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Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

MAR 17 1994

94-ERB-083

Mr. Dave C. Nylander
Nuclear and Mixed Waste
State of Washington
Department of Ecology
7601 W. Clearwater, Suite 102
Kennewick, Washington 99336

Mr. Douglas R. Sherwood
Hanford Project Manager
U.S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, Washington 99352

Dear Messrs. Nylander and Sherwood:

TRANSMITTAL OF RESPONSES TO REGULATOR COMMENTS FOR DOE/RL-93-96 "PHASE II REMEDIAL INVESTIGATION REPORT FOR THE 300-FF-1 OPERABLE UNIT," DRAFT A

Please find enclosed the responses from U.S. Department of Energy, Richland Operations Office, to comments by the U.S. Environmental Protection Agency and the State of Washington Department of Ecology on the subject document. General concurrence on these responses were reached at a meeting on February 4, 1994.

If you have any questions regarding these responses, please contact Mr. R. G. McLeod (509) 372-0096.

Sincerely,

Steven H. Wisness
Hanford Project Manager

END:RGM

Enclosure

cc w/encl:
D. R. Einan, EPA
L. C. Treichel, EM-442
T. A. Wooley, Ecology
EDMC, H6-08

cc w/o encl:
B. A. Austin, WHC
R. D. Belden, WHC
R. F. Stanley, Ecology
T. M. Wintczak, WHC

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300-FF-1 OU PHASE II RI REPORT (DOE/RL-93-96, DRAFT A)
RESPONSE TO COMMENTS FROM EPA AND ECOLOGY
MARCH 8, 1994

GENERAL COMMENTS
from EPA and Ecology

The 300-FF-1 operable unit (OU) physical separation of soil treatability study, in general, demonstrates the potential to reduce the amount of contaminated soils in the 300-FF-1 OU by over 90 percent at a cut-off point of 0.425-millimeter (mm) particle size using a physical separation system. However, it lacks conclusive evidence that soil washing is a viable option for volume reduction of contaminated soils in the 300-FF-1 operable unit. The evidence for success is provided more from the standpoint of benchscale results than from pilot scale performance. There must be a successful propagation of adequate performance beginning with bench scale operations all the way through to full-scale operations for soil washing to be considered for remedial action in 300-FF-1.

Comment Noted. Evidence pointing to the success of soil washing at a pilot scale is provided in the report. However, this point was likely missed due to potential confusion, particularly in sections 2.0 and 3.0 of the report. After looking at comments and reviewing the report, WHC agrees that portions of the report may confuse the reader. As a result, the report will be reorganized to combine Sections 2.0 and 3.0 in an effort to minimize redundancy and confusion. Text will be added as needed to clarify results of Pilot-Scale Tests that were conducted.

As a result of the reorganization, page numbers of Sections, Tables and Figures where comments are incorporated will not correspond with the original comment.

In addition, several issues remain to be addressed:

- The proposed test performance levels (TPL's) are not explained. The proposed TPL's are high for most of the contaminants of concern (COC). For example, the TPL for uranium (U)-238 is 370 picocurie per gram (pCi/g.) Preliminary risk-based screening for radioactive soil contaminants at the North Process Pond calculated the following soil concentrations for U-238 (DOE 1992):

  - 0.93 pCi/g at external lifetime incremental concern risk (ICR) = 10^{-6}
  - 27 pCi/g at oral ICR = 10^{-6}
  - 7 pCi/g at inhalation ICR = 10^{-6}

  If these conservative levels are used to return the "clean" soil fractions for backfilling, then the volume reduction achievable by these physical separation systems would likely be significantly lower.

Partial Accept. TPL's included in the report are consistent with previous discussion and agreement between DOE, EPA and Ecology as defined in the test plan DOE/RL-92-21, the basis for selecting these TPL's and reference to the

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agreement will be added to Section 2.1. P. 3-35 shows 10^{-6} ICR values for several contaminants. Assumptions used for these calculations will be included in the the comparison table, previously Table 3-18. The numbers shown in the comment are ultra conservative based on assumptions made in Section 4.0 of the RI Phase I report. While 10^{-7} ICR preliminary screening values are included in the Phase I RI report, they were never intended as cleanup levels. If the levels shown in the comment are enforced as "clean up levels, it is likely that neither physical soil washing, chemical extraction, nor any other potential volume reduction method could be considered for remediation.

- Test results indicate that soil containing the "green material" was the primary source of the radioactivity contributed primarily by U-238 radioisotope. The soil characterization protocol should include examination of the various size fractions of a representative sample of radioactive soil to provide additional information on contaminant and host-material (green material) mineralogical and physical properties in support of feasible volume reduction techniques.

Comment Noted. This information is already included in the text. Text will be reorganized and modified for clarification (see Section 6.0 revised report).

- An important consideration in a large-scale remediation process using water is the amount of water required. If the wash water can be recycled, an appreciable amount of water will be conserved. Further, recycling will eliminate the necessity of disposal or treatment of large volumes of radioactive liquids. This report does not identify the recycle capability of the wash water. Future studies should examine whether wash water could be disposed of directly or, more importantly, be recycled several times during the washing process before treatment and disposal.

Acknowledged. As stated in the test plan, a full scale soil washing system would include in-line treatment and wash water recycle to minimize water volumes. One of the objectives of the test was to analyze process effluent to determine what treatment would be required to recycle water. As noted in section 8.0 water treatment test are still in progress. Future studies (ie. vendor tests) will include assessment of recycle systems. Discussion of water treatment and recycle will be added (Sections 1.3 and 2.1 in revised report).

- Physical separation and soil washing is not usually a stand-alone technology. Typically, both the fine soils recovered after washing and the spent wash water are subject to other treatment and disposal techniques, as appropriate, to complete the clean up. Because of problems encountered in the field, studies of the treatment of wash water were not completed. The draft final report should include results on wash water treatment, and on sludges generated during wash water treatment.

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Partial Accept. Refer to previous comment response. The water treatment section will also be modified to include and discuss off-site analysis of samples taken during Nov. 93 tests, and results to date on sludge from clarification tests. However, results of final tests will be written up in a separate WHC support document, per agreement in the January Unit Managers Meeting. The information will be used in the FS III for 300-FF-1.

- To establish the percent of contaminant removal, particle size separation, and distribution of contaminants in the washed soil, the following should first be studied: (1) wash time, (2) wash water-to-soil ratio, and (3) rinse water-to-wash water ratio. The report does not list such information or discuss applicable studies, but should.

Partial Accept. Previous studies (Gerber et al. 1991, Serne et al. 1992) did not address these specific issues, but did discuss the applicability of soil washing at Hanford. This report does include some of the information requested, but additional information will be added (see Tables 6-2 and 7-2).

- Typographical errors, inconsistent statements, and incorrect values were noticed throughout the report. These errors are not addressed in specific comments unless the meaning of the report is affected. The final draft, however, should be carefully proofread to eliminate this kind of problem.

Accept. While edited previously, it was a quick job to meet the milestone. Editing will be more thorough for the final report.

- The variability of the grain size distribution is not addressed. A series of four to six replicate runs under exactly the same set of conditions should be considered to obtain information on the variability of the grain size separation technique.

Partial Accept. Variability of the grain size distribution will be discussed for the samples collected, no additional tests or samples are needed for this assessment. Variability in grain size is expected for this type of equipment and has little or no impact on equipment performance. This will be discussed in the text.

- Test runs were made from hotspots, as well as from less contaminated areas, by excavating soils from 1 meter below the surface. It is more practical to test the specific waste matrix that will be fed to the full-scale system. If the character of the soil changes radically over the depth of contamination, then tests should be designed to separately study system performance on each soil type. These testing considerations should be discussed in the report using the data from the Phase I remedial investigation (RI) report.

Partial Accept. Text will be modified to clarify and explain that soils tested will be fed to a full scale system. Two scenarios that were not tested were separate processing of fly ash, and processing of intact pieces of the "green-layer". It is believed that intact pieces of the green layer

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should not be processed. Text will be added to discuss this and processing of the fly ash.

SPECIFIC COMMENTS

1. Section 1.3.1, Table 1-1, page 1-5

Minimum performance levels for soil treatability tests are presented in this table. The table references "WHC (1991)" for radionuclides.

The footnote does not clearly explain whether performance levels for inorganic and organic contaminants are from the Model Toxic Control Act (MTCA) method B or C, soil cleanup levels. This should be clarified. The basis for setting these performance levels for the treatability tests should also be explained in the text.

Accept. MTCA levels should be for method "C industrial". This will be added to the footnote, and numbers corrected accordingly. The basis for setting these performance levels for the treatability tests will be explained.

2. Section 1.4, page 1-7

This section discusses soil washing as a water-based technology without the use of chemicals. It is seeming doubtful that a water-only-based technology will be adequate for the contaminant reduction in 300-FF-1 soils. Add text that discusses the potential for use of chemical additives.

Not Accepted. The test was successful without the use of chemical additives. Text will be modified for clarification. Use of chemicals was beyond the scope of the test per concurrence by EPA and Ecology with Jan. 20, 1993 meeting minutes, and consistent with the March 5, 1993 Telecon with D. Einan and R. Hibbard.

3. Section 1.4, Figure 1-3, page 1-10

In this figure, screen size and clean soil fraction size are specified in inches, in millimeters (mm) and in both units (for example 1-inch to 2-mm clean soil). A single unit should be used to specify screen sizes and size fractions of processed soils, (either inches or mm) or both units could be used with one in parenthesis.

This comment is also applicable to Figures 2-1a and 2-2a.

ACCEPT. All units will be changed to SI units.

4. Section 1.4, page 1-11, second, fourth, and fifth bullets

The wire mesh screen size for the United States National Bureau of Standards (US) #40 or US #70 should be given in millimeters within parenthesis for clarity.
Accept

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A schematic diagram of the off-line water treatment process used in this study should be included.
Not Accepted, see p. 2.15, Fig. 2-3.

The kind of box to be used and the range of specific activity applicable to disposal of wastes in the low-specific-activity (LSA) boxes should be identified.
Accept, noted as B-25, LSA boxes.

Section 2.1, page 2-1, fourth paragraph, second bullet

The text states that the cleanup levels are "(i) < 20 μR/hr above background radioactivity; (ii) the Residual Radioactivity Program, < 25 mRem/hr; (iii) WHC radioactive threshold concentrations for accessible soils; and MTCA, Method C, soil cleanup levels." A definition for the units "μR/hr" and "mRem/hr" should be provided. The relationship between (μR/hr), (mRem/hr), and pCi/g should be discussed.
Accept, Definitions will be added to the document

Also, when was MTCA Method C agreed upon and where was this documented?
This agreement is documented in Feb. 27, 1992 meeting minutes. This will be added to the text.

5. Section 2.1, page 2-1, last paragraph

Although water treatment is a secondary objective for the tests, data on the type and amount of wastewater generated from washing operations would be useful for selecting appropriate technologies and estimating the cost for treatment and disposal or recycling of wash water. ~~The treatability tests should also incorporate wastewater management (treatment, recycling, and discharge) objectives for soil washing studies to be complete.~~

Comment Acknowledged. Text will be added to discuss this in the water treatment section. (Last Sentence of comment was withdrawn)

6. Section 2.1, page 2-3, third and fourth bullets

The text states, "evaluate separation efficiencies in relation to process parameters." The process parameters should be specified.
Accept, process parameters will be specified.

This section refers to complete dispersion of "agglomerates." It should be clarified whether the agglomerates refer to the green material or to other particles.

Not accepted. This question is from the test plan, and is stated as a DQO. It pertains to both the "green material" and other particles, but the "green material" was not within the planned scope prior to the test.

7. Section 2.1, page 2-4, "question" 7

The scope of the question should include whether more than one indicator analyte is required, such as an inorganic ~~and an organic~~.

Partial accept. The question will be revised to "analytes", and discussion will be added to the text on potential inorganic analytes. However no organic indicator is needed (Section 15).

8. Section 2.2.1, page 2-4, second paragraph

The statement "to spray rocks 25 mm to 150 mm to remove fine soil particles" should be clarified, as should statements that "Particles 2 mm to 2.5 mm in diameter were sprayed" and "Particles < 25 mm were sprayed." It appears that these statements contain typographical errors.

Accept. Statements will be clarified. 2.5 mm should 25 mm.

9. Section 2.2.1, page 2-4

This section briefly describes the physical separations prototype system with clean soil. Information on the amount of water used and generated, the amount of soil processed, and the operational period of each process should also be included to allow comparisons with other test runs.

Partial Accept. Additional information will be added (now Section 5.0). However, the pre-test run was a shake-down test of the system. No samples or analyses were conducted. Therefore there would be little or no added value in including information such as the amount of water generated and other details on the pre-test. These are in the WHC Support Document referenced.

10. Section 2.2.2, page 2-5

Information on the estimation method and the amount of soil processed during the first day of operation should be included, and minor system modifications made on the second day of the test should be identified. The period of each process operation during the first and second days of the test should also be specified.

Accept. The estimation method will be explained, and periods of operation on each day of the test stated. This section will be reorganized for clarity.

11. Figure 2-16, page 2-7

This figure presents operational parameters for equipment used in test run #1. Information on the following parameters should also be included:

- The feed rate to each part of the equipment (such as Grizzley, primary vibrating screen, belt conveyor, trammel screen, and secondary vibrating screen)
- The flow rate of the slurry pumps
- The rationale for the selected operational parameters

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Accept

12. Section 2.2.2, page 2-8, first paragraph

A total of 17.5 tons of material was processed during test run #1. The text should specify the total duration of the tests for processing this material and the amount of soil processed each day.

Accept. Text will be reorganized for clarity, and the requested information added (Section 6 and Section 7 for Test #2).

13. Section 2.2.2, page 2-8, last paragraph

The amount of additional storage volume created by evaporation in each fractionation tank should be identified.

Accept. An estimate of the volume of effluent evaporated will be added (Section 8.0).

14. Section 2.2.2, Table 2-2, page 2-9

The number of process soil and effluent samples collected in test run #1 is shown in this table, categorized by laboratory analysis, physical analysis (XRF and gamma spectrometry), and toxicity characteristic leaching procedure (TCLP) analysis. The discussion on page 2-8 (first paragraph), identifies the off-site analytical laboratory, and PNL. The report should identify which samples were sent to which laboratory. A revised table showing sampling location, sample designation, and the type of analysis to be performed for samples sent to each laboratory would be useful.

This comments is also applicable to Table 2-3.

Accept. All labs will be identified in Section 1.0. Tables will be revised to clarify where samples were sent, offsite or onsite and throughout the text labs will be referred to as onsite or offsite.

15. Section 2.2.3, page 2-10, last paragraph

The text states that "A US #40 sieve was used for this test (Test #2) because soils processed in Test #1 using the US #40 sieve did not meet test goals." This statement is confusing because the same sieve (US #40) was used both in tests #1 and #2.

Accept. Statement will be deleted and text clarified.

16. Section 2.2.3, page 2-11, third paragraph

Additional soils containing green material were processed with equipment adjustments. For example, sprays were added to the 0.425-mm screen and the speed of the screen vibration was reduced. The operating parameters (such as

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nozzle pressure and flow rate and the speed of screen vibration), however, are not shown, but should be, in Figure 2-2b.

Accept. Parameters requested will be added to the Figure (Now Table 7-2).

17. Section 2.2.4, page 2-11, second paragraph

Operating parameters, sampling locations, sample numbers, and types of analyses performed should be included for water treatment tests conducted following completion of test run #2.

Accept. Text and Table will be revised to more clearly show sampling locations, sample numbers, and types of analyses performed for water treatment tests.

18. Section 2.2.4, page 2-16, second paragraph

The text states that approximately half of the water from the fractionation tanks was processed through the clarifier skid. The handling and disposal of the clarified effluent, however, is not discussed, but should be.

Partial Accept, This is stated in sections 2.5 and 3.4. Text will be reorganized for clarification. (Now Sections 8.0 and 9.0).

19. Section 2.4.2, page 2-19, second and fourth bullets

The kind of filter used to process effluent samples before shipment to the laboratory for analysis should be identified. The kind of filter used to filter solids out of the process effluent to conduct the TCLP analysis should also be identified.

Accept. The type of filter used to process effluent prior to shipment and the filter used to remove solids for TCLP analysis will be identified (Now Section 4.0).

20. Section 2.4.2, pages 2-18 and 2-19

This section addresses collection of process samples. The rationale and procedures used to collect samples (grab or composite) at each sampling location should be explained.

Partial Accept. This information is provided in the test plan and RI work plan, and need not be repeated here. However, any deviations from the test plan will be noted in this report.

21. Section 2.4.3, page 2-19, first paragraph

The text references Tables 2-2 and 2-3 for post-process samples. These tables, however, do not identify post-process samples. This discrepancy should be corrected.

Accept. Tables will be revised to identify post-process samples.

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22. Section 2.4.3.1, page 2-19

The text should specify the procedures used and the type of samples collected (whether grab or composite) from the >150-mm material piles. Also, the text should state whether the rocks, and soils rinsed off the rock, were analyzed for chemical and radiological contamination.

Further, the text states that one 5-gallon (gal) sample for test run #1 and one for test run #2 were sent to PNL. Two samples for test run #1 and none for test run #2 are shown in Tables 2-2 and 2-3. This discrepancy should be corrected as appropriate.

Accept. Text and tables will be revised for consistency and text clarified.

23. Section 2.4.3.2, page 2-19

The text states, "The composited material was wet sieved. Each fraction was then dried, weighed, and mixed with similar sized material from other process piles." This statement should be clarified. The purpose of mixing similar sized material from other process piles should be explained. This comment is also applicable to Sections 2.4.3.3 and 2.4.3.4.

Accept. Will attempt to explain this. The explanation is somewhat complex and has previously led to confusion (see Section 4.0).

24. Section 2.4.3.3, page 2-20

The text states, "Two 300 ml samples were taken from each of 16 locations." The 16 locations are not identified, but should be. Further, it is not clear whether these samples were from the test run #1 pile or the test run #2 pile. This should be clarified. This comment is also applicable to Section 2.4.3.4.

Partial Accept. The exact locations of the 16 samples can not be identified nor would they add value to the report. As stated, the samples were obtained randomly from each process pile. Text will be revised for clarity to show which samples were taken on which day.

25. Section 2.5, page 2-20

The first sentence (first paragraph) states that "the process effluent was . . . collected in <u>three</u> . . . tanks (emphasis added)." In Section 2.2.2 (page 2-8, sixth paragraph), the text states that the process effluent was pumped to <u>two</u> fractionation tanks. This inconsistency should be corrected as appropriate.

Accept. The discussion in Section 2.2.2 will be deleted. Section 2.5 (now Section 9.0) will be further clarified.

The second paragraph states, "Process effluent was recycled through the treatment system and back into the fractionation tanks until solids were removed from the tanks and effluent met purgewater acceptable standards." In

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Section 2.2.4 (page 2-16, second paragraph), the text states that approximately half of the water was processed in a single cycle through the clarifier skid. It is not clear whether all of the water containing fine solids was treated in a single cycle or several cycles. This should be clarified.

In the third paragraph, the text states that the solids removed from the effluent were contained in low-specific-activity boxes. The number of boxes, the amount of solids contained in each, and sampling and analysis procedures used should also be discussed.

Accept. Text to be revised for clarity and discussion of procedures modified to identify what was accomplished to date as opposed to what was planned. As noted in the report water treatment tests were not completed. Therefore, what was planned and what actually happened were two different things. The amount of solids in the LSA boxes to date is minimal, this will be quantified and stated.

26. Section 3.2.2, Table 3-8, page 3-10

Particle sizes are shown in the first row of this table. It is not clear whether the sizes are greater than or less than the given values. In the last column of the first row, zero (0) size is listed. The meaning of "0" size should be explained in the text or in a footnote to the table. The values for total uranium in the last row are presented in pCi/g by converting total uranium milligrams per kilogram (mg/kg) to pCi/g. The source for analytical results in mg/kg for total uranium should be cited in a footnote. Further, the reported values are misaligned, making it difficult to evaluate the results. The values corresponding to lead (Pb) appear to be very high, but actually are not. Those values may be for uranium in mg/kg. At any rate, the reported values listed for U in pCi/g by using a conversion factor of 0.35 are incorrect. These discrepancies should be corrected.

Accept. These changes have been noted and will be made.

27. Section 3.2.2, page 3-11, third paragraph

This paragraph discusses the fact that performance levels for uranium were met in the course fractions between 2- to 9.5 mm. A table that shows which performance levels were not met and a brief statement to explain how each problem will be addressed in future tests would be helpful.

Partial Accept. Text will be revised for clarity and additional explanations provided. A table showing performance levels not met is deemed unnecessary with appropriate text revisions (see Section 6.0).

28. Section 3.3.2, page 3-25, sixth paragraph

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The source for the contaminants tetrachloroethylene (PCE) and trichloroethylene (TCE) found in test run #1 process water samples should be identified.

Partial Accept. The source of these constituents are unknown. This entire discussion will be revised to state that VOCs were detected at very low levels and are not a contaminant of concern in the north pond. The source of these VOCs with low detects will not be discussed.

29. Section 3.4, page 3-34, first paragraph

The text states that, "As a result of . . . decided to drain the system for the winter." It is not clear whether the decision was to drain the contents of the fractionation tanks, the contents of the clarifier or the entire water treatment system. The text should also identify where the contents of the system were drained.

Accept. Only the water treatment unit was drained. Contents were pumped to the Frac Tanks. This will be clarified.

30. Section 3.5, page 3-34

This section and Table 3-18 only mention the MTCA residential standards as potential ARAR's. The reference should be more general in this section.

Accept, Section 3.5 will be revised to clarify that Table 3-18 is for comparison only (Now Section 12.0). The title of the section and text will be revised.

31. Section 5.0, page 5-1, first paragraph

The following minimum radioactive performance levels were provided in this paragraph:

- <20μR above background radioactivity
- The Residual Radioactivity Program, Version 4.0, <25 mRem/hr
- Westinghouse Corporation (WHC) radioactive threshold concentrations for accessible soils

The results of tests #1 and #2, however, are not compared with these minimum radioactive performance levels. The text should include these comparisons.

Accept. Comparisons will be discussed in Section 12.0. These bullets will be deleted and replaced with clarifying text.

REFERENCE

DOE 1992. Phase I Remedial Investigation Report for the 300-FF-1 Operable Unit. DOE/RL-92-43 Draft B. U.S. Department of Energy. September.

CORRESPONDENCE DISTRIBUTION COVERSHEET

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Subject: TRANSMITTAL OF RESPONSES TO REGULATOR COMMENTS FOR DOE/RL-93-96, "PHASE II REMEDIAL INVESTIGATION REPORT FOR THE 300-FF-1 OPERABLE UNIT," DRAFT A

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Enclosure is the same as outgoing letter number 9451719D

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