8.1, p. 8.1

This section does not provide for QA of radiological samples that do not fit the criteria of routine analytical services. As stated earlier, specify a CLP level V QA for radiological samples or use the performance based criteria that is being used in the RI/FS Work Plans.

30. **Deficiency:** Section 8.2, p. 8.1

The text is not specific as to what will be analyzed in the off-gas. No organic constituents are proposed for analysis. Thorough evaluation of contaminants in the off-gas is a significant element of this project.

Recommendation:

The list of parameters must be inclusive of known contaminants and for those that are expected to be found as a result of the wood timbers, e.g., organics, creosote products, and complete and incomplete products of combustion).

31. **Comment:** Section 8.3, paragraph 2, p. 8.1

Provide a justification for the use of the EP toxicity and MCC tests. Were TCLP tests considered? Also, the protocols for the MCC leach tests are not presented.

32. **Deficiency:** Section 8.3, last paragraph, p. 8.2

Composite sampling was not clearly outlined in the previous sections.

Recommendation:

Describe composite sampling procedures.

33. **Deficiency:** Section 8.3, p. 8.2

The second full paragraph inaccurately describes the EP Toxicity test procedure. EP Toxicity is not derived from immersing the powder in deionized water at room temperature.

Recommendation:

Provide the correct description of the EP Toxicity test and how it will be used in this demonstration project.

34. **Comment:** Section 10.1, p. 10.1 and elsewhere

The term "decontamination factor (DF)" is misleading. In reality, there is no decontamination occurring through the ISV process, but rather an immobilization process. This term should not be used. Also, the discussion of the initial input mass and the exit mass needs to be more fully described, including the rationale that supports this equation as an appropriate means of evaluating the treatment process.

35. **Comment:** Section 10.1, p. 10.1

The second paragraph mentions soil gas monitoring. It is not clear whether this refers to the initial soil gas monitoring that was conducted during the site characterization process or whether additional soil gas sampling is being proposed. If it is the latter, full details of the soil gas sampling program must be specified.

36. **Comment:** Section 10.1 and Table 10.1, p. 10.2

The term "soil-to-gas DFs" is not described or understood by the reviewer. Table 10.1 is meaningless because the basis for these factors has not been established. It provides only a relative ranking for various constituents. See next comment.

37. **Deficiency:** Section 10.1, p. 10.2

The total amount of hazardous material leaving the vitrified zone via soil and ground-water pathways are noted to be calculated as the basis for determining the overall and individual constituent decontamination factors. However, the ground-water data collection program as described in the work plan will not provide adequate information to make the calculation. Only one post-treatment ground-water quality sample is planned for each of the two down-gradient observation wells. In addition, no ground-water-level measurements or aquifer tests are planned. The rate and direction of ground-water flow and the lateral and vertical extent of any ground-water plume

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will be unknown. It will therefore be impossible to estimate the total amount of hazardous material leaving the vitrified zone via the ground-water pathway. In fact, it will be nearly impossible to estimate whether the ISV demonstration test has any effect on ground-water at all.

Recommendation:

Follow recommendations for increased ground-water quality sampling and collection of ground-water level measurements noted previously. In addition, include aquifer testing as described in Revision 1.0 dated May, 1989.

38. **Comment:** Section 10.1, p. 10.3

Under objective 2, second paragraph, line 6, change "should" to "must". Under objective 3, on line 5, the objective is limited to radiological constituents (i.e., "activity"). Expand this objective to include chemical constituents.

39. **Deficiency:** Section 10.1, pp. 10.3 and 10.4

The discussion for objective 3 is only partially complete.

Recommendation:

Revise the text under objective 3 to be consistent with the stated objective. The objective of this demonstration is to show that the inventory of wastes at this crib can be effectively immobilized via ISV to a depth of 20 feet (see Section 5.1). At this time, the vertical extent of contamination has been established (April 1989 soil data) and the test depth has been established. The key is the extent to which chemical and radiological constituents will leach out of the vitrified block, particularly at the lower boundary of the block, after cooling. The purpose for analyzing soil beneath and around the block is to determine whether the ISV process has created a negative environmental impact by driving contaminants downward or outward.

40. **Deficiency:** Section 11.2.4, p. 11.4

It is not clear whether there could be a shock hazard due to precipitation or surface moisture during the test.

Recommendation:

Include a discussion of the potential for shock hazard in this section. If it presents a possible problem, discuss the conditions under which the test can be run and the associated safeguards.

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41. **Comment:** Section 12.1, p. 12.1

The assumption is made that solid wastes will be disposed in the Hanford Site low-level waste facilities. This will only be allowed if such wastes are disposed in accordance with the EPA's land disposal restrictions (40 CFR Part 268). A statement to this effect needs to be added to this paragraph. Also, it is not clear whether the contaminated casing material will be placed into storage or whether on-site disposal is being proposed. This needs to be clarified.

42. **Comment:** Section 12.2, p. 12.1

Replace the last sentence of the first paragraph in this section with the following: "Storage, treatment and disposal of purge water will be conducted in accordance with the Hanford Purge Water Management Plan, which is approved by EPA and Ecology."

43. **Comment:** Section 13.0, p. 13.1

It appears that several references noted in the text may not be included in the list of references. Verify that all references are listed in Section 13.0.

44. **Comment:** p. B-8

If arcing is a real possibility during start-up, the specified eye protection equipment should be required for anyone who will be observing the start-up.

45. **Comment:** p. B-9

The method of determining safe temperatures during the cool down period is not specified. How is this determined to prevent an arbitrary decision?

46. **Comment:** p. B.20

Number B.1 should refer to section VI-R, not V-R.

47. **Comment:** Tables B1 and B2, pp. C.1 through C.5

Although CLP detection limits are to be achieved, it may be worthwhile to consider methods with lower detection limits, where

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applicable, particularly for groundwater. Since this is a research project, data of the highest quality should be attained to ensure that data are adequate to support the ISV process at other units.

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cc: J. L. Waite

Subject: EPA TECHNICAL REVIEW OF TREATABILITY TEST WORK PLAN FOR THE 116-B-6A CRIB DEMONSTRATION PROJECT

12/05/89JLW:dh

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