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United States
Environmental Protection
Agency

Region 10
Hanford Project Office
712 Swift Boulevard, Suite 5
Richland WA 99352



January 30, 1992



James D. Goodenough
Operable Unit Manager
U.S. Department of Energy
P.O. Box 550, A6-95
Richland, Washington 99352

Re: Review of the Draft Remedial Investigation/Feasibility Study Work Plan for the 100-FR-3 Operable Unit, Hanford Site, Richland, Washington, dated November, 1991.

Dear Mr. Goodenough:

Enclosed are the comments from the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and their contractors on the rescoped Draft Remedial Investigation/Feasibility Study Work Plan for the 100-FR-3 Operable Unit, Hanford Site, Richland, Washington.

The work plan is well written and has been revised significantly to reflect the rescoping. However, EPA has concerns with the 100-FR-3 schedule. In particular, we believe that well drilling activities should begin upon approval of this work plan. The anticipated approval date for this work plan is May 1992. Given this, the remaining schedule should be adjusted to reflect the accelerated schedule for well installation.

EPA requires three interim milestones be added to milestone M-15-00. The first interim milestone for the 100-FR-3 Remedial Investigation /Feasibility Study Work Plan will require submittal of all validated data of sampling activities associated with groundwater and vadose zone investigations to us by July 1, 1993.

The second interim milestone will require the USDOE to submit a draft 100-FR-3 Remedial Investigation report to EPA and Ecology for review by March 1, 1994.

The third interim milestone will require USDOE to submit a draft 100-FR-3 Feasibility Study report and Interim Remedial Measures Plan to EPA and Ecology for review by November 1, 1994.

A review of the schedule shows that there is no commitment to any remedial activity beyond the Interim Record of Decision (ROD). The schedule must be changed to reflect that additional remediation may need to occur to reach a final ROD. In addition, EPA does not agree that the proposed plan produced as a result of the 100-FR-3 RI/FS Work Plan will necessarily result in only an

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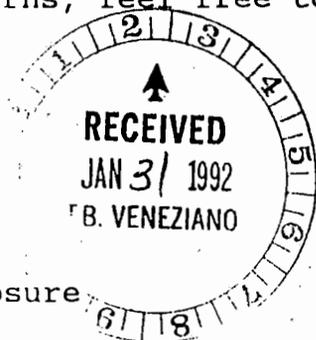
interim ROD. This plan may address clean up of the entire operable unit and therefore result in a final ROD.

The schedule for the Interim Record of Decision is incorrect. The EPA is responsible for writing the Record of Decision based on the proposed plan submitted by USDOE. The schedule must be changed to correct this error.

Another major area of concern focuses on the lack of detail in the Quality Assurance Project Plan (QAPjP) and field sampling activities listed in Section 5. These sections must be strengthened to support implementation of field sampling activities. Discussions held during comment resolution on the work plans for 100-BC-1 and 100-BC-5 resolved the issues concerning the QAPjP. It was agreed to at that time that the QAPjP's for all remaining work plans would be revised based on those discussions. Therefore, no specific comments on the QAPjP are included in this review.

The final concern pertains to the Data Management Plan. As you are aware, the EPA and Ecology are concerned with the current site-wide Data Management Plan and its ability to track and make available the large volumes of data that will be generated during the life of these projects. Since the Data Management Plan is applicable to all operable unit work plans it is suggested that the Site Wide Data Management Plan be addressed as part of appendix F to the Hanford Federal Facility Agreement and Consent Order. By doing this it will allow for more time to address the Data Management Plan issue while not impacting the approval of this work plan.

The comments for this work plan has been transmitted to you electronically via cc:mail. If you have any questions or concerns, feel free to contact me at (509) 376-8631.



Sincerely,

Dennis A. Faulk
Unit Manager

Enclosure

cc: C. Cline, Ecology
D. Teel, Ecology
G. Hofer, EPA
D. Lacombe, PRC
W. Staubitz, USGS
T. Veneziano, WHC
Administrative Record (100-FR-3 Operable Unit)

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Specific Comments for 100-FR-3 Operable Unit

1. Deficiency: Section 1.1, p. WP 1-2

This section is entitled Purpose and Scope of the Remedial Investigation/Feasibility Study. But it does not discuss the purpose of a RI/FS study.

Recommendation:

Revise the text to state "The purpose of the RI/FS process is not the unobtainable goal of removing all uncertainty, but rather to gather information sufficient to support an informed risk management decision regarding which remedy appears to be the most appropriate for a given site." (See Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, October 1988.)

2. Deficiency: Section 1.1, pp. WP 1-2 Through WP 1-3

The purpose of the work plan is to gather data necessary to write RI/FS reports. This must include the compilation and collection of contaminant concentrations to make remedial decisions.

Recommendation:

Expand the section to discuss how the Description of Work for sampling and analysis will contain a detailed description of sampling locations, sampling methods, level of analysis, etc. Also, include a discussion that the Description of Work is not a primary document but that unresolved regulator comments could result in denying approval of the RI report, extensive resampling, or insufficient data to support the FS report.

3. Comment: Section 2.1.1, WP 2-1, first paragraph, last sentence.

This statement reads the 100-F area is the Hanford site production area closest upstream from Richland. This is not a true statement. The text should be changed to state that the 100-F area is the closest of the old production reactors to the city of Richland.

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4. Deficiency/Recommendation: Section 2.1.1, page WP2-1, second paragraph

A map indicating the boundary of the 100-FR-3 operable unit with respect to the stated Hanford site plan coordinates should be included to better represent the location of the operable unit.

5. Deficiency/Recommendation: Section 2.1.2.2.1, page WP2-2, first paragraph

The text refers to the 142-F laboratory as the first facility for ichthyological (fish) studies. According to Becker (1990), the first aquatic biology building was the 146-F hut. The correct facility number should be verified.

6. Deficiency: Section 2.1.4, pages WP 2-5.

The subsection on Reactor Ventilation System and Inert Gas System Wastes that is addressed in the work plan for the 100-FR-1 source operable unit is missing in this work plan.

Recommendation:

The information on Reactor Ventilation System and Inert Gas System Wastes discussed in the 100-FR-1 work plan should be included in this section.

7. Deficiency/Recommendation: Section 2.1.4.3, page WP2-11, second paragraph

The site designation number for the unplanned release is incorrect. It should be UN-100-F-1 instead of UN-116-F-1.

8. Comment: Section 2.2.3.2, page WP 2-18

The stated value for vertical hydraulic conductivity (10^{-8} ft/d) seems extremely low and highly unlikely. The range of ratios of vertical to horizontal conductivity of $1/10^{-7}$ to $1/10^{-9}$ is also highly unlikely. A more acceptable range for vertical conductivity for these soil types would be (10^{-4} ft/d) and a vertical to horizontal range of $1/10^{-3}$ to $1/10^{-4}$.

9. Comment: Section 2.2.6.2, p. WP 2-22

The Bald Eagle Site Management Plan for the Hanford Site, South-Central Washington (Fitzner and Weiss, Oct 1991) gives further information regarding the habitat of the bald eagle on the Hanford Site. Of particular interest is the occurrence of two nesting areas in the

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F Area, one north and one south of 100-F. This information should be included in the work plan as it may effect investigation scheduling.

10. Comment: Section 2.2.7.2, p. WP 2-24

Recent archaeological surveys of the 100-F area indicate the presence of potential sites. The work plan should be updated to reflect this.

11. Deficiency/Recommendation: Section 2.2.7.4, page WP2-24

The text should refer to 100-FR-3 instead of 100-FR-1 when discussing the community relation plan.

12. Comment: Figure 2-10, p. WP 2F-20 and Table 2-2, p. WP 2T-2a

Well 699-84-33 is shown on the figure, but is not included in the table.

13. Deficiency/Recommendation: Figure 2-30, page WP2F-30

The title for this figure includes the term "wildlife." However, statistical tables are only shown for fish and birds. The table should either include examples of wildlife or omit the term.

14. Comment: Table 2-2, p. WP 2T-2A

This information would be more useful if the depth to water was correlated with the well construction at the time of water-level measurement. With each change in well construction, water-levels and water-quality can be expected to change. The well data should be presented to show the periods of each construction in each well so that water-level and water-quality data can be matched to the proper construction.

15. Deficiency/Recommendation: Table 2-3, page WP2T-3a

A space should be inserted between 'persistent' and 'sepal' in the section for endangered vascular plants.

16. Deficiency: Section 3.1.1, page WP3-2, third paragraph

The text does not list all the high priority sites as specified in the letter report (DOE 1991).

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Recommendation:

All high priority sites as specified on pages 4 and 5 of the letter report should be listed.

17. **Deficiency:** Section 3.1.1.1, p. WP 3-2

This section discusses the 116-F-14 retention basin. It is noted that sludge was removed from the basin on at least one occasion but the final burial location of the sludge is unknown. According to agreements reached during the comment resolution meeting held on October 15, 1991, it was agreed that if information gathered during the compilation task does not reveal the burial location then remote sensing methods could be employed to locate the sludge. This information needs to be included in the work plan.

18. **Comment:** Section 3.1.1.1.1, p. WP 3-3 and Table 3-1, p. 3T-1b

The length and depth of the 116-F-14 basin are given as 467 and 18 feet, respectively in Section 3.1.1.1. In table 3-1, these dimensions are given as 450 and 24 feet, respectively. The dimensions should be verified and corrected.

19. **Comment:** Sections 3.1.1.1.1 and 3.1.1.1.2, p. WP 3-4

In the last paragraph of Section 3.1.1.1., it is stated that borehole L is several hundred feet southeast of the retention basin. However, in the first paragraph of Section 3.1.1.1.2, it is stated that the 116-F-2 basin is 200 feet southeast of the retention basin. Where is borehole L in relation to these two facilities?

20. **Deficiency/Recommendation:** Section 3.1.1.2, page WP3-7, first paragraph

The text incorrectly refers to Section 3.1.1.6.6 for information on the 132-F-6 lift station. The correct section is 3.1.1.8.6.

21. **Comment:** Section 3.1.1.4.3, p. WP 3-10

It is stated in paragraph two of the section that boring B-10 was drilled 10 feet east of the tile pipe. However, later in the same paragraph it is indicated that the B-10 may have been drilled in the central part of the drain. This statement needs clarification.

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22. Deficiency/Recommendation: Section 3.1.3.1, page WP 3-18

This section refers to Table 3-11 for background levels for selected constituents in Hanford groundwater. Table 3-11 does not include nitrate as a selected constituent. Nitrate is present as a site-wide contaminant in groundwater. The rationale for not determining the background level for nitrate should be included.

23. Comment: Section 3.1.3.2, p. WP 3-18

It is indicated that pesticides, herbicides, and semivolatile organics have not been detected in the 100-F area wells. Include information on the number of samples and the number of wells that have been tested for these parameters.

24. Deficiency: Section 3.1.3.2.1, page WP 3-19

The text discusses the nature and extent of contamination for a limited number of contaminants. For example, the nature and extent of contamination for inorganic metals is not discussed. Concentrations of metals are provided for filtered samples only. State and federal drinking water standards, and most risk assessments, are based on the analysis of unfiltered samples. Therefore, based on data provided in the text, it is not possible to determine if risk-based levels have been exceeded.

Recommendation:

The nature and extent of contamination in groundwater by inorganic contaminants are not but should be discussed in this section.

25. Deficiency/Recommendation: Section 3.1.4, page WP3-21, second paragraph

The text refers to applicable DOE concentration guides for several chemicals. The work plan does not but should provide a reference for these concentration guides and include a table comparing analytical results with the appropriate DOE concentration guide.

26. Deficiency/Recommendation: Section 3.1.4.3 and 3.1.4.4, pages WP 3-22 and WP 3-23

A map showing sampling stations used to determine background sediment quality and sediment contamination in the Columbia River with respect to 100-FR-3 is not but should be included.

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27. Deficiency/Recommendation: Section 3.1.4.4, page WP3-23, second paragraph

The text refers to the 100-K Area instead of the 100-F Area. This error should be corrected.

28. Deficiency/Recommendation: Section 3.1.6.2, page WP3-24, fourth paragraph

This section is incomplete in its description of studies and surveys conducted regarding aquatic biota. The work plan should reference Becker (1990), which includes detailed descriptions of studies on effluent testing on aquatic biota and radioecological surveys of the Hanford Reach of the Columbia River.

29. Deficiency/Recommendation: Section 3.2.4.1, page WP3-30, first paragraph

The Model Toxics Control Act is incorrectly referred to as "NTCA." The correct acronym, MTCA, should be used.

30. Deficiency: Section 3.3.2.2, page WP3-34

This section is incomplete and inappropriate in regard to the criteria identified by EPA (1989b) for toxicity as a contaminant characteristic.

Recommendation:

This section should discuss the method of selection of the most toxic contaminants. EPA (1991) provides an example of a risk-based screening method for selection of contaminants of concern.

31. Deficiency: Section 3.3.2.5, page WP3-35

This section discusses bioconcentration factors for certain contaminants and an informational list is provided in Table 3-29. However, it is not clear why these specific bioconcentration factors are presented. That is, it is not clear if these contaminants are of special concern with respect to their ability to bioaccumulate or bioconcentrate. It is also unclear why bioaccumulation is illustrated with a table listing bioconcentration factors because bioaccumulation is the process that results in increased concentrations of contaminants in organisms with increasing trophic levels in the food chain, whereas bioconcentration is the ratio of the contaminant concentration in tissue to the concentration in a specific medium (EPA 1989a).

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Recommendation:

The rationale for providing the bioconcentration factors for the set of contaminants listed in Table 3-29 should be given. The use of bioconcentration factors to illustrate bioaccumulation should be explained.

32. **Deficiency:** Section 3.3.3, page WP3-36, first paragraph

It is not clear why daughter products of radionuclides are excluded from the list of contaminants of interest.

Even though the daughter products are excluded, the text states they must be evaluated for human and environmental impacts. The text does not describe a method for evaluation.

This section also refers to the list of general contaminant parameters applicable to the 100-FR-3 operable unit (Table 3-28, page WP3T-28). However, there is no discussion provided of how contaminant characteristics were used to select the contaminants of interest.

In addition, table 3-28 refers to a list of general contamination screening parameters. However, no rationale is given for the selection of these parameters, and no discussion is given regarding how they will be used for screening purposes.

Recommendation:

A list of the radionuclide daughter products that may adversely impact human health or the environment should be included, or the rationale for not including the products should be given.

The work plan should describe how impacts from the daughter products will be considered during the investigation process.

This section should include a discussion on how contaminant characteristics were used to select contaminants of interest. The document should provide an explanation of general screening parameters and their selection, such as the effect of physico-chemical properties on the behavior of contaminants in affected media.

33. **Deficiency/Recommendation:** Section 3.3.4, page WP3-37

The conclusions in this section should be supported by quantitative information such as comparison with ARARs or risk-based screening values. If such information is not

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available and a comparison cannot be made, then a statement to that effect should be included. In addition, this section should be titled "Use of Qualitative Risk Assessment to Make Interim Action Decisions", not "Imminent and Substantial Endangerments", according to the outline provided in the letter report (DOE 1991). In addition, the section should be revised to discuss how the qualitative risk assessment will be used in making interim action decisions.

34. Deficiency/Recommendation: Section 3.4.1, p. WP 3-38

The second bullet it appears that Potential CARs should be changed to read potential ARARs. If CARs is the correct acronym it should be listed in the acronym listing.

35. Deficiency/Recommendation: Figure 3-9, page WP 3F-9

The boundaries of 100-FR-1 and 100-FR-2 source operable units should be shown on the map to better indicate the soil sampling and monitoring well locations at the 100-FR-3 operable unit.

36. Deficiency/Recommendation: Figure 3-10, page WP 3F-10

The boundaries of 100-FR-1 and 100-FR-2 source operable units should be shown on the map to better understand the soil sampling and monitoring well locations at the 100-FR-3 operable unit.

37. Deficiency: Figure 3-18, p. WP 3F-18

There are several deficiencies in the contaminant exposure pathway model, as follows:

- The figure legend shows a hexagonal symbol for primary contaminant sources and known contaminated media; however, in the figure primary sources (process effluents) and contaminated media (soil) are identified with a circle.
- The arrow between biota and ingestion is pointed both ways.

Recommendation:

The legend symbol should be used for identification of all the appropriate components in the figure. The arrow between biota and ingestion should point to ingestion only.

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38. **Deficiency:** Figure 3-19, p. WP 3F-19

Potential conflict with ARARs or future land and water use is shown as yes and no for various interim remedial technologies. There is no discussion in the text about this potential conflict with ARARs.

Recommendation:

A brief discussion should be included in Section 3.0 on the potential conflict of each process option with ARARs or with future land and water use.

39. **Comment:** table 3-1, p. WP 3T-1d

The years in service for 118-F-6 should read 1965-1973.

40. **Deficiency:** Table 3-2, page WP3T-2

The table title indicates only subsurface soil data are presented. However, surface soil data is also presented. No units are given in the depth column.

Recommendation:

The word "subsurface" should be deleted from the table title. The appropriate units should be provided.

41. **Deficiency:** Table 3-3, page WP3T-3

The table title indicates only subsurface soil data are presented. However, surface soil data are also presented.

A separate column for depth is not provided and the units for depth are not given.

Recommendation:

The word "subsurface" should be deleted from the table title.

A separate column for depth and the appropriate units should be provided.

42. **Deficiency:** Table 3-5, page WP3T-5a

The table title indicates only subsurface soil data are presented. However, surface soil data are also presented.

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Recommendation:

The word "subsurface" should be deleted from the table title.

43. **Deficiency:** Table 3-8, page WP3T-8

A separate column for depth is not provided and the units for depth are not given.

Recommendation:

A separate column for depth and the appropriate units should be provided.

44. **Deficiency/Recommendation:** Table 3-12, page WP3T-12a

Trichloroethene should also be listed in the Table 3-12 since it is reported in two wells at levels exceeding drinking water MCLs (see page WP3-18, last paragraph).

45. **Deficiency:** Table 3-12, pages WP 3T-12a to WP 3T-12aa

It is not clear whether the list of analytes provided in this table are the analytes measured for the groundwater sample collected from the 100-F area wells or the proposed list for the analysis of groundwater samples.

Recommendation:

The purpose of providing an overly extensive list of analytes should be explained. It appears that this table is irrelevant to this section and can be deleted unless an explanation is provided.

46. **Deficiency/Recommendation:** Table 3-13, page 3T-13a

A definition for Alpha-HI is not but should be provided. The rationale for not analyzing total metals is not provided but should be presented in a footnote.

The entire designation for each well should be used. For example, 199-F5-1 should be used instead of 1-F5-1.

47. **Deficiency/Recommendation:** Table 3-14, page 3T-14a

In columns 12 and 13, the parameters "nitrate" should be stated as nitrogen, and "NO₃-Ion" should be stated as NO₃ for clarity.

The entire designation for each well should be used. For example, 199-F5-1 should be used instead of 1-F5-1.

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48. Deficiency/Recommendation: Table 3-15, page WP3T-15a

The entire designation for each well should be used. For example, 199-F5-1 should be used instead of 1-F5-1.

49. Deficiency/Recommendation: Table 3-26, page WP 3T-26

The title of the table indicates that the list of waste constituents is prepared from the nonradioactive wastes disposed adjacent to the 100-FR-3 operable unit. Either the title should be changed or the rationale for preparing the list from the nonradioactive wastes disposed adjacent to the 100-FR-3 operable unit instead of wastes disposed within the operable unit should be provided.

Boiler sludge containing trisodium phosphate was disposed at the 100-FR-1 source operable unit. Hence, trisodium phosphate should also be included in the preliminary list of nonradioactive waste constituents.

Cadmium and boron may have leached from the disposal of lead-cadmium poison slags and boron poison salines at the 100-FR-2 operable unit (Section 3.1.1.10.1) during rainfall and snowmelt. Hence, these two compounds should also be considered in the preliminary list of nonradioactive waste constituents.

50. Deficiency/Recommendation: Table 3-28, page WP 3T-28

Many contaminants in the groundwater at the 100-FR-3 operable unit exceeded either background levels, risk-based concentrations, or MCLs. For example, the concentration of cadmium in the filtered sample exceeded its background level of $<0.2 \mu\text{g/L}$ (Table 3-13) for two wells. The filtered arsenic level exceeded its background level of $3.9 \pm 2.4 \mu\text{g/L}$ and its risk-based concentration of $0.05 \mu\text{g/L}$ (EPA 1991). These compounds should be included in the preliminary list of contaminants of interest.

This table presents a preliminary list of contaminants of interest for the 100-FR-3 operable unit. It does not list all of the chemicals identified as waste constituents in Table 3-26, page WP3T-26. There are no details given to describe the elimination process used to arrive at the preliminary list of contaminants of interest. Detailed information on the process by which several of the substances shown in Table 3-26 were eliminated from the preliminary list of contaminants of interest should be provided.

51. **Deficiency:** Section 4.1.2.1, pp. WP 4-5 and 4-6

The data needed for "An understanding of the relationship between water-table fluctuations and release and transport of contaminants from the lower vadose zone and capillary fringe to groundwater..." is described as being derived from 100 Area aggregate investigations. The collection of these data are not explicitly described in Milestone M-30 and we know of no other 100 Area aggregate investigation that would address this issue.

Recommendation:

Providing data to evaluate the release of contaminants to groundwater as a result of fluctuating water levels should fall within the scope of the 100-FR-3 operable unit RI/FS and should be noted as such.

52. **Comment:** Section 4.1.2.2, p. WP 4-6

It is noted that determining the nature and vertical extent of contamination in the vadose zone should be sufficient for conducting a qualitative assessment at individual waste sites. This information may indicate what contaminants are present, but provides little guidance on potential future exposures. At a minimum, at least semiquantitative information on infiltration rates, soil hydraulic characteristics, and contaminant transport characteristics will be required for a qualitative risk assessment. For this reason, a 100 Area-wide physical properties strategy was developed. In Section 4.1.2.2., note that information on contaminant transport characteristics will also be required for a qualitative risk assessment.

53. **Deficiency:** Section 4.1.2.3, page WP4-7

This section indicates that treatability study information relevant to the limited range of interim actions may be considered for source operable units within 100-FR-3 and the 100 aggregate area feasibility study. The text does not specify clearly whether treatability study information will be considered for groundwater and aquifer soils within the source areas for 100-FR-3 and the 100 aggregate area feasibility study.

Recommendation:

This section should clearly specify that treatability study information will be gathered for remediation of contaminated aquifer soils and groundwater applicable to the limited range of interim actions.

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54. **Comment:** Section 4.1.2.4, p. WP 4-8

In the fourth bullet, it is noted that "...physical characteristics of site contaminants are needed. We are confused by this statement. Should this read "...physical characteristics of contaminated sites are needed"? If not, please specifically describe exactly which physical contaminant characteristics are being referred to.

55. **Deficiency/Recommendation:** Section 4.2.1.1, page WP4-10

The text in the second bullet should include "and data collected from analogous facilities" after "existing work plans."

56. **Deficiency/Recommendation:** Section 4.2.2, page WP 4-11, first paragraph

At the beginning of the paragraph, the text states that groundwater from two sampling rounds will be analyzed for a full suite of analytes. Then, at the end of this paragraph, it states that it may not always be necessary to have two full rounds of sampling from all wells.

Since available data have not received extensive QA/QC, a minimum of two rounds of sampling from all wells should be considered.

57. **Comment:** Section 4.2.2, p. WP 4-12

The reference to the USGS in regard to the plan for selected physical properties of soils should be removed. The plan was submitted by the EPA.

58. **Deficiency:** Table 4-1, page WP4T-1a

RCRA terminology is inappropriately used in the fourth and fifth columns.

Recommendation:

The appropriate CERCLA terminology should be used. That is, ARARs should replace "CARs," and feasibility should replace "corrective measures."

59. **Deficiency/Recommendation:** Section 5.1, page WP 5-1

No tasks or subtasks are provided to meet the following data needs:

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- Groundwater recharge and discharge, and contaminant transport from off-site sources to the 100-F area (Section 4.1.2.1)
- Effects on the 100-FR-3 operable unit from effluent disposal activities in other areas (such as the operation of B- and U-Ponds) (Section 4.1.2.1)
- Treatability study information relevant to the limited range of interim actions that may be considered (4.1.2.3)
- Information on the nature and extent of soils contaminated by seeps at the river edge and the human and environmental risks posed by this soil (Section 4.1.2.4)

How these data needs will be met should be explained either under separate tasks or under relevant tasks provided in Section 5.0.

60. Comment: Section 5.1.3.2, p. WP 5-4

It is stated that surface mapping will be conducted within the 100-F area from the river to the vicinity of the reactor building. All the 100-FR-3 operable unit should be mapped.

61. Comment: Section 5.1.3.2, p. WP 5-5

A fourth bullet (the geologic unit at the land surface) should be added to the three bullets indicating the features to be recorded on the topographic map.

62. Deficiency/Recommendation: Section 5.1.4, page WP 5.5

This section refers to Appendix D-1 for surface water and sediment investigations. Appendix D-1 mainly addresses water and sediment sampling from springs and seeps. It does not address the river sediment sampling. The approximate sampling locations within the reach of the 100-FR-3 operable unit should be indicated on a map. The distance of sampling locations from the river bank should be included in this section. The text in this section should be consistent with Appendix D-1. In Appendix D-1, most of the discussion relates to water and sediment sampling from seeps and springs. This section mainly focuses on river water and sediment sampling. Task 4 in this section should be addressed separately for seeps and springs and for river water and sediments.

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63. Comment: Section 5.1.5.2, p. WP 5-7

See comment on section 4.2.2 regarding reference to USGS.

64. Comment: Section 5.1.5.4, p. WP 5-7

It is stated that gross-gamma logging will be conducted in "selected boreholes".

Recommendation:

Gross-gamma logging should be conducted in all boreholes. Where gross-gamma logging indicates significant contamination, spectral-gamma logging should be conducted.

65. Comment: Section 5.1.6.2.1, p. WP 5-12

In the fourth paragraph of the section it is stated that the "deep well" will be completed near the bottom of what is nominally considered to be the unconfined aquifer system. However, in section 5.1.6.2.2 (p. WP 5-13) it is stated that the deep well will be completed in the upper confined aquifer. The bottom of the unconfined aquifer is at the top of the "upper aquitard", well above the "upper confined aquifer." The deep well should be completed in the upper confined aquifer.

66. Comment: Section 5.1.6.2.2, p. WP 5-12

It is stated that the uppermost aquifer will be cased and sealed before drilling into deeper zones. However, no mention of testing the seal integrity is made. In the 300-FF-5 operable unit, a seal test plan (EMO-1029, AD-940) was written and used to test the integrity of the seals. It is recommended that a seal integrity test plan be written for this well also.

67. Comment: Section 5.1.6.2.3 p. WP 5-13

This section, which addresses sampling of boreholes needs to be expanded. As the section reads now little information is given on the way samples will be taken, field screened, or analyzed. In the first sentence add that samples will also be measured for radioactive constituents. In addition, a table or tables should be developed and added to section five and include the following information:

* soil physical parameters to be measured and testing methods.

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* number of soil samples to be taken, location, and constituents that will be analyzed for.

* Analytical methods to be used.

68. Deficiency/Recommendation: Section 5.1.6.2.4, page WP 5-13

The rationale for the proposed screened interval of 20 feet for well installation should be provided. The expected total depths for shallow wells vary from 11 feet to 20 feet (Table 5-1). It is not clear how 20 foot screened intervals can be used for shallow wells.

Also, the rationale for extending the well screens 1.5 meters (5 feet) above the water table is not provided. The proposed screen length of 1.5 meters (5 feet) above the water table may not provide adequate data to understand the relationship between water table fluctuations and release and transport of contaminants from the lower vadose zone and capillary fringe to groundwater (Section 4.1.2.1).

Groundwater levels in the unconfined aquifer near the Columbia River appear to be affected by fluctuations in river stage (Section 2.2.3) as well as by the resulting mound of groundwater that developed during operation of the reactor (Section 4.1.2.1). Continuous water level measurements should be taken from selected existing monitoring wells, or existing data from other operable units should be used to interpret water level fluctuations. These factors should be evaluated and used to set the screen lengths above the water table.

69. Comment: Section 5.1.6.2.5, p. WP 5-14

It is stated that slug tests will be performed on all new monitoring wells. It should also be stated that all slug tests will be performed with temporary casings and screens in place (prior to installation of sand packs.)

70. Deficiency: Section 5.1.6.2.7, p. WP 5-14

Quarterly water-quality sampling of monitoring wells will not be sufficient unless the effects of changing river stage can be identified.

Recommendation:

Selected wells should be monitored on a continuous basis (sensors and recorders) for several basic parameters (e.g., temperature and specific conductance) in order to identify the effects of changing river stage on the water quality in the aquifer.

9 2 1 2 4 1 1 9 8

- 9 2 1 2 4 1 7 1 1 9 9
71. Deficiency/Recommendation: Section 5.1.6.3, pages WP 5-14 and WP 5-15

Ambiguous statements such as "where existing water quality data are insufficient to identify a reduced list of parameters" (first sentence) and "unless a reduced list of parameters can be identified from existing data" (second paragraph) should be deleted. Section 4.0 indicates that the amount and quality of available information are not adequate to quantify the risk and complete the FS. Further, the available data are not validated and do not include a full suite of analytes. Hence, the text in this section should specify that the first two rounds of groundwater samples will be analyzed for a full suite of analytes. Also, the last sentence of the second paragraph (page WP 5-15) should be moved to the end of first paragraph for continuity.

The text in the first paragraph (page WP 5-14) states that groundwater samples will be analyzed for only selected radionuclides, but no rationale is provided. The selected radionuclides should be referenced here.

72. Deficiency/Recommendation: Section 5.1.8, page WP5-16

This section discusses the ecological investigation. This text should briefly mention that information obtained in the ecological investigation will be used to support the baseline risk assessment.

73. Deficiency/Recommendation: Section 5.1.11, page WP5-17, second paragraph

The text states "Both the qualitative and baseline risk assessments will be developed in accordance with EPA (1989a). . ." This reference is for human risk assessment guidance from EPA headquarters. Ecological risk assessment guidance from EPA headquarters should also be referenced and is already listed in Section 8.0, References, as EPA 1989b. In addition, EPA Region 10 risk assessment guidance should be referenced (EPA 1989b, 1991) and included in Section 8.0.

74. Deficiency: Section 5.1.11.3, page WP5-19

Toxicity assessment criteria catalogued under this subtask do not include ecological parameters and are specific to human health. The potential for changes in toxicity when contaminants are exposed to site-specific environmental conditions in the transport media is not taken into account.

Recommendation:

The toxicity assessment criteria should include ecological parameters as discussed in EPA (1989a,c).

75. **Deficiency/Recommendation:** Section 5.1.11.4, page WP5-19

The text states that "ecological receptors are evaluated based on assessment of appropriate endpoints." The text should include a reference for endpoint identification.

76. **Deficiency:** Section 5.2.2, page WP5-21

In item 1, it is not clear whether the primary task is to identify contaminants of concern for the vadose zone soils or the aquifer soils.

Item 2 applies to the 100 Area soil aggregate feasibility study but does not apply to the 100 Area groundwater aggregate feasibility study.

Recommendation:

Since this section addresses the scope of work for the 100 Area groundwater aggregate feasibility study, the text should clarify that the primary task for item 1 is identification of contaminants of concern for the aquifer soils and groundwater, as proposed in Section 3.4.3.

Item 2 should include identification of ARARs pertinent to the removal of aquifer soils as well as contaminated groundwater extraction and reinjection, treatment, and disposal.

77. **Deficiency/Recommendation:** Figure 5-1, page WP 5F-1

The potential sources upgradient to the proposed monitoring wells should be indicated on the figure.

78. **Deficiency/Recommendation:** Table 5-1, page WP 5T-1

The following information would clarify the suitability of well locations:

- Approximate distance of wells from the potential sources
- Identification of potential public or environmental impact areas such as Columbia River, recreational areas, and fishing including the approximate distance of priority 1 wells from those areas.

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The expected total depths for shallow wells are incorrectly reported. For example, the total depth for well 199-F3-12 is reported as 11 feet. As stated in Sections 5.1.6.2.1 and 5.1.6.2.2, if shallow wells are extended to 15 or 16 feet below the water table, the total depth for well 199-F3-12 will be greater than the reported value of 11 feet. The total depth should be a sum of the approximate depth between the ground surface and the water table and the extended depth below the water table. Also, the depth should be specified in both metric and english units to be consistent in the report. The table should be revised accordingly.

79. **Comment:** Figure 6-1, items 6.2.3 and 6.2.5

Water-level measurements and groundwater sampling are scheduled to be done monthly and quarterly, respectively, for the first year after well installation and quarterly and semiannually, respectively, thereafter. However, the schedule as shown in Figure 6-1 indicates water-level measuring and groundwater sampling ending at the same time as the last well is scheduled for completion.

80. **Deficiency/Recommendation:** Section 7.1.2.2, page WP7-2, first paragraph

The text incorrectly refers to 100-FR-1 instead of 100-FR-3. This should be corrected.

81. **Deficiency/Recommendation:** Section 8.0, page WP8-4

The reference section should include additional EPA Region 10 risk assessment guidance (EPA 1991).

82. **Comment:** Table QAPjP-3, p. A-14

Footnote B states that methods for bulk density, moisture retention, and unsaturated hydraulic conductivity shall be developed and submitted to Westinghouse Hanford for review and approval prior to use. It should also be noted that these methods will require regulatory review and approval as well.

83. **Deficiency/Recommendation:** Appendix B, Section 5.0, page B-11, second paragraph

General occupational health standards for Washington (DLI 1990) are not but should also be listed.

84. **Deficiency/Recommendation:** Appendix C, Table C-2, page C-5

For Task 6, estimated data quantities for field activities and laboratory analysis are incorrectly reported. Thirteen

shallow wells and one deep well are proposed under this task. The total number of logbooks, chain-of-custody forms, and sample locations should be 14. Accordingly, the number of total samples and data points will change. These discrepancies should be corrected.

Estimated data quantities are not reported for Tasks 4 and 8. Although data generated as a result of Tasks 4 and 8 are not operable unit specific, a technical memorandum or report should be included for these tasks summarizing study results.

85. **Comment:** Section 3.3, p. D1-3

There is no mention of mapping the geology in the "geologic mapping" section.

86. **Deficiency:** Section 3.4, p. D1-3

The one-hour period for measuring trends in conductivity, pH, and temperature is insufficient.

Recommendation:

The period of trend watching has to be increased. The needed length of the period could be determined by investigating the nature of trends in water-quality at springs, water-levels in near-shore wells, and river stages at a few locations for a period of several days. The observed relationships should allow us to determine the needed period of trend monitoring for all seeps/springs.

87. **Deficiency/Recommendation:** Appendix D, Section 3.4, page D1-3

This section does not address sampling of soil and river sediments contaminated by seeps and springs. This deficiency should be addressed.

Also, a map indicating approximate sampling locations should be included.

88. **Deficiency/Recommendation:** Appendix D, Section 3.5, page D1-4

A rationale for analyzing water and sediment samples for selected radionuclides and for not analyzing organics should be provided. The existing data for springs and seeps is only for temperature. Limited or no data exist for organic contamination. Many radionuclides were detected in the Columbia River water and sediments (Sections 3.1.4.2 and 3.1.4.4). Also, many radionuclides and organic contaminants

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were detected in groundwater in the 100-FR-3 operable unit. Hence, the water and sediment samples from springs and seeps and rivers should be analyzed for contaminants of interest presented in Table 3-28.

89. **Deficiency:** Section 3.6, p. D1-5

Only three wells are scheduled for water-level records in the vicinity of each of the river-stage recorders. Three are not sufficient for analysis of the river-aquifer connection.

Recommendation:

In the vicinity of each river-stage recorder, we should have a minimum of three wells parallel to the river and three wells perpendicular to the river. These two lines can (and should) intersect, resulting in five wells needed to construct the two lines. If a "reference" well is needed (i.e., a well which will be used to eliminate the effects of partial penetration of the river and "skin effects" of the river bed), then a sixth well may be necessary. All of these wells should be continuously sampled for selected water-quality parameters (e.g., temperature and specific conductance) as well as for water levels.

90. **Deficiency/Recommendation:** Appendix D2, Section 3.2, page D2-3, fifth paragraph

The text refers to surveys that have been done to document species lists. References for those surveys, including Becker (1990), should be provided.

TYPOS/MISCELLANEOUS COMMENTS

1. Section 2.2.3.1, p. WP 2-17, second paragraph, ninth line; "be neath" should be "beneath".
2. Figure 2-22, p. WP 2F-22; wells 199-F5-3 and -1 have sections with no symbols (this is not included in the legend).
3. Section 3.1.1.1.1, p. WP 3-4, third paragraph, sixth line; "Tables 3-3" should be "Table 3-2".
4. Section 3.1.1.1.1, p. WP 3-4, fourth paragraph, third line; "Table 3-4" should be "Table 3-3".
5. Section 3.1.1.4.1, p. WP 3-9, second paragraph, seventh line; "Table 3-8" should be "Table 3-7".
6. Section 3.1.1.4.2, p. WP 3-10, first paragraph, fourth line; "Table 3-8" should be "Table 3-7".
7. Section 3.1.1.4.4, p. WP 3-10, second paragraph, fourth line; "Table 3-8" should be "Table 3-7".

8. Section 3.1.1.4.6, p. WP 3-11, second paragraph, second line; "Table 3-8" should be "Table 3-7".
9. Section 3.1.1.4.6, p. WP 3-11, second paragraph, third line; "238/239 PU" should be "239/240 PU".
10. Section 3.1.1.4.7, p. WP 3-11, second paragraph, fourth line; "Table 3-8" should be "Table 3-7".
11. Table 5-1, p. WP 5T-1; The column "Approximately Depth" has not units indicated.

REFERENCES

- Becker, C.D., 1990. Aquatic Bioenvironmental Studies: The Hanford Experience 1944-1984. Studies in Environmental Science 39. Elsevier.
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- DOE 1991. Letter Report for Rescoped Work Plans for the 100-FR-1 and 100-FR-3 Operable Units. U.S. Department of Energy. October 1, 1991.
- EPA 1986. Test Methods for Evaluating Solid Waste. SW-846, Third Edition. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency. Washington, D.C.
- EPA 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final. EPA/540/G-89/004. U.S. Environmental Protection Agency. October 1988.
- EPA 1989a. Risk Assessment Guidance for Superfund, Volume II, Environmental Evaluation Manual, Interim Final. EPA/540/1-89/001. U.S. Environmental Protection Agency. March 1989.
- EPA 1989b. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual Interim Final. EPA/540/1-89/002. U.S. Environmental Protection Agency. December 1989.
- EPA 1989c. Statement of Work for the RI/FS Environmental Evaluation for Superfund Sites. U.S. Environmental Protection Agency, Region 10. November 1989.
- EPA 1991. EPA Region 10 Supplemental Risk Assessment Guidance for Superfund. U.S. Environmental Protection Agency. August 16, 1991.

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