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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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May 14, 2004

Mr. Larry Romine
Richland Operations Office
United States Department of Energy
P.O. Box 550; MSIN: A6-33
Richland, Washington 99352

Dear Mr. Romine:

61536

Re: Review of the Feasibility Study and Proposed Plan for the 200-TW-1 Scavenged Waste Group, the 200-TW-2 Tank Waste Group, and the 200-PW-5 Fission-Product Rich Waste Group Operable Units, DOE/RL-2003-64, Draft A Re-issue and DOE/RL-2004/10, Draft A Re-issue

61537

The Washington State Department of Ecology (Ecology) reviewed the following:

Feasibility Study for the 200-TW-1 Scavenged Waste Group, the 200-TW-2 Tank Waste Group, and the 200-PW-5 Fission-Product Rich Waste Group Operable Units, DOE/RL-2003-64, Draft A Re-issue, and

Proposed Plan for the 200-TW-1 Scavenged Waste Group, the 200-TW-2 Tank Waste Group, and the 200-PW-5 Fission-Product Rich Waste Group Operable Units, DOE/RL-2004/10, Draft A Re-issue

Ecology comments on these documents are enclosed. There are major issues to resolve with these documents and Ecology requests joint discussions with the United States Environmental Protection Agency and the United States Department of Energy to develop a consensus approach to document revision and re-submittal.

If you have any questions, please contact me at (509) 372-7921, or Noe'l Smith-Jackson at (509) 372-7926.

Sincerely,

John B. Price

John B. Price
Environmental Restoration Project Manager
Nuclear Waste Program

cc: See page 2

cc: Mike Goldstein, EPA
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Todd Martin, HAB
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Noe'l Smith-Jackson, Ecology
Environmental Portal
Administrative Record 200-TW-1, 200-TW-2

DOCUMENT REVIEW

Document: ***Feasibility Study for the 200-TW-1 Scavenged Waste Group, the 200-TW-2 Tank Waste Group, and the 200-PW-5 Fission-Product Rich Waste Group Operable Units*, DOE/RL-2003-64, Draft A, Re-Issue**

Reviewer: **Washington State Department of Ecology**

Date: **May 12, 2004**

General Comments

1. Reviewing these documents is very frustrating because is appears that there was no internal review completed before giving the document to the regulators. For example, simple things like telling the reader to see Table 2.8 when it should say Table 2.11 and having no units on numerical quantities contributes to a lack of confidence in the document technical analysis. In short, it appears that the U.S. Department of Energy (USDOE) is intentionally or unintentionally using the regulators for editorial review, when instead we should be focused on other more important aspects of the review.

2. Chapter 1.0, page 1-2, paragraph 2, indicates that the feasibility study (FS) covers the 200-TW-1, regulated by U.S. Environmental Protection Agency (EPA), and the 200-TW-2 and 200-PW-5 regulated by the Washington State Department of Ecology (Ecology). Ecology and EPA agreed to the integration of the 200-TW-1 and 200-TW-2 RI/FS, and then added the 200-PW-5 RI/FS, with the understanding that it would be more cost-effective for USDOE as compared to executing three separate RI/FS. The result, however, is that the FS as structured now is extremely complex and impossible to process within the Tri-Party Agreement (TPA) prescribed review period. The task of reviewing and commenting on the proposed remedy will be arguably impossible for the general public. USDOE, in consultation with the regulatory agencies, needs to develop a strategic approach to the remedy selection and public involvement for same.

3. Per MTCA for nonradionuclides (WAC 173-340-740[7][c][iv][B] or -740[7][d][i][A]), when comparing COPC soil concentrations to cleanup levels (or background levels when background is the default cleanup level), a 95% UCL concentration (based on either a normal or lognormal distribution, as demonstrated) should generally be used. Note that the "true mean" (WAC 173-340-740[7][c][iv][B])refers to the population mean which is not known but can be conservatively estimated via the 95% UCL on the sample mean.

   In addition, for nonradionuclides: (1) no single sample concentration shall be greater than 2x the soil cleanup level, and (2) <10% of sample concentrations shall exceed the soil cleanup level (WAC 173-340-740[7][e]).

   Finally, re-censored nonradionuclide data (<PQL):
   - Half detection limit (DL/2) should be assigned when <15% of the measurements are <PQL (WAC 173-340-740[7][f][i])
   - Full detection limit (DL) should be assigned when measurements are >DL but <PQL and <15% of the measurements are <PQL (WAC 173-340-740[7][f][ii])

- A UCL should be calculated with Cohen's method when 15-50% of the measurements are <PQL and the data are assumed to be lognormally or normally distributed (WAC 173-340-740[7][f][iii])
- The maximum concentration should be used when >50% of the measurements are <PQL (WAC 173-340-740[7][f][iv]).

4. The results of risk evaluation should all be in one place. As it currently stands, the reader must look to several places in different documents to find the detailed results. Page 2-61, for example, states that some results are found in section 2.7, others in Appendix C, and yet others in a different document (the RI Report DOE/RL-2002-42). This is extremely cumbersome to a reader attempting to understand the details.

5. Clarify exactly what criteria will be used to make decisions concerning radiological contamination. As it currently stands, the dose and risk assessment results are inconsistently compared to several criteria. It is unclear which of the criteria will actually be used to make decisions, and it is unclear how all the different criteria will be used.

   For example, Section 6.1.1 states that the CERCLA risk range of 1E-4 to 1E-6 for human health will be used as the indication of protectiveness. Yet Section 3.4 states that the remedial action objective (RAO) is to prevent exposure to soil that results in a radiological dose above 15 mrem/year. Which is the decision-making criterion, dose or risk?

   Further, the dose and risk assessment results are compared to different criteria in different places, and it is not clear how this information is being used. For example, in Section 2.7.1.2, the radiological risk assessment results are first compared to the target risk level of 1E-5. This target risk level was not discussed in the section covering RAOs or PRGs, so it is unclear where it came from and how it will be used. Then, the risk assessment results are compared to the CERCLA target risk range of 1E-4 to 1E-6. Finally, in section 2.7.4.1 the dose assessment results are compared to the 15 mrem/year PRG. In many cases, the dose results are presented at time 0 years, yet section 3.4 states that comparison to the 15 mrem/year criteria is to be over a period from 50 to 1,000 years. All this leaves the reader unclear as to which criteria will be used to make decisions and unclear about the purpose of all these different criteria.

   In addition, dose and risk assessment results are presented for the waste sites with and without clean cover in an industrial scenario, as well as for an intruder scenario. It is not clear how these different cases will be used to make decisions.

   A similar situation occurs for the protection of groundwater. Sections 6.1.1 and 3.4 (RAOs) state that protection is measured against the MCLs identified in 40 CFR 141, yet section 2.7.1.2 compares the radiation dose from contaminated groundwater to a target dose level of 4 mrem/yr as well as to a target risk level of 1E-6. So, groundwater does not in fact seem to be compared to the MCLs, and it is not clear where the target risk level of 1E-6 comes from.

6. The radiological dose assessment methodology for protection of groundwater appears incorrect. As it currently stands, radiation dose from the groundwater pathway is calculated by RESRAD and then compared to a 4 mrem/yr criterion. However, the doses calculated by RESRAD are *effective dose*, while the criterion in 40 CFR 141 is specified as *equivalent dose*.

Effective dose and equivalent dose differ by tissue weighting factors. As such, comparing the groundwater pathway effective dose to 4 mrem/yr effective dose has no regulatory basis.

The solution to this problem is simply to compare the maximum groundwater concentrations calculated by RESRAD to the MCLs in 40 CFR 141, which is in fact consistent with the RAOs as specified in section 3.4.

7. Risk values are commonly equated to radiation dose. For example, the document states that 15 mrem/yr roughly equates to a risk of 1E-4. Although this dose/risk equivalence statement may be used by EPA, the fact remains that whatever the risks are at dose levels corresponding to radiation protection criteria, for example 15 mrem/yr, the risks are too small to be detectable with current methods, and therefore they must be hypothesized. The document gives the impression that the risks are actually known, when in fact they are not. The document needs a discussion of the fact that the risks are hypothesized by extrapolating from high dose, high dose-rate health effects data assuming no low-dose threshold, and that this is only one of many possible models of the dose-response relationship.

8. Appendix C is essentially a more detailed version of Section 2.7. Therefore, any comments from Section 2.7 that are also applicable to Appendix C should be addressed in Appendix C. In a related issue, I think it would be easier on both the reviewer and USDOE to simply have one section dealing with risk assessment. It seems a waste of time to produce, and then have to review, both Section 2.7 and Appendix C, when almost everything in Section 2.7 appears again in Appendix C.

9. All numerical quantities should have associated units. Units are missing in many of the tables.

Specific Comments

1. **Page 2-12, Section 2-2**: A review of SEC. 2.2 PHYSICAL SETTING AND SEC. 2.3 NATURAL RESOURCES against the Hanford Site National Environmental Policy Act (NEPA) Characterization (PNNL-6415 REV 14) did not reveal any discrepancies. *No correction required.*

2. **Page 2-12, Section 2.2**: Ecology noted that no specific information on soils present in the Operable Units is provided in Section 2.2. Please incorporate specific information on the soil types or insert a reference to PNNL-6415 Rev. 14, Section 4.2.4 Soils (WAC 197-11-444 and -960.B.).

3. **Page 2-12, Section 2.2**: No specific information is provided in air or air quality in Section 2.2. Please add pertinent information on the air quality at the operable units (OUs). (WAC 197-11-960.B.2)

4. **Page 2-48, Section 2.6.2.1.1, second bullet**: The text appears to be contradictory. It states the trenches in this specified 216-B-20 Series, except for 216-B-42, are all located in the same area, are constructed the same, operated during the same period of time and duration, and accepted waste from the same source. If Trench 216-B-42 does not share these characteristics, why is it in the 216-B-20 Series? Please clarify.

5. **Page 2-52, Section 2.6.2.1.3, #3**: Based on the contamination inventory difference of 216-B-53A from the analogous sites that it has been categorized with, should 216-B-53A be a stand-alone site?

6. **Page 2-54, #6**: The text states that contaminants were injected directly into the aquifer, and that they remain in the soils at and just above the current water table level. Is there potential for migration? If not, what is the basis for this answer?

7. **Page 2-61, paragraph 1**: The text states that results of the risk assessment for five representative sites are reported in DOE/RL-2002-42, whereas results of 216-B-58 Trench and several analogous sites are presented in the current document. This fragmentation of results decreases the "ease of review," as well as the transparency of the analysis.

8. **Page 2-61, paragraph 2**: The Tri-Party response to HAB Consensus #132 (Klein et al, 2002) states that the industrial scenario is appropriate for the core zone for the foreseeable future (which is at least the period of institutional controls, i.e., 150 yr). However, for the post-institutional control period (>150 yr), other scenarios should be evaluated. In this regard, evaluation of alternate scenarios (e.g., Native American, residential, farmer, recreational) would not only be for "comparison purposes" (to the current industrial scenario) but may more accurately model future (i.e., post-institutional control) land use.

9. **Page 2-62, paragraph 1**: The first sentence should be revised to clarify that risk only relates to carcinogens (e.g., delete "and noncarcinogenic constituents that pose a chronic toxic effect to human health").

10. **Page 2-62, paragraph 2**: Re the first sentence, note that standard Method C industrial soil cleanup levels (WAC 173-340-745) and standard Method C industrial air cleanup levels (WAC 173-340-750) include only soil ingestion and air inhalation pathways, respectively. These scenarios do not consider food chain exposure. Please acknowledge this source of uncertainty in risk estimates.

    Re the second sentence, the 95% UCL soil concentration or maximum concentration (WAC 173-340-740[7]) should generally be used to compare against standards (not the mean concentration).

11. **Page 2-62, paragraph 4**: One of the nitrates mentioned should presumably be nitrite (per Table 2-6).

12. **Page 2-64, paragraph 1**: It should be noted that the conversion of dose to risk depends both on the dose to risk conversion factor (e.g., 5E-7 risk/mrem for fatal cancers, ICRP 60) and the exposure duration (e.g., 30 yr). Also, the 15 mrem/yr here is effective dose, whereas the 4 mrem/yr MCL is equivalent dose.

13. **Page 2-64, paragraph 2 and 3**: The reference to Table 2-8 should be Table 2-11.

14. **Page 2-64, paragraph 6**: The ELCR (0.13) for 216-B-58 Trench is extremely high and a soil cover should be mandatory.

15. **Page 2-66, paragraph 4**: The ELCR (4.3) for 216-B-26 Trench is extremely high and a soil cover should be mandatory.

16. **Page 2-66, paragraph 5 and 6:** Re groundwater protection for radionuclides, the text does not appear consistent with data presented in Table 2-5. That is, Table 2-5 shows that only one of the representative sites (216-B-58 Trench) and only one of the analogous sites (216-B-50 Crib) met the groundwater protection PRGs.

    Also, the texts states that Table 2-10 contains groundwater dose and risk for 216-B-85 Trench, although this is not the case.

17. **Page 2-67, paragraph 1 and 2**: Re groundwater protection for radionuclides, the text with STOMP modeling (but not RESRAD modeling, see comment for page 2-66, paragraph 5 and 6) appears consistent with data presented in Table 2-5.

    Note that this paragraph is under Radiological Results (section 2.7.1.2), so why mention nonradionuclides (e.g., nitrate, nitrite, sulfate)?

18. **Page 2-67, paragraph 4**: The text states that the ecological PRG was exceeded for Mn at 216-B-26 Trench, but Table 2-6 shows no corresponding exceedance of this ecological PRG. Please clarify.

19. **Page 2-69, paragraph 2**: Please note the uncertainty in employing the analogous site method.

20. **Page 2-70, paragraph 2, bullet 1**: For 216-B-38, Table 2-5 indicates that the human health PRG is met for radionuclides with a soil cover and that the dose is negligible at times 0, 150, and 1000 yr (<4E-13 mrem/yr). However, the text indicates that human health is not protected due to the longevity of the contaminants. Please clarify.

21. **Page 2-72, paragraph 1, bullets 3 and 4**: For 216-B-47, the text states that groundwater and ecological receptors are not protected without a soil cover but are protected with a soil cover. Table 2-5 shows that groundwater is not protected, and ecological receptors are protected for chemicals but not for radionuclides. Please reconcile text with this table information.

22. **Page 2-147 to 2-150, Tables 2-5 and 2-6**: Similar to the way in which data are presented for human health protection for radionuclides (i.e., with and without a soil cover), please clarify the presence/absence of a cover with respect to human health protection for chemicals, groundwater protection for radionuclides, and ecological receptor protection for chemicals and radionuclides. There is currently some inconsistency between text and tables in this regard (e.g., see comment for page 2-72, paragraph 1, bullets 3 and 4).

23. **Page 2-64, Section 2.7.1.2**: Dose criteria of 15 mrem/yr and 4 mrem/yr are presented. Clarify that the 15 mrem/yr is effective dose, while the 4 mrem/yr in 40 CFR 141 is equivalent dose. Clarify effective or equivalent dose every time throughout the document that these criteria are specified. It would be helpful to non-technical readers to have a short discussion on the difference between effective and equivalent dose.

24. **Page 2-64, Section 2.7.1.2**: Under subsections titled Shallow Zone - Industrial Scenario - Clean Cover and Shallow Zone - Industrial Scenario - Without Clean Cover, Table 2-8 should be Table 2-11.

25. **Page 2-64, Section 2.7.1.2**: Subsecton titled Shallow Zone - Industrial Scenario - Without Clean Cover indicates that the 216-B-7A Crib exceeds the 15 mrem/yr dose standard because RESRAD calculated a dose of 15.1 mrem/yr. This points out a problem with significant figures and uncertainty. The uncertainty of these calculations is large, and it does not seem appropriate to carry three significant figures of accuracy when presenting the results. Otherwise, it indicates a level of knowledge that does not exist. The document should use significant figures that are consistent with an estimated level of uncertainty.

26. **Page 2-64, Section 2.7.1.2**: Subsection titled 216-B-58 Trench states that the ELCR is never below the target risk level, yet Table 2-9 indicates a time of 280 years to reach the PRG. Again, as stated above in the general comment section, this leads the reader to wonder exactly what criterion is being used to make decisions. The text indicates the site never reaches one target level, yet the table indicates it takes 280 years to reach a different target level. Clarify which criteria are being used for which purposes.

27. **Page 2-66, Section 2.7.1.2, Deep Zone**: Specify the point of compliance for evaluating groundwater protection.

28. **Page 2-66, Section 2.7.1.2, Deep Zone**: Specify the origin of the 1E-6 target risk level.

29. **Page 2-66, Section 2.7.1.2, Deep Zone RESRAD modeling**: Comparing the RESRAD groundwater pathway results, expressed as effective dose, to 4 mrem/yr has no regulatory basis, as 40 CFR 141 uses an equivalent dose criteria (not effective dose). It would be more appropriate to compare maximum groundwater concentrations calculated by RESRAD to the MCLs in 40 CFR 141.

30. **Page 2-67, Section 2.7.1.2, Deep Zone STOMP modeling**: Include a quantitative summary of the STOMP results, and clarify how the results of RESRAD and STOMP will be used. Clarify why different fate and transport models were used for different waste sites.

31. **Page 2-67, Section 2.7.2.2**: When concentrations exceed the BCGs, quantify the exceedance.

32. **Page 2-68, Section 2.7.3**: The 216-B-58 Trench meets the dose goal but exceeds the risk goal. Clarify how this information will be used in decision making. Which criteria will be used to make decisions?

33. **Page 2-147 through 2-150, Tables 2-5 and 2-6**: Doses at a time of 50 years should also be presented, since the 15 mrem/yr criterion is supposed to be evaluated from 50 to 1000 years, as stated in section 3.4.

34. **Page 2-152, Table 2-8**: Add a column to present the year in which the 15 mrem/yr criterion for an intruder is not exceeded.

35. **Page 2-147 and 2-155, Tables 2-5 and 2-11**: Doses calculated to be less than some determined value should be listed as zero. For example, a dose of 3.5E-13 mrem/yr should be stated as zero. These numbers only come out of RESRAD because the computer holds a large number of decimal places.

36. **Page 3-1, Section 3.0, third paragraph, second sentence**: Please revise text as follows "... address the types of contaminants present, and it facilitates the identification of potential ARARs.

37. **Page 3-2 through 3-5, Section 3.1.2, second paragraph and 19 bullets**: Delete text between "... in the CLUP-EIS (DOE/EIS-0222-F) and associated ROD (64 FR 61615), which were issued in 1999." and "Consistent with the Future Site Uses Working Group, the CLUP-EIS was developed ...." The bullets do not add any 'value' to the document and are redundant. The remaining text should be reviewed to eliminate redundancy.

38. **Page 3-5, Section 3.1.2, third paragraph, last sentence**: Add a parenthesis ")" at the end of the sentence.

39. **Page 3-5, Section 3.1.2, fourth paragraph, fourth sentence**: Please revise text as follows "... remediate soil waste sites to support industrial land uses, remediate groundwater for the most beneficial use, lease facilities for ..."

40. **Page 3-7, Section 3.4, second paragraph, second sentence**: The sentence refers to "The RAOs specific to the 200 Area for soils, solid wastes, and groundwater were developed in the Implementation Plan (DOE/RL-98-28)." In this instance, the RAOs from the Implementation Plan should be repeated in this document. Please insert additional RAOs developed in the Implementation Plan.

41. **Page 3-7, Section 3.4, RAO-1**: Please revise the text as follows "...human health, or the screening criteria in WAC 173-340-900, Table 749-3, for ecological...."

42. **Page 3-7, Section 3.4, RAO-1**: For clarification purposes, Ecology suggests splitting RAO-1 into two separate RAOs, one dealing with nonradiological risk, the other dealing with radiological risk.

43. **Page 3-9, Section 3.5.1.1**: Both the HFFACO and the 200 Area Implementation Plan identify MTCA as an applicable ARAR; however, the Method C industrial soil cleanup levels in WAC 173-303-745(5) have not been adequately incorporated into this text. Please revise text accordingly, specifically for human health protection (i.e., concentrations that, due to direct contact with contaminated soil, are estimated to result in no acute or chronic noncarcinogenic toxic effects on human health using a hazardous quotient of one (1) and concentrations for which the upper bound on the estimated excess cancer risk is less that or equal to one in one hundred thousand (1×10^{-5})).

44. **Page 3-9, Section 3.5.1.2, first paragraph, last sentence**: Please provide the definition for the acronym SLERA.

45. **Page 3-10, Section 3.5.2.1, fourth paragraph**: Please revise text as follows "...The soluble salts of uranium present noncarcinogenic toxic effects that are evaluated by an HQ and estimated excess cancer risk, in addition to the incremental cancer risks...."

46. **Page 3-13, Section 3.5.3.2, fourth paragraph**: The text states, "For radionuclides in the vadose zone, concentrations of residual contaminants are considered protective of groundwater if the residual levels do not result (via migration through the vadose zone) in concentrations that exceed groundwater remediation goals." It is not clears what the residual contaminant concentration is or how it was calculated. Please add explanatory text and insert applicable values into Table 3-2.

47. **Page 5-4, Section 5.2.3.1**: The text states that clean fill could be found at a number of sites including borrow pits. Ecology requests that the USDOE identify the borrow sites under consideration during remedial action planning. The *Final Hanford Comprehensive Land Use Plan EIS* DOE/EIS-0222-F and DOE/EA-1403 *Use of Existing Borrow Areas* list borrow pits that contain State or Federal plant species of concern. USDOE should not assume that such borrow areas may be used without mitigation measures, including protection of such species. For example, in the cost estimates, Pit 30 is assumed to be the borrow pit that will be used. Pit 30 is the site of certain Piper's daisy individuals (a Washington State species of concern). A survey of the Pit 30 site where fill will be extracted will be necessary to ensure that no adverse impact will result.

48. **Page 5-7, Section 5.2.4**: The text states that vadose zone monitoring will be performed as part of cap performance monitoring, if practical for the modified RCRA Subtitle C barrier design. Should a Hanford barrier be installed above a TRU waste site, from the text describing the cap in place in 216-B-57, some performance monitoring should also be conducted. Please add more specific information on the performance monitoring that would be conducted for a Hanford Barrier.

49. **Page 5-5, Section 5.2.3.2**: The section indicates that soil contaminated with TRU at levels of concern would be disposed at WIPP. Ecology requests confirmation from the USDOE that the State of New Mexico and the Carlsbad Office are in agreement that the soil from this CERCLA cleanup action may be disposed at WIPP, which is a RCRA permitted facility. Please provide approved WIPP forecasts that show the volume of soil from these CERCLA cleanup actions that Hanford will be allowed to send.

50. **Page 5-8, Section 5.3.1**: The text states that sludge from the 241-T-361 and 241-B-361 Settling Tanks can be assumed to be TRU; therefore, it will be disposed at WIPP. As above, please provide confirmation that the waste will be accepted at WIPP.

51. **Page 6-3, paragraph 2**: There is no mention of the CERCLA metric for noncancer nonradionuclides with respect to protection of human health. In this regard, the text should mention a HI<1 as an acceptable threshold.

52. **Page 6-3, Section 6.1.1, second paragraph**: The text states "Protection of groundwater was measured against groundwater protection standards derived from the MCLs identified in 40 CFR 141 and on fate and transport modeling, reported in DOE/RL-2002-42." MTCA is an applicable ARAR and establishes requirements for the protection of groundwater that should

be included in this text and evaluation. Please revise text to include this evaluation where appropriate.

53. **Page 6-3, Section 6.1.2, second paragraph**: The text references a document (EPA/540/2-88/002, Technological Approaches to Cleanup of Radiologically Contaminated Superfund Sites; EPA/540/G-89/004), Ecology suggests this is an incorrect reference, and the proper references should be EPA/540/G-89/006, CERCLA Compliance with Other Laws Manual: Interim Final, and EPA/540/G-89/004, Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA.

54. **Page 6-5, Section 6.1.7**: The text states that monitoring costs are included; however, in every discussion thereafter, groundwater monitoring is specifically excluded. Those long-term monitoring costs are said to be addressed in the 200-BP-5, 200-PO-1, 200-UP-1, and 200-ZP-1 Operable Units. Considering that some contaminants are already in the groundwater as a result of disposal in 200-TW-2 units (specifically those disposed via the 216-B-5 reverse/injection well), Ecology requests that costs of groundwater monitoring be included to allow the decision-makers to evaluate the full costs of the alternatives presented (except for Alternative 1, which assumes no monitoring).

55. **Page 6-7, Section 6.2, third paragraph**: Table 8-1 includes the 216-B-51 French Drain as an analogous site. It is not listed under the 216-B-46 Crib representative site. Please revise text to include the analogous site.

56. **Page 6-27, Section 6.2.3.7**. This Cost section does not include a discussion of costs that could arise from characterizing, certifying, and packaging 8.4 m^3 of TRU waste from the 216-B-7A Crib. Please address those incremental costs in text (i.e., fraction of waste acceptance costs at ERDF, similar to onsite disposal in the mixed waste trenches). Please provide the bases for the estimates in Appendix Section D.3.3.5.

57. **Pages 6-28 and 6-32, Sections 6.2.4.1 and 6.2.4.6**: Section 6.2.4.1 states that "Capping at the 216-B-5 and 216-T-3 Injection/Reverse Wells is impracticable...." and "Capping at the 200-C-114 Pipeline also is impracticable." However, Section 6.2.4.6 states that "The capping alternative is considered implementable at all waste sites." and does not address technical impracticability. These sections should be revised for consistency.

58. **Sections 6.2.4.6 and 6.2.5.6**: Ecology supports the USDOE's plan to conduct environmental evaluations of the impacts of removing very large volumes of silt/loam soil from an appropriate borrow area (Section 6.2.4.6 and 6.2.5.6). Such an evaluation led the USDOE to identify Piper's daisy at Pit 30 and to commit to biological review prior to removal in the area where it appeared. The State of Washington supports cleanup of Hanford Site and wishes to allow the public to comment on all aspects of cleanup planning.

59. **Page 6-34, Sections 6.2.5.1 and 6.2.5.2**: The text describing 216-B-46 Crib and Its Analogous Sites states that "These sites are assumed to only have shallow contamination, or in the case of tanks, contamination associated only with the sludge." The text describing the 216-B-7A Crib and Its Analogous Sites states that "The sludge at these sites is assumed to contain all the risk; removal of the sludge would result in these sites meeting RAOs." The text in Section 6.2.5.2 states that "All of the representative sites waste groups have deep

contamination except the 216-B-58 Trench and its analogous sites, where ...." These sections should be revised to be consistent.

60. **Page 6-44, Section 6.3.2.6**: The text states that environmental justice impacts would be minimal for Alternatives 1,2,4, and 5 because future use restrictions apply only to a small part of the Central Plateau and it would be under active waste management industrial land use. Ecology suggests that the impacts of some alternatives affect areas beyond the Central Plateau; therefore, they made cause impacts to native peoples beyond the area of the cleanup. Extraction of silt/loam soils from borrow pits across the site may of such volume that site restoration and reuse is precluded for future populations. Alternative 2 measures to maintain soil covers would not preclude additional quantities of contaminants from entering the groundwater, which then travels under the Hanford Site to the nearby Columbia River. This potentially could impact usual & accustomed uses by native peoples. Ecology suggests that environmental justice issues not be addressed only for the Central Plateau but for all areas and populations affected by the alternatives described here.

61. **Page 7-3, Section 7.2**: Text in Section 7.2 should be reviewed against Tables 8-1 through 8-7 to ensure preferred alternatives are in compliance with ARARs.

62. **Page 8-18, Table 8-8**: Since the preferred alternative shown in Table 8-2 is a mix of Alternatives 2, 3, and 4 depending on the waste site characteristics, Table 8-8 would be more informative if the left hand column listed the waste sites and then the type of potential sampling was indicated for each waste site. Suggest revising table.

63. **Table 8-A and 8-B**: A second identification and evaluation of applicable or relevant and appropriate requirements should be conducted. Several applicable requirements were omitted from, these tables (e.g., RCRA, NEPA, WAC 173-303-160, 200, 300, 320, and WAC 173-340-702, 705, 706, etc).

64. **Page C-9, paragraph 3**: Although the Tri-parties have agreed that the industrial scenario is appropriate for the core zone for the foreseeable future (see page 2-60), please emphasize that the land use for the post-institutional control period (>150 yr) is uncertain. Thus, other scenarios (e.g., residential, Native American) should be assessed for the post-institutional control period (>150 yr).

65. **Page C-9, paragraph 5**: Please state that the MTCA Method B three-phase model (WAC 173-340-747) is used to estimate soil concentrations of nonradionuclides that are protective of groundwater (if this is the case).

66. **Page C-12, paragraph 1**: Why was evaluation of the Native American scenario (Harris and Harper, 1997) limited to radionuclides (i.e., excluding nonradionuclides)? The Native American scenario should be assessed for both rad and nonrad COPCs.

67. **Page C-13, paragraph 1**: Re UCL, please see comment for page C-15, paragraph 6.

68. **Page C-15, paragraph 5**: Re Table C-70, "90% UCL Background" is actually the "90th Percentile Background." This is not a UCL but a rather a percentile of a lognormal distribution (see DOE/RL-92-24, Rev 3).

69. **Page C-15, paragraph 6**: At least for nonradionuclides, re data in Tables C-2 to C-8, 95% UCL normal or 95% UCL lognormal concentrations should generally be used (WAC 173-340-740[7]). However, the max concentration should be used when >50% of the measurements are <PQL (WAC 173-340-740[7][f][iv]).

70. **Page C-16, paragraph 2**: Same comments as for page C-15, paragraph 5 and page C-15, paragraph 6.

71. **Page C-18, paragraph 1**: It should be acknowledged that even essential nutrients can be toxic at high doses (e.g., 40 mg iron/kg BW).

72. **Page C-18, paragraph 3**: In general, the 95% UCL sample concentration (rather than the max concentration) should be compared to the 90th percentile background concentration (see comment for page C-15, paragraph 6).

73. **Page C-18, paragraph 4**: Toxicity values are available for several PAHs (e.g., carcinogenic PAHs, e.g., benzo[a]pyrene). Therefore, please include PAHs.

74. **Page C-19, paragraph 3**: The last two sentences do not introduce the discussion of nonrad and rad COPCs logically. Please revise.

75. **Page C-20, paragraph 4**: Clarify that 14% of the year spent indoors and 9% spent outdoors is on site, whereas 77% of the year is spent off site (if this is the case).

76. **Page C-20, paragraph 5**: Why is the Native American scenario limited to radionuclide risk? Please evaluate this scenario for both nonradionuclides and radionuclides.

77. **Page C-20, paragraph 6**: The conservative approach for a screening analysis should assume that COPCs do reach the river and fish are contaminated.

78. **Page C-20, paragraph 7**: Please show how a soil risk-based standard was calculated for titanium.

79. **Page C-21 to C-22**: Please define terms in all equations.

80. **Page C-21, paragraph 7**: Please show how groundwater risk-based standards were calculated for benzoic acid, cobalt, hexane, and titanium.

81. **Page C-21, paragraph 8**: The equations shown for groundwater concentration are in WAC 173-340-720 (not -747).

82. **Page C-22, paragraph 1**: Delete "EF" in groundwater carcinogen equation denominator.

83. **Page C-22, paragraph 2**: Please clarify that the MTCA 3 phase model was only applied to nonradionuclides and that RESRAD was used for radionuclides.

84. **Page C-23, paragraph 1**: What are the sources for toxicity values (i.e., slope factors or risk coefficients) for radionuclides?

85. **Page C-23, paragraph 3**: Please clarify that "true mean" is conservatively estimated via the 95% UCL.

86. **Page C-24 to C-25**: For nonradionuclides, when comparing COPC concentration to a cleanup level, the 95% UCL or maximum concentration should be employed (see comment for page C-15, paragraph 6). Also, when data are non-detect, one-half the detection limit (DL/2) should be used when <15% of the measurements are <PQL (WAC 173-340-740[7][f][i]). Please see General comment.

87. **Page C-24, paragraph 3**: As an example of the comment above (page C-24, paragraph 2) in Table C-38, the 95% UCL for chromium, calculated with all 18 detected and non-detected values, should be compared to the cleanup level. Alternatively, for pentachlorophenol, since >50% (12/14) of the measurements were non-detect (and therefore <PQL), the maximum concentration should be compared to the cleanup level.

88. **Page C-26, paragraph 1**: The first sentence implies that a pooled soil COPC concentration was compared to a COPC air concentration. Please clarify.

    Again, a 95% UCL or max COPC concentration (not average) should be compared with a COPC air cleanup level. Units are missing in Table C-45 and Tables C-45a through C-45l. Also, re these tables, note that "90% UCL Background" should be "90th Percentile Background" (not UCL), and there appears to be no footnotes "a" and "d" in the body of the tables. Where are Background data in Table C-45a?

89. **Page C-26, paragraph 2**: It appears that "Section C2.4.5" should be "Section C3.2.2." Why is the Native American scenario evaluated only for radionuclides (excluding nonradionuclides)? What is the basis for the 1000 yr time period? Results in the SST Closure Plan were projected out 10,000y.

90. **Page C-26, paragraph 4**: Show the particular equation used to convert dose to risk.

91. **Page C-26, paragraph 5**: Units are missing for most parameters in Table C-46 and Table C-48.

92. **Page C-27, paragraph 3**: The text and Table C-53 show the peak dose at 0.68 mrem/yr at year 50, whereas the corresponding dose in Figure C-6 appears to show a peak of 8 mrem/yr. Please clarify.

93. **Page C-30, paragraph 3**: The uncertainty section is too simplistic. It might be useful to tabulate sources of uncertainty and indicate if default parameter values under or over estimate risk. In addition, selected sensitivity analyses may be useful to identify variables that drive risk. Please describe model and parameter uncertainties in the risk assessment.

94. **Page C-30, paragraph 4**: One source of uncertainty not listed is the analogous site method. Please note this. COPC selection is also likely a key source of uncertainty that should be acknowledged.

Provide rationale as to how number and location of samples were determined for each waste site and comment on how selected methodology contributes to uncertainty.

95. **Page C-30, paragraph 7**: Acknowledge the uncertainty in excluding nonradionuclides with the Native American scenario.

96. **Page C-30, Section C3.6.2**: The text states that future soil EPCs were assumed to be equal to existing soil concentrations, thus not accounting for fate and transport of contaminants. However, RESRAD does account for fate and transport. Please clarify.

97. **Page C-30, Section C3.6**: The uncertainty associated with fate and transport quantities used in the RESRAD calculations should be mentioned. For example, uncertainty in the distribution coefficient K_d and hydraulic conductivity can propagate into significant uncertainty in future groundwater concentrations.

98. **Page C-30, Section C3.6**: A sensitivity analysis of RESRAD input parameters should have been conducted and discussed. It is important to establish which parameters have a large influence on the RESRAD results, so that efforts can be made to minimize the uncertainty in those parameter values. In addition, RESRAD calculations can be carried out using the upper and lower bounds of the most sensitive parameters to establish the upper and lower bounds of the RESRAD dose results.

99. **Page C-30, Section C3.6**: The uncertainty in converting from radiation dose to risk should be discussed.

100. **Page C-30, Section C3.6**: There should be at least a qualitative discussion of the upper and lower bounds on the dose calculations.

101. **Page C-31**: Add a section on conclusions of the human health risk assessment.

102. **Page C-31, paragraph 6**: Include Ecology's ERA guidance (i.e., WAC 173-340-7493).

103. **Page C-33, paragraph 3**: Note that the dose assumed to protect terrestrial plants is 1 rad/d, while the dose assumed to protect terrestrial animals is 0.1 rad/d.

104. **Page C-33, paragraph 5**: Regarding the second sentence, I believe the reference in parentheses should be EPA-540-R-97-006, rather than EPA/630/R-95/002F.

105. **Page C-34, paragraph 2**: Please note that soil screening levels (e.g., MTCA eco soil level, BDAC/BCGs) are based on LOAELs or NOAELs, rather than "risk," per se.

106. **Page C-34, paragraph 3**: Although WAC 173-340-7490[2][b] indicates that only wildlife need be evaluated for industrial properties, this is not the case for T&E plant species (WAC 173-340-7490[2][b][i]). More importantly, land use far into the future (e.g., 1000 yr) is highly uncertain, so that plants and soil biota should be considered here, along with wildlife (see comment for page 2-61, paragraph 2).

Note that soil concentrations protective of wildlife in Table 749-3 are based on LOAELs, rather than NOAELs (see Table 749-3 footnote "e," Table 749-5 footnote "a," and WAC 173-340-7493[4][a]).

107. **Page C-35, paragraph 1**: In the equation, "Total risk estimate" is better described as "sum of fractions" or "hazard index (HI)."

108. **Page C-35, paragraph 3, #2**: In addition to the assumption of infinitely small mass to maximize external dose, organisms are also assumed to be infinitely large to maximize internal dose.

109. **Page C-36, paragraph 3**: Table C-55 indicates that a total of 42 soil samples were evaluated for the ERA. Is this correct?

110. **Page C-36, paragraph 4**: Rather than selecting the lower of the 95% UCL and the max concentration for the EPC, the UCL should be used (unless >50% of the measurements are below the PQL, in which case, the max can be used). Please see comment for page C-15, paragraph 6.

111. **Page C-37, paragraph 2**: Re Table C-63, please show how "Average" Concentration" is calculated. Also, two columns are needlessly duplicated (DOE Screening Level, Max Detected Exceed DOE Value?) in this table and others (Table C-63 through C-69).

Re Table C-70, the BCG for Cs-137 is 20 pCi/g (not 200 pCi/g). Also, see comment for page C-15, paragraph 5.

112. **Page C-37, paragraph 3**: Re uncertainty in ERA, please see comments for page C-30, paragraph 3 and page C-30, paragraph 4. Add another bullet for "risk characterization."

113. **Page C-37, paragraph 4**: Please acknowledge that nonrandom collection of soil samples introduces uncertainty in the risk estimates.

114. **Page C-37, paragraph 5**: Please note that the assumption of no chemical transformation is not necessarily conservative. For example, relevant transformation products sometimes result in greater persistence or risk than the parent compound alone (Fenner et al, 2000, ES&T 34:3809-3817).
Why does the SLERA not account for radionuclide decay at future time points? Also, it should be stated that in growth of daughters is neglected (if this is the case).

115. **Page C-38, paragraph 2**: Re nonradionuclides, please see comment for page C-15, paragraph 6.

116. **Page C-38, paragraph 4**: Reference to "Table 2-6" should be to "Table 2-7."

117. **Page C-38, paragraph 5**: Similar to the assumption of an area use factor (AUF)=1, a temporal use factor (TUF) was apparently not applied (i.e., TUF=1). You might state this too.

118. **Page C-39, paragraph 1**: Re BCGs, please see comment for page C-33, paragraph 3.

The last sentence is without basis. A COPC with no tox data does not necessarily imply no toxicity. COPCs with no tox data should be evaluated qualitatively and addressed in the uncertainty section.

119. **Page C-39, paragraph 2**: Contrary to what the text states, ERA results are presented in Tables C-56 through C-62 and Table C-72 (nonradionuclides), Tables C-63 through C-69 and Table C-76 (radionuclides), and Tables C-70 and Table C-73 (both nonrad and rad). Although more conventionally part of a human health risk assessment (rather than ERA), results of groundwater protection are presented in Tables C-53, C-54, C-71, C-73, and C-75.

In addition to Cs-137 exceeding the BCG at 216-B-26 Trench, this was also the case for Sr-90 (Table C-70).

Although the current industrial land use and clean soil cover may support a conclusion of no significant adverse ecological effects, this conclusion may not hold for longer time periods (e.g. 1000 yr) when land use may change and soil erosion may expose contamination.

For radionuclides, Table C-53 shows that groundwater protection (4 mrem/yr) has been exceeded at 216-B-26 Trench at 68 yr (360 mrem/yr). For nonradionuclides, the soil concentration protective of groundwater has been exceeded for Mn, U, and nitrate (Table C-71).

120. **Page C-39, paragraph**: The final bullet concludes that radionuclide soil concentrations (i.e., both maximum-Level 1 and mean-Level 2) do not exceed BCGs for terrestrial wildlife at analogous sites. However, this is not the case for Cs-137 and Sr-90 at the analogous site 216-B-26 Trench (Table C-70). Please revise.

121. **Page C-45, Figure C-1**: Please clarify why pathways are incomplete for the Occasional User.

122. **Page C-170, Table C-53**: RESRAD groundwater concentrations should be compared to 40 CFR 141 MCLs, instead of comparing the RESRAD drinking water dose (effective dose) to 4 mrem/yr effective dose, as the latter has no regulatory basis. (See discussion in Section 2.7 comments).

123. **Table C-53 and Figure C-6**: The maximum drinking water dose for the 216-B-43 Crib specified in the table and the figure do not agree. Please clarify. Time did not allow the reviewer to check every single result in the tables and figures for consistency. Please make sure all results are consistent.

Re Table C-56, the last column (EPC Exceed Table 749-3 Value?) sometimes has a "No" even when there is no Table 749-3 value available (i.e., Be, Co, Ag, V, di-n-butylphthalate). Please correct and check other tables (Tables C-56 through C-62) for this error. Show how "Average" Concentration" calculated.

Re Table C-70, there are no units specified for PEF/VF and various air concentrations. Please specify these. Also, see comment for page C-15, paragraph 5.

124. **Appendix D**: Ecology requests cost information and proposed sources of silt/loam soil that the USDOE might use that are located away from the Hanford Site. Detailed estimates in Appendix D (e.g. Table D.20, page D-207) show that pea gravel will be purchased and brought onsite; however, silt/loam soil is assumed to be removed from Pit 30 for all alternatives. Should ecological concerns at Pit 30 cause that location to be unavailable for soil extraction, purchase of silt/loam soil may be required. This cost could affect the alternative chosen for both cost and schedule.

125. **Section D1.0**: Text states that FS did not evaluate economies associated with implementing multiple sites or groups with a common alternative or aggregated remediation. Such economies are to be considered during long-range planning; thus, they will not be addressed before RODs are issued. This is contradictory to USDOE's proposed use of "geographic closures" to achieve economies of scale. Ecology is concerned that failure to evaluate such economies will cause estimates to be excessive for some alternatives and lead to their rejection for that reason alone. Estimated costs will therefore not truly represent work to be done.

126. **Section D2.2, D.2.3 and D.2.4**: Text states that groundwater monitoring and sampling are considered institutional costs; therefore, **they are** not considered in the cost models. Ecology deems groundwater monitoring for the alternatives to be necessary; therefore, Ecology requests that the incremental costs of groundwater monitoring and sampling be included in Appendix D.

127. **Section D2.4 ALTERNATIVE 4-CAPPING, page D-4**: Text states that the estimates for barriers are based on a modified RCRA subtitle C barrier. Such an approach for estimating cap costs ignores the description of capping in Section 5.2.4 Alternative 4 – Capping, which states that a Hanford barrier would be required for TRU sites. The costs of capping are therefore under-estimated because the costs of a Hanford barrier are substantially greater than those for a modified RCRA Subtitle C barrier. Please provide costs for the Hanford Barrier.

128. **Section D3.1.1**: Labor and Markup lists labor rates as supplied by Fluor Hanford. Section D.3.1.2 shows markups of 15% for general and administrative costs on materials, labor, and equipment, but does not show additional adders for continuity of service. In contrast, Contractor G&A on labor is assigned a value of 26.5%, and a direct mark up on labor of 25% (presumably for continuity of service, etc). From these assumptions, it would appear that contractor costs for labor in some instances exceed Fluor costs for equivalent efforts. For example, a Construction Field Engineer earns $50/hr, to which 25% is applied for direct mark up, raising the rate to $62.50. That rate then is subject to 26.5% G&A, raising the rate to $79.06. In contrast, a Fluor Field Engineer earns $56/hr, to which 15% is applied, increasing the rate to $64.40. From those estimates, it would appear to be more costly to hire a contractor than to allow Fluor to perform the work. Please explain why Fluor proposes to contract work if the costs for contract workers exceed the costs for its workforce. In addition, please specify any other incremental costs not reflected in Fluor's labor rates (continuity of service, etc) to allow accurate comparisons with contractor labor costs.

129. **Sections D3.2 through D3.5**: Contains estimate information for selected representative sites within Alternatives 2 through 5. For purposes of clarity, Ecology suggests that at the beginning of each alternative, a list of those representative waste sites not considered to be implementable under the alternative be added. Without such a list, the reader is forced to recall the representative sites that are excluded, thereby creating yet more searches through a lengthy, complex document.

130. **Section D2.5**: States that contaminants will be removed to the maximum levels stipulated in Table 2-7. This statement is misleading for Alternative 5. 216-B-5 Injection/Reverse Well is considered a representative waste site for 200-TW-2. Per Table 2-7, its depth to the top of the contamination is 243 ft. Section 6.2.5.1 states that implementing Alternative 5 is impractical for 216-B-5. Please clarify the text in Section D.2.5 and add references to the section 6.2.5.1 that lists those sites deemed to be impractical to remediate under alternative 5 into D.3.5.

131. **Section D3.1.2**: Mark Ups states that cost estimates do not include costs for design, work plan preparation, or any other costs associated with activities occurring before field mobilization. Ecology requests that a general estimate of such costs be included because such activities would not be required were field activities not required to complete remedial actions resulting from the Record of Decision.

132. **Section D3.1.2**: Mark Ups imposes a 15% FHI markup on contractor G&A. Ecology requests more information on this adder; please specify if this adder is a contract administration cost or what other expense it represents.

133. **Section D3.2.1**: Text states that fencing and monuments/signs for institutional controls and fencing maintenance are institutional costs, as are groundwater monitoring and sampling. Ecology requests information on the institutional costs related to Alternatives 2 through 5; it appears that these items will vary with alternative, with groundwater monitoring costs greater for Alternative 2 than the removal/treatment/cap or capping alternatives. Please explain the assumption made that the institutional controls will not vary.

134. **Section D3.2.4**: Representative Site 216-B-5 Reverse Well Alt 2 assumes a haul road will be required. No costs are shown to conduct biological and cultural surveys of the area prior to disturbing the area. Please explain their estimated costs.

135. **Section D3.2.4**: Representative Site 216-B-5 Reverse Well Alt 2 assumes that vadose zone monitoring will be conducted at 50 ft depth, per Table 2-2. This seems a useless expenditure of funds because the top of the contamination for this particular unit is 243 ft. Likewise, the depth to contamination of the associated T-3 well is 105 ft. Please explain why these costs are included.

136. **Section D3.2.5**: Alt 2 Rep. site 216-B-7A&B Crib Inspection and Surveillance states that for costing purposes, sites 50,000 ft^2 or smaller are required to a team of two inspectors and rad surveys. Please add information that the charge will be imposed, regardless of areal extent of the representative site, if under 50,000 ft^2. Presentation of the areal extent of the site serves only to indicate that the site is less than 50000 ft^2; it has no impact on the cost.

137. **Section D3.2.5**: Alt 2 Rep. Site 216-B-7A&B Crib Existing Cover Maintenance states that soil material costs are included. From Table D-16, the actual costs for soil materials are in fact pea gravel, not soil. Soil is assumed to be removed from Pit 30, so the costs are transportation costs, not material costs. Please clarify in text. This comment also applies to the soil costs statements in the B-38 trench, B0-57 crib, B-361 settling tank texts.

138. **Section D3.2.5**: Alt 2 Rep. site 216-B-7A&B Monitoring for Natural Attenuation again states that groundwater monitoring is assumed to be an institutional cost not considered in the cost estimate. Again, Ecology requests this cost be included for purposes of information.

139. **Table D.14** shows $10,000 in annual reporting costs for Alt 2 Rep. Site 216-B-7A&B. No explanation appears in the Tables D.16 or 17 to explain this cost. The explanation does not appear in the D3.1 Global Assumptions. Please provide a basis for the $10000 estimate in the D3.1 Global assumptions for Alternative 2 because it is part of the Present Worth Analysis for every site.

140. **Section D3.2.6**: Representative Site 216-B-38 Site Inspection and Surveillance shows 528 hours for time to complete inspection. Please explain why a site that is approximately 3.38 times larger than the estimated site (50,000 ft2) requires 33 times the amount of time to survey (528 hr vs. 16 hr). It appears that the estimate is inflated by a factor of 10 or that the hours for the radiological survey are added for B-38 but omitted for B-7A.

141. **Section D3.2.6**: 216-B-38 Trench Monitoring for Natural Attenuation again states that groundwater monitoring is assumed to be an institutional cost not considered in the cost estimate. Again, Ecology requests this cost be included for purposes of information.

142. **Section D3.2.7**: Representative Site 216-B-57 Monitoring for Natural Attenuation again states that groundwater monitoring is assumed to be an institutional cost not considered in the cost estimate. Again, Ecology requests this cost be included for purposes of information.

143. **Section D3.2.8**: Settling Tank 241-B-361 includes costs for vadose zone monitoring every 5 years. It is not clear why vadose zone monitoring will be required around the tank, if the tank has not leaked to date and the plan is to remove the sludge in the tank and package it for disposal. Please provide Ecology the estimated volume of sludge that will be left in the tank after removal efforts end, the means that the USDOE will take to control the release of the remaining sludge, and the fraction of the estimated volume left that is assumed to be released to the sub-surface.

144. **Section D3.2.8**: Settling Tank states that the actual cost of sludge removal from 241-B-361 is $ 6 million, but does not include the cost of site storage and ultimate disposal costs. Please provide those costs and explain how those costs will be funded.

145. **Section D3.3.1**: General assumptions states that groundwater monitoring will be performed under a separate operable unit. This differs from the rationale provided in Alternative 2 (i.e., institutional cost). Please provide the groundwater monitoring and evaluation costs in a rough estimate for Alternative 3.

146. **Section D3.3.5**: States that time required to prepare pre- and post-construction submittals is in addition to the time shown for the alternative. Ecology requests a more detailed explanation of the purpose of those documents.

147. **Section D3.3.5**: Volume to dispose is 2825 yd^3 but the site description shows total volume of material to dispose as 750 yd^3 and total volume of material required from Pit 30 as 2825 yd^3. The disposal volume under site description should be corrected to show 1750 + 175 + 150 = 2075 under Site Description. The use total volume to dispose under FH Transportation and Disposal should be changed to 2075 or an explanation provided for the added 750 yd^3 from other sources provided.

148. **Section D3.3.5**: Text applies the 20% contingency to the length of the fence as done in Alternative 2 but 10% for materials to the road. Again, explain the variation in estimating approach.

149. **Section D3.3.5**: Text shows RCT supervisor and Radiological engineer support for 35 days. It is unclear why these individuals must provide continuous support during the 35 days scheduled for excavation. Explain what job functions they will perform that are directly related to the 216-B-7 Effort.

150. It is not clear for any of the Alternative 3 sites how the volume of contaminated soil to be blended is derived. For example, for 216-B-38, the depth to the top of the highest contamination is 14.5 ft. The zone of higher contamination extends to 40 ft bgs. The depth of clean overburden soil is 15 ft bgs. The zone assuming that the zone of contamination is 25 ft thick, then only the top 10 ft are assumed to be blending. In contrast, for 216-57, the volume of soil requiring blending is 30 ft (40-15) X 200 X 15 ft, although the top of the contamination is at 41 ft bgs. Please explain what assumptions are used for establishing the soil blending volumes.

151. **Section D3.3.8**: Section includes B-361 tank demolition. The concrete waste is assumed to be placed into containers and disposed in ERDF. Please identify the dangerous waste volumes of waste assumed to be present on the concrete debris at the time of disposal.

152. **Section D3.4**: Capping assumes that groundwater monitoring will be performed as part of an operable unit. As requested above, please provide estimated costs for groundwater monitoring.

153. **Section D3.5**: Partial excavation assumes that groundwater monitoring will be performed as part of an operable unit. As requested above, please provide estimated costs for groundwater monitoring.

154. As related to the above comment, the fence around the site has a 20% adder, but the haul road has a 10% adder. Again, the difference is application should be explained.