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U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10

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REPLY TO
ATTN OF:

August 3, 1990

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

Dear Mr. Goodenough:

Re: Comments on Remedial Investigation/Feasibility Study Work Plan, 100-KR-1 Operable Unit, Draft A, May 1990.

The EPA, as lead regulatory agency for the 100-KR-1 Operable Unit, has reviewed the subject document. Enclosed are our specific comments, in both hard-copy and WordPerfect 4.2 disk formats.

In accordance with the schedule for primary document review specified in the Action Plan, the revised work plan is due to EPA and Ecology within 60 calendar days, i.e. by close of business on **October 2, 1990.**

If you have any questions, please don't hesitate to call me at 376-3883.

Sincerely,

David R. Einan
Unit Manager

Enclosure

cc: w/Enclosure
W. Staubitz/B. Drost, USGS
D. Lacombe, PRC
L. Goldstein/C. Cline, Ecology
L. Powers, WHC
Administrative Record (100-KR-1)

cc: w/o Enclosure
K. Thompson, DOE
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TECHNICAL REVIEW COMMENTS
REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN
100-KR-1 OPERABLE UNIT
HANFORD SITE

1-1 **Deficiency:** Section 1.0, p. WP 1-3

It is not clear why the Columbia River is included within the boundary of the 100-KR-1 operable unit. This operable unit does not include the river or its sediments.

Recommendation:

Change the border of the 100-KR-1 operable unit to the south shore of the Columbia River (include the intake and the outfall).

1-2 **Deficiency:** Section 1.1, p. WP 1-5

The first paragraph of this section contains the acronym "WHC." WHC has not yet been defined in the text and does not appear in the list of "ACRONYMS."

Recommendation:

Define the acronym "WHC."

1-3 **Deficiency:** Section 1.1, p. WP 1-6

The first data gathering goal of the 100-KR-1 RI is to "Identify the contaminants that occur in the vadose zone and have the potential to be released to the unsaturated soil..." This statement seems to be self-contracdictory in that contaminants that occur in the vadose zone are already in contact with the unsaturated soil.

Recommendation:

Clarify the data gathering goal to include identifying the quantity and distribution of contaminants in the vadose zone and the potential transport of these contaminants through the unsaturated soil to the groundwater. It has been agreed in the review and approval of other work plans that characterization of unsaturated flow and solute transport processes is within the scope of the source operable units.

1-4 **Deficiency/Recommendation:** Section 1.2, p. WP 1-7

Insert the word "volume" after "areal extent" in the second bulleted item.

1-5 **Deficiency/Recommendation:** Section 1.2, p. WP 1-9

The title for the Figure 1-3 misspells the word "process."

1-6 **Deficiency/Recommendation:** Section 1.4. p. WP 1-23

The reference "DOE-RL 1983" is not listed in "Section 8.0 REFERENCES."

2-1 **Deficiency:** Section 2.1.1, p. WP 2-1, first paragraph

The last sentence states, "The 100-KR-1 operable unit is adjacent to the Columbia River shoreline between River Miles 380 and 382 (Figure 2-1)." River Miles 380 and 382 are not shown on Figure 2-1.

Recommendation:

River Miles 380 and 382 for the 100-KR-1 operable unit should be marked on Figure 2-1. Also, provide the datum for "River Miles".

2-2 **Deficiency:** Section 2.1.3, p. WP 2-4

In Table 2-1, the following events stated:

1974:	105-KE basin leak detected
1975:	N reactor irradiated fuel storage begins in 105-KE
1980:	105-KE basin leak isolated and repaired

Was the leak rectified before storing fuel in 1975? If not, did the leak continue until it was isolated and repaired in 1980?

Recommendation:

Incorporate this information into the table.

2-3 **Deficiency:** Table 2-2, p. WP 2-7

The reference for Table 2-2 is given as AEC-GE, 1964. However, the data reported in Table 2-2 is for 1955 to present.

Recommendation:

Include all references used to prepare this table.

2-4 **Deficiency:** Table 2-2, p. WP 2-7

In Table 2-2, the facility outfall structure (1908-K) is shown to be active, and the facility purpose is said to be "control effluent discharge from 107-KE and 107-KW retention basins." The retention basins are currently inactive (dry). What is the current function of the outfall structure?

Recommendation:

Explain the current use of the outfall structure.

2-5 **Deficiency:** Table 2-2, p. WP 2-7

The radioiodine monitoring building (1904-K) is shown to be monitoring radioactivity of the effluent; this use was discontinued in 1971. There are no reported data and no discussion of results in this work plan.

Recommendation:

Provide the data on effluent radioactivity monitoring and discuss the results in Section 3.0.

2-6 **Deficiency:** Table 2-2, p. WP 2-10

The facility 1608 KE/KW wastewater pump houses are shown to collect and pump potentially contaminated liquids from the 105 reactor buildings and pump effluent to the reactor effluent line. No data is presented on the number of pumps, capacity, frequency of use, and the characteristics of effluent handled.

Recommendation:

Provide more information on the contaminated waste water from the reactor buildings.

2-7 **Deficiency:** Table 2-2, p. WP 2-10

The 1706-KE and 1706-KER facilities are reported as active facilities for testing.

Recommendation:

Explain in detail the purpose of 1706-KE and 1706-KER facilities.

2-8 **Deficiency:** Table 2-2, p. WP 2-12

No details are provided for the Acid Tanks, Sodium Dichromate Tanks, Borrow Pit, Burning Pit, Burial Ground, and Filter Crib.

Recommendation:

Provide details on these facilities.

2-9 **Deficiency:** Section 2.1.4.1, p. WP 2-18, third paragraph

This paragraph discusses frequent fuel-cladding failures and the contamination of cooling water effluent. No data is provided on the number of times fuel-cladding ruptures occurred, the effluent characteristics, and the quantity of effluent disposed of during fuel-cladding failure periods.

Recommendation:

Provide information on the number of times fuel-cladding failed; the years in which these failures happened; whether failures occurred at one reactor or more reactors at a time; the quantity and concentration of effluent disposed; whether effluent was monitored for radioactivity levels; whether the reactor facilities were decontaminated after fuel-cladding failure; whether there was any incidence of radiation exposure during fuel-cladding failure, either within the reactor buildings or outside the disposal facilities. These items should be either discussed here or incorporated in the investigation task for data compilation.

2-10 **Deficiency/Recommendation:** Section 2.1.4.2, p. WP 2-19

The last sentence of the second bulleted item states "...radionuclides in the reactor cooling water were low during normal operations." Define "low."

2-11 **Deficiency:** Section 2.1.4.2, p. WP 2-19, fourth paragraph

The text discusses in general the leaks from the 107-KE and 107-KW retention basins, but does not identify the retention basin from which the leak occurred, nor does it say whether the leak was from the bottom or joints or holes on the walls or because of foundation failure? Was the leak visible from the outside? When was the leak found and repaired? Was there any overflow from trench to crib during such times? Was the leaking effluent clear or did it contain suspended solids?

Recommendation:

Answer the above questions or include them in the investigation task for data compilation.

2-12 **Deficiency:** Section 2.1.4.3, p. WP 2-19

This section discusses miscellaneous waste disposal in small cribs and drains as well as in the 116-K-2 trench. The "small cribs and drains" are not included in Table 2-2.

Recommendation:

Include "small cribs and drains" in Table 2-2, and Figure 2-2 with a description of each facility, its purpose, and dimensions.

2-13 **Deficiency:** Section 2.1.4.4, p. WP 2-20

This section describes the sources for radioactive sludge and radioactive solid waste. The information provided is not sufficient.

Recommendation:

Provide more information on the frequency, quantity, and characteristics of sludge removed and disposed from each facility. Also, provide information on the disposal facilities, such as the solid waste burial ground. Describe the area occupied by the solid waste burial ground. Is the disposal facility an excavated pit? Are there separate disposal areas for liquid waste, sludge, and non-radioactive solid wastes?

2-14 **Deficiency/Recommendation:** Section 2.1.4.5, p. WP 2-20

The text states, "ground sterilants were used for both ground and aerial application." Specify the kind of sterilants used. Describe the quantity and frequency of application.

2-15 **Deficiency/Recommendation:** Section 2.1.5, p. WP 2-20, first paragraph

The second sentence states, "The success of past decontamination and deactivation efforts using current standards and future contaminant potential has not been addressed in this work plan." The meaning is unclear and should be clarified.

2-16 **Deficiency:** Section 2.1.5, p. WP 2-20, first paragraph

This paragraph states that assessing the success of past decontamination and deactivation efforts is not part of the work plan, but it will become part of the RI. These statements seem to be contradictory. The assessment of potential contaminant sources should include all decontaminated and deactivated facilities where the potential for migration of contaminants exists.

Recommendation:

The task of evaluating past decontamination and deactivation efforts should be included in this work plan and the 100-KR-2 and 100-KR-3 work plans.

2-17 **Comment:** Section 2.1.5, p. WP 2-20

Does the reactor D+D EIS currently under review effect the 100-KR-1 operable unit? If so, its existence should be noted and the potential effects of the reactor D+D effort on the 100-KR-1 operable unit should be noted.

2-18 **Deficiency/Recommendation:** Section 2.1.6, p. WP 2-21, first paragraph

In the fifth line, substitute "116-K-2 Trench" for "116-K-2 Crib."

2-19 **Deficiency:** Section 2.2.1, p. WP 2-22, second paragraph

The last sentence refers to Plate 1 for the topography of the 100-K area. Plate 1 is a water level map of the entire Hanford Site, at a scale that makes it difficult to see any contours in the 100-K area.

Recommendation:

Provide a map that shows the contours of the 100-K area.

2-20 **Deficiency/Recommendation:** Section 2.2.2.1.2, p. WP 2-23

In the fifth line, the text states, "The Columbia River Basalt Group is subdivided into five formations." The five formations should be listed.

2-21 **Deficiency:** Section 2.2.2.1.3, p. WP 2-23

The second paragraph states that the section type I is not thought to be present beneath the 100-K Area, yet Figure 2-6 shows section type I in the vicinity of the 100-K Area.

Recommendation:

Be consistent in the geologic description. As noted in Section 2.2.2.2.1.2, p. WP 2-49, the Ringold Formation beneath the 100-K Area is probably a mixture of type I and type II. A correction of Section 2.2.2.1.3 and/or Figure 2-6 is warranted.

2-22 **Deficiency/Recommendation:** Section 2.2.2.1.1, p. WP 2-25

The geologic member "Umptanum" is misspelled as "Umtanum."

2-23 **Deficiency/Recommendation:** Section 2.2.2.1.6, p. WP 2-28

The reference at the end of the sixth line (Fecht 1978, p. 17) should be listed under "8.0 REFERENCES."

2-24 **Deficiency:** Section 2.2.2.2, p. WP 2-28 through WP 2-33

In this section as well as in other sections, the text mentions the "600 Area." This area is not shown in the Site Map or in Plate 1.

Recommendation:

Include the "600 Area" on Figure 1-1.

2-25 **Deficiency:** Table 2-3, p. WP 2-39

Well K-13 is noted to have oil in the well, yet no further discussion of the origin of this oil is noted.

Recommendation:

Provide information in the work plan or in the response to comments as to the source of the oil in well K-13. Is the oil from a leaking pump in the well or is the aquifer contaminated with oil in this location?

2-26 **Deficiency:** Table 2-3, p. WP 2-39

The depths of wells K-21 and K-23 do not agree with their screened intervals and are less than what would be expected for a depth to groundwater. Are these well depths correct, are the wells dry, or have they been sanded in? The comments section of the table gives no guidance.

Recommendation:

Check the well depth figures.

2-27 **Deficiency:** Table 2-3, p. WP 2-40

The table mentions "Sources," but lists no sources. Few of the abbreviations in the table, such as P-Sub, P-submrsbl, and T.D, are defined.

Recommendation:

Provide the sources for the data and define the abbreviations under "Notes."

2-28 **Deficiency:** Figure 2-12, p. WP 2-41

The unit for the depth scale "Depth Below Land Surface" is not given. The title is incorrect. One reference has an incorrect year.

Recommendation:

Specify "feet" as the unit for the "depth below land surface." For the figure title, substitute "Geologic Logs" for "Graphic Logs." Under "SOURCES," substitute "Fecht et al. 1985" for "Fecht et al. 1984."

2-29 **Deficiency:** Section 2.2.2.2.1.1, p. WP 2-49

Well 199-B3-2 (1-B3-2) is discussed on this page and elsewhere. However, the well (1-B3-2) location is not shown in the well location maps (Figures 2-10 and 2-11 or elsewhere).

Recommendation:

Indicate the well location (1-B3-2) on the appropriate maps.

2-30 **Deficiency:** Section 2.2.2.2.1.2, p. WP 2-50, second paragraph

In the seventh line from the top, the year for the reference "Brown 1962" is given as 1962. Under the list of references, "8.0 REFERENCES," the year is shown as 1989.

Recommendation:

Correct this error.

2-31 **Deficiency:** Figure 2-15, p. WP 2-51

In this figure, the unit for "ELEV" is not given in the tabular column. The reference years 1962 and 1984 under "SOURCE" are incorrect.

Recommendation:

Specify "ft, msl" as the unit for "ELEV" in the tabular column. Give the correct reference years under "SOURCE."

2-32 **Deficiency:** Figure 2-5, p. WP 2-51

The elevation of the top of the Ringold in well K-11 (413 ft) does not support the placement of the 430 ft contour.

Recommendation:

Check the elevation of the Ringold in well K-11 and adjust if necessary. Otherwise, redraw the contours.

2-33 **Deficiency/Recommendation:** Section 2.2.2.2.1.4, p. WP-53

In the first line, the word "pond" is used for "crib" in "the 116-K-1 pond berm." Use the word "crib" for 116-K-1, for consistency throughout the work plan.

The sixth line contains the acronym "USAEC." USAEC has not yet been defined in the text and does not appear in the list of acronyms. Define the acronym "USAEC."

2-34 **Deficiency:** Section 2.2.3.1, p. WP 2-53

The statement in paragraph 3 that "the depth of groundwater beneath <u>most</u> of the Hanford Site is generally 200 to 300 ft" is not entirely correct. Generally, depth to groundwater greater than 200 ft is only found in the 200 Area plateu. The areas to the north of Gable Mountain and to the east of the 200 Area plateu have a depth to groundwater generally less than 100 ft.

Recommendation:

Correct the statement.

2-35 **Deficiency:** Section 2.2.3.1, p. WP 2-54, third paragraph

In line 2, the text states, "Therefore, in a general regional sense, vertical ground water movement is upward in response to increasing hydraulic head with depth." The statement is unclear.

Recommendation:

Clarify the above statement using regional hydrogeological data.

2-36 **Deficiency:** Table 2-6, p. WP 2-59

The stratigraphic terminology is confusing. An upper Ringold sequence is noted. We assume that this is a local designation since the more classic upper Ringold sequence of the Pasco Basin is known to be absent in the 100-K Area. This site specific differentiation of the Ringold can lead to confusion and should be revised. For instance, in Section 2.2.3.2.2.5, are the Hanford/middle Ringold sediments, noted in the last paragraph of this section, referring to the locally designated middle Ringold sequence or the classic Pasco Basin middle Ringold?

Recommendation:

We recommend not using the locally designated upper, middle, and lower Ringold sequence terminology. We also recommend coordinating the stratigraphic and hydrostratigraphic terminology with other 100 Area work plans to yield a consistent nomemclature and to enhance the transfer value of results between operable units.

2-37 **Deficiency:** Section 2.2.3.2.2.2, p. WP 2-61

The text states, "Also, the continuity of these layers (or the degree of cementing) may change resulting in variations to ground water and contaminant flow." There is no discussion or any reference to indicate that the degree of cementing may change due to ground water and contaminant flow. Also, the term, "contaminant flow" was introduced abruptly in this sentence. In general, the degree of cementing may change due to the presence of silicious, calcarious, and other materials present in ground water or in the soil layers.

Recommendation:

Provide evidence that the degree of cementing may change due to variations in ground water and contaminant flow.

2-38 **Deficiency:** Section 2.2.3.2.2.2, p. WP 2-61, second paragraph

The second paragraph of this section discusses the potential effect of the cemented gravel layers on contaminant movement; cation exchange capacities (CEC) are discussed using the CEC data in Table 2-7. The potential effect of the cemented gravel layers on contaminant movement is said to be evident in the variations in cation exchange

capacities. According to Table 2-7, cemented gravel layers exist only under well 699-78-62 which is far away from the 100-KR-1 Area. The CEC data for the geologic layers underlying 100-KR-1 (Wells K-19, K-25, K-26, and K-18) are very low, indicating increased contaminant mobility.

Significant increases in CEC values, which could indicate decreased contaminant mobility, are said to correspond to layers in which caliche or clay were noted. Significant increase in CEC values were seen in layers below 100 feet (30 m) from ground surface. These layers contained mostly sand and clay, with some gravel and caliche. In the 100-KR-1 Area, the geologic layers are mostly sand, gravel, and boulders, with very low CEC values. The cemented gravel layers are reported only for well 699-78-62, which is far east of the 100-KR-4 operable unit (Table 2-7).

Given the hydrogeology of the site, lithology data for well 699-78-62 and ground water flow during reactor operations period (Figure 2-19 from 1967 data), contaminants might have migrated towards well 699-78-62. However, more data on the hydrogeology and lithology of the site for 100-KR-1 Area is necessary to confirm the effect of the cemented gravel layers on contaminant movement.

Recommendation:

Discuss the potential effect of cemented gravels on contaminant movement by comparing the data for lithology of wells as well as the contaminants present in the soil and ground water.

2-39 **Deficiency/Recommendation:** Table 2-7, p. WP 2-65

The reference "Bensen et al 1963" under "Sources" at the bottom of the table should be listed in "8.0 REFERENCES."

2-40 **Deficiency:** Section 2.2.3.2.2.8, p. WP 2-67

Reported hydraulic conductivities for flow tops in the Saddle Mountains Basalt are noted to range between 10^{-2} to 10^{-6} ft/d. An examination of about 10 references available to us indicates a range in the hydraulic conductivities in the flow tops to be about 10^{-2} to 10^{3} ft/d.

Recommendation:

Review the sources for this data and correct the range as appropriate.

2-41 **Comment:** Section 2.2.3.2.3, p. WP 2-71

The difference in groundwater elevations between wells K-11 and K-13 can also be explained by the fact that the water level measurements were made on different dates and could have been influenced by different river stages.

2-42 **Deficiency:** Section 2.2.3.2.4.1, p. WP 2-73

Although the conclusion of a shallow flow system near the river seems reasonable, it is not clear how review of photography indicates the occurrence of warm water seepage.

Recommendation:

Provide more detail on exactly what type of photographs exist, what area they cover, and what they show. Characterization of diffuse groundwater seepage to the river is an important data need not be addressed by the 100-KR-4 work plan. Can these photographs provide some useful information on characterizing the areal extent of seepage through the river bottom sediments?

2-43 **Deficiency/Recommendation:** Figure 2-17, p. WP 2-69 and Figure 2-19, p. WP 2-75

Specify "ft, msl" as the unit for elevation in the tabular column. Cite the reference for the 1967 data used.

2-44 **Deficiency:** Section 2.2.3.2.5, p. WP 2-77, first paragraph

The last two sentences state, "Once production ceased, the groundwater elevations reverted to "natural" conditions. Contaminants which had been transported to the south could then migrate back toward the site and the river, perhaps at greater depth." No substantial evidence is given for this statement.

Recommendation:

During reactor operation, there was sufficient hydraulic head from the ground-water mound (25 ft) to transport contaminants. However, once the operations of the reactors ceased, the hydraulic head dropped from 5 feet to 10 feet, depending upon the ground-water level fluctuations. This may not be sufficient to revert the migration of contaminants back to the site and the river. According to the groundwater elevations shown in Figure 2-17, there is no

substantial head available for contaminant migration towards the site at a faster rate than during operations. Data is needed to substantiate the statement cited above. Contaminant migration depends on the soil conditions, groundwater flow rate, and the type of contaminants present.

2-45 **Deficiency:** Section 2.2.4.1., p. WP 2-77

According to Plate 1, the Hanford ditch traversed the 100-K Area, yet no mention of the Hanford ditch is contained in the work plan. Was the ditch filled in during construction of the reactors or does it still exist in the vicinity of 100-K and did it serve as a potential conduit for tank spills?

Recommendation:

Note the status of the Hanford ditch with respect to the operating history of the 100-K Area.

2-46 **Deficiency/Recommendation:** Table 2-9, p. WP 2-91

Three references at the bottom of this page -- "Hitchcock and Crunquist 1978," "Department of Natural Resources 1987," and "Department of Wildlife" should be listed in the list of references, "8.0 REFERENCES."

2-47 **Deficiency/Recommendation:** Section 2.2.6.6, p. WP 2-97, second paragraph

Include the references for the documents "WAC 173-201-080(2)" and "WAC 173-201-045(2)b" in the list of references.

3-1 **Deficiency:** Section 3.1, p. WP 3-1, first paragraph

The last sentence states, "A goal of this remedial investigation will be to develop data on the distribution and concentration of nonradioactive inorganic and organic species." This remedial investigation is intended not only to develop data on the distribution and concentration of nonradioactive inorganic and organic species but also to develop more data on the distribution and concentration of radioactive species.

Recommendation:

Include "radioactive species" in the text.

3-2 **Deficiency/Recommendation:** Section 3.1.1, p. WP 3-2

The five waste sites under bullets should be listed in the order discussed in the subsequent sections. In the fourth

and fifth bullets, under the facility description, "Cooling Water Effluent Retention Basins" should be substituted for "Water Retention Basins."

3-3 **Deficiency/Recommendation:** Section 3.1.1, p. WP 3-2, second paragraph

The chemical composition of cooling water effluent should be reported, if available.

3-4 **Deficiency/Recommendation:** Table 3-1, p. WP 3-5

References should be provided for the information provided in this table.

3-5 **Deficiency:** Table 3-1, p. WP 3-5

In Column Five, the text describes, "Effluent from 107-KE and 107-KW retention basins at times of high activity due to fuel element failure" for 116-K-1 and 116-K-2 facilities. However, during fuel element failure, the effluent was directly discharged to the 116-K-1 and 116-K-2 facilities most of the time, and not from the retention basins.

Recommendation:

In Column Five under "Process stream received/handled," the text should be modified as follows:

116-K-1 Direct discharge of cooling water effluent on one or two occasions of high activity due to fuel element failure.

116-K-2 Direct discharge of cooling water effluent at times of high activity due to fuel element failure. On a few occasions, high activity effluent was taken through the retention basins and then discharged.

3-6 **Deficiency:** Table 3-1, p. WP 3-5

In Column Six, for the facilities 107-KE and 107-KW basins, the total radioactivity is reported as 6.2 Ci soil/fill and 3.9 Ci soil, respectively. Are these data for soil outside the basins or for the inside basin contents? If the data is for soil, how was the total radioactivity level determined? If the data is for contents of the basin, what is the volume of the sludge and soil in each basin?

Recommendation:

Provide answers to these questions.

3-7 **Deficiency:** Section 3.1.1.1, p. WP 3-6, second paragraph

In the last sentence, the text states, "Predominant radionuclides present in the soil column as a result of cooling water leaks and waste disposal are ^{3}H, ^{60}Co, ^{63}Ni, ^{90}Sr, ^{137}Cs, and $^{152,154,155}Eu$." The basins are supposed to retain cooling water effluent with short-lived radionuclides. The contamination of soil with the above long-lived radionuclides around the basins indicates that during fuel-cladding failure high activity cooling water effluent was taken through the basins. However, the information provided in the work plan is insufficient to confirm this.

Recommendation:

More information on the record of operations of the cooling water effluent retention basins is needed for RI Phase I activities for the 100-KR-1 operable unit, as well as for the 100-KR-4 operable unit.

3-8 **Deficiency:** Section 3.1.1.1.1, Table 3-2, p. WP 3-6

A summary of radionuclide inventories for the 107-K retention basins in 1976 is given. However, data for each individual basin is not reported.

Recommendation:

Instead of reporting total values for the three tanks each in 107-KE and 107-KW, provide the data for each individual 107-KE and 107-KW basin. In addition, discuss the approximate quantity of sludge and filling material present in each basin. This information would help to quantify the amount of radioactive substances present in each tank, for further investigation and feasibility study.

3-9 **Deficiency/Recommendation:** Section 3.0, Tables 3-3 through 3-6 and 3-8

The analytical test methods and detection limits for each analyte should be included.

3-10 **Deficiency/Recommendation:** Table 3-3, p. WP 3-8

It is unclear what "^{11}P/scalar" represents. Also, the unit for c/m in Column Six should be defined. Explain numbers such as <200/40. What do the numerator and denominator numbers represent?

3-11 **Deficiency/Recommendation:** Section 3.1.1.3, Figure 3-3, p. WP 3-11

In Figure 3-3, provide the unit for elevations in the table for "TRENCH AND CRIB SAMPLE HOLE DATA" column. The elevation for hole B is given as 0.00. Is this value correct? The elevations for holes D and E inside the crib are given as 430.17 and 420.88, respectively. This difference in elevation of 10 feet between holes D and E suggests a substantial amount of surficial deposits in the crib. Explain this, in view of surface undulations in the crib due to soil deposition from nearby sources.

3-12 **Deficiency/Recommendation:** Section 3.1.1.2 and 3.1.1.3, pp. WP 3-13 and WP-15

Provide summary tables of radionuclide inventories in Tables 3-4 and 3-5 for comparison to Table 3-2.

3-13 **Deficiency/Recommendation:** Table 3-4, p. WP 3-13

Contaminant concentrations in surface samples from holes D and E are higher than the depth samples for most of the radionuclides. This indicates an immediate threat of release of radionuclides to the environment. It further confirms the migration of contaminants from the nearby sources through surficial deposits during storms and persistence of contaminants at the site due to less permeable soil. Explain this table more thoroughly, including lateral and vertical migration of contaminants.

3-14 **Deficiency/Recommendation:** Table 3-5, p. WP 3-15

The sampling depths are not consistent with each hole. The first depth sample was taken from below 10 feet from the surface at most of the holes along the trench. At some holes, the first depth sample was taken at below 17 feet from surface. Is there any reason for this? Discuss also the lateral and vertical movement of the contaminants, as suggested by the data in Table 3-5.

3-15 **Deficiency:** Section 3.1.1.5, p. WP 3-17

It is not clear whether the pipelines and valves are part of this operable unit, since they were not listed as a source in Section 3.1.1 (p. WP 3-2).

Recommendation:

Include in the list of sources all piping and valves associated with the reactor cooling systems.

3-16 **Deficiency/Recommendation:** Section 3.1.2.1, p. WP 3-17, first paragraph

The next to last sentence states, "The highest radionuclide concentrations in the area are in the sludges in the 107-K basins." However, the data in Table 3-3 are for the soil samples taken inside the basins. Clarify this point or rectify this error.

3-17 **Deficiency:** Table 3-6, p. WP 3-19 and WP 3-20

The data for test holes A and B for the 107-KE basins; O for 107-KW, and A in between 107-KW and 107-KE are not given in Table 3-6 but are shown on Figure 3-4. Indicate the reason for the discrepancy at the end of the Table 3-6. It appears from the data supplied in Table 3-6 that surface soils are more contaminated than depth samples, indicating a possible immediate threat to the atmosphere.

Recommendation:

Evaluate and discuss more thoroughly the lateral and vertical movement of the contaminants, using the data in Table 3-6. Indicate the direction of contaminant migration -- either north, south, west, or east of the retention basins -- comparing the data between adjacent holes.

3-18 **Deficiency:** Section 3.1.2.1, p. WP 3-21, first paragraph

The last sentence states, "The remaining soil samples in 116-KW-3 and 116-KE-4 showed contaminant concentrations generally below background." However, the background levels are not mentioned anywhere in the text or table.

Recommendation:

Indicate the background level of contaminant concentration at the bottom of each table for each radionuclide. Also include the analytical detection limits used. Show the location of background samples on Figure 3-4.

3-19 **Deficiency/Recommendation:** Section 3.1.2.2, p. WP 3-21

In Table 3-7, include the summary of radionuclide inventory near 116-K-2 Trench. This information will help to understand the magnitude of contaminant migration from the trench to the nearby soil column.

3-20 **Deficiency:** Section 3.1.2.2, p. WP 3-21

Table 3-8 is titled, "Radionuclide Concentrations in Soil Samples Outside the 116-K-1 Crib and 116-K-2 Trench." However, the data in Table 3-8 are only for the soil samples outside the 116-K-2 trench.

Recommendation:

Correct the table title. Provide analytical detection limits for the radionuclides in Table 3-8.

3-21 **Deficiency:** Section 3.1.2.2, p. WP 3-21, last paragraph

The last sentence states, "Very low concentrations were found at the five sample sites for all the measured contaminants." No basis is given for this statement.

Recommendation:

Substantiate the above statement. Provide a background level for comparison and include analytical detection limits.

3-22 **Deficiency:** Section 3.1.3, p. WP 3-23

The discussion of groundwater in Chapter 3 is not adequate to address the needs of the work plan. The nature and extent of contamination in groundwater underlying the source operable unit is important information to evaluate in identifying contaminant of concern and in focussing the investigation on the constituents that exhibit the greatest degree of mobility. A thorough examination of existing groundwater quality in the near vicinity of the 100-KR-1 operable unit will further help focus the investigation on areas with relatively high or anomalous concentration of contaminants and help identify specific areas of greatest concern.

It is noted in the work plan that it may be difficult to differentiate the source operable unit (i.e., 100-KR-1, 3, and 3) in which contamination occurred. This is true and points out an important objective of the source operable unit RI/FS; that is, to specifically identify which waste management units within each operable unit present the greatest threat to the environment and to develop a plan to expeditiously remediate these significant sources of contamination. A thorough examination of existing groundwater information is critical in identifying where anomalies occur and where further site characteristic work needs to be focussed. For instance, in 300-FF-1, a separable uranium plume was identified in groundwater in the southern

part of the operable unit, and this data was used to focus the RI to identify the source of this plume. A similar approach should be taken here. This is a significant shortcoming in the 100-KR-1 work plan. The brief reference to groundwater information in the 100-KR-4 work plan does not meet the site specific requirements of this work plan.

Recommendation:

Use existing groundwater data to evaluate the extent and nature of contaminants in the groundwater underlying the 100-KR-1 operable unit. Present a summary of this information in the work plan and describe how this information is being used to identify the contaminants and areas of concern within the 100-KR-1 operable unit.

3-23 **Deficiency:** Table 3-9, p. WP 3-23

No unit of measurement for radionuclides is given.

Recommendation:

Provide the unit ("pCi/g") in the table.

3-24 **Deficiency:** Section 3.1.5.2, p. WP 3-25, first paragraph

The third sentence states, "Emission data show stack concentrations well below DOE Derived Concentration Guides (DCG) for ^{56}Mn, ^{60}Co, and ^{137}Cs." No reference is given for DOE DCGs.

Recommendation:

Provide the reference as well as DOE DCG concentrations for the above radionuclides. (DOE Order 5400.5 contains DCGs for the above radionuclides as well as 137 Cs, 239 Pu, 239, 240 Pu)

3-25 **Deficiency:** Section 3.1.6.1.1, p. WP 3-25

The second sentence states, "The analytical results of on-site versus offsite for 1983 through 1988 are shown in Figure 3-8." However, the locations for off-site sampling are not shown on Figure 3-7.

Recommendation:

Show the off-site sampling locations on Figure 3-7 or another figure.

3-26 **Deficiency/Recommendation:** Figure 3-6, p. WP 3-26

The legend for the hatched area should be given.

3-28 **Deficiency/Recommendation:** Table 3-10, p. WP 3-27

The unit of measurement for air quality data should be included and the terms "nearby" and "distant" defined.

3-29 **Deficiency/Recommendation:** Section 3.1.6.1.1, Figure 3-7, p. 3-29

The flora sampling locations should be clearly marked or identified in the legend.

3-30 **Deficiency:** Section 3.1.6.1.1, p. WP 3-30

This figure has two deficiencies. First, the title says "Median (3 standard deviations)..."; but only one data point is presented per year for both on-site and off-site vegetation. This point is presumably the median. It is not clear what "3 standard deviations" refers to.

Second, the poor quality of reproduction does not allow the reader to distinguish between the on-site and off-site bar graphs.

Recommendation:

Provide the range for the 3 standard deviations for each bar, or change the title to eliminate "3 standard deviations." Improve the quality of the graphics to make it easier to differentiate between on-site and off-site vegetation.

3-31 **Deficiency/Recommendation:** Section 3.1.6.1.2, p. WP 3-32

Change the title of this figure from "Terrestrial Fauna Sampling Locations Near 100-K Area" to "Terrestrial Fauna Sampling Location Near the 100 Areas. This figure shows locations near the 100-K, 100-D/DR, and 100-H areas.

3-32 **Deficiency:** Section 3.1.6.1.2, Table 3-14, p. WP 3-34

The data provided in the table do not sufficiently describe the 100-KR-1 and 100-KR-4 areas.

Recommendation:

More data is needed for the 100-KR-1 area. This must be addressed in the RI Phase I tasks.

3-33 **Deficiency:** Section 3.1.7, p. WP 3-34

The last sentence of Bullet 3 states, "However, inference is made to the presence of contaminants near the unconfined water table based on groundwater contamination, historic records of water levels, and groundwater temperature data." The inference is actually made based on data available for the vadose zone in the 100-KR-1 area.

Recommendation:

Revise the statement to read, "However, the presence of contaminants below the 100-KR-1 Area is inferred, given the presence of vadose zone soil contamination."

3-34 **Recommendation:** Figure 3-11, p. WP 3-35

The box identified as infilitration along one of the potential primary exposure pathways should be shaded to indicate that it is a subject that is pertinent to the 100-KR-1 operable unit work plan. As noted in the comments on Section 1.2, characterizing the occurrence and transport of contaminants in the vadose zone is to be addressed by the source operable unit RI/Fs. As noted in Section 3.3.1.2, "the most significant primary release mechanism at the 100-KR-1 operable unit is infiltration...", and characterizing this release mechanism should therefore be within the scope of the 100-KR-1 RI/FS work plan.

3-35 **Deficiency:** Section 3.1.7.1, p. WP 3-37

In third line of this section, the cooling water retention basins and associated pipelines are mentioned as the major known sources of vadose zone contamination. No data is provided for contaminants in the associated pipelines to show that the pipelines or the 105-KE fuel storage basin leak are also a major source of contamination. The contamination associated with other ancillary structures, such as piping, outfall, spillway channel, and other sources, is yet to be investigated in the Phase I RI.

Recommendation:

Correct the above statement concerning known and suspected major sources of contamination.

3-36 **Deficiency:** Section 3.1.7.1, p. WP 3-37, second paragraph

The first two sentences appear contradictory. The first sentence states, "Other potential sources of contamination considered less significant, based on current knowledge of the site, are the sludge that remains in the retention basins, and the radiological contamination that remains in the ground at the effluent crib and trench." The second sentence states, "the highest concentrations of beta-gamma radiation at the 100-KR-1 operable unit occur in the retention basin sludge, the retention basin fill dirt, the soil beneath the basins, and the scale and sludge that

remain in the cooling water effluent pipelines." It appears from the data presented in the work plan that the sludge inside the retention basins, as well as the soils inside and outside the retention basins, crib, and trench, are highly contaminated.

Recommendation:

Clarify these statements, referring to the reported data.

3-37 Deficiency/Recommendation: Section 3.1.7.1, p. WP 3-37

There is no mention of the soil adjacent to the retention basins as a source. Section 3.1.2.1 (p. WP 3-17) states that "over 80% of the radionuclide inventory of the 107-KE and 107-KW basin areas is contained in contaminated soils adjacent to the basins." If this is a true, these soils should be included as a source.

3-38 Deficiency: Section 3.1.7.2, p. WP 3-38, second bullet

The text refers to the vadose zone being contaminated with various "radionuclides, nitrates, and chromium." This is a limited list and ignores the other contaminants mentioned in Table 3-15 (p. WP 3-44). If these are the primary vadose zone contaminants, then that should be indicated, with a comment regarding other types of contaminants, such as PCBs, herbicides, etc., as being secondary.

Recommendation:

State the primary known vadose zone contaminants (known at this time). Add a statement regarding other types of contaminants that may potentially of concern using the information in Table 3-15.

3-39 Deficiency: Figure 3-12, p. WP 3-39

This is a poor representation of a vadose zone model. The groundwater table is not clearly identified, groundwater recharge through the vadose zone (a flow process of primary concern) is not shown, the variably saturated zone resulting from water table fluctuation (a potentially important zone of contamination) is not shown, nor is there any representation of the vertical distribution of contaminants in the vadose.

Recommendation:

Characterizing the distribution of contaminants within the vadose zone and quantifying their potential movement to groundwater is a primary objective of the 100-KR-1 RI/FS.

Therefore, a complete and accurate conceptual model of the vadose zone should be included within the work plan. Completely revise Figure 3-12 and include the most accurate information on the physical makeup, water balance, and distribution of contaminants within the vadose zone. Use this conceptual model in the identification of data gaps and development of the data collection program in Section 4.3.

3-40 <u>Deficiency:</u> Section 3.1.7.2, p. WP 3-38 and WP 3-39

The present conceptual model assumes that infiltration and recharge are on the order of a few tenths of an inch per year in the 100-KR-1 area. We believe this assumption is not supproted by the most current information on recharge at Hanford. The waste management units in the KR-1 area are generally overlain by coarse soils with little or no vegatation. Under these conditions, there may be substantial infiltration and recharge on the order of 60 percent of annual precipitation, or about 4 inches per year.

<u>Recommendation:</u>

As shown in the site conceptual model, Figure 3-11, contaminants may reach groundwater via infiltrating precipitation. This may be an important contaminant migration pathway and as such should be a mjor discussion of infiltration and recharge in the conceptual model using the most current information available from Westinghouse and Battelle sources. Also include infiltration and recharge as a data gap requireing further work to confirm the conceptual model in designing the data collection program in Section 4.3.

3-41 <u>Deficiency:</u> Section 3.1.7.3, p. WP 3-41

The potential for recharge by infiltration of precipitation is probably more greatly affected by the vegetation cover (or lack thereof), than by the thickness of the vadose zone and proximity to the river.

<u>Recommendation:</u>

Include in the conceptual model of the groundwater flow system a realistic appraisal of infiltration and recharge and note that there is potential for significant infiltration of precipitation and vertical movement of contaminants in the vicinity of waste management units with unvegetated surface soils.

3-42 **Deficiency:** Section 3.1.7.6, p. WP 3-42

The first two sentences state, "The transport of contaminants via the air pathway does not appear to be significant. Known sources of contamination in the vadose zone are generally located under several feet of clean soil."

The statements appear to be incorrect. According to the results of analyses presented in the tables, as well as the reported surface radiation levels for the sources and vadose zone, surface soils are more highly contaminated than depth samples, indicating a possible threat to the atmosphere.

Recommendation:

Clarify the above statements using the reported data.

3-43 **Deficiency/Recommendation:** Section 3.2, p. WP 3-42

The definition of "applicable" has been revised in the new National Contingency Plan (NCP). Refer to 40 CFR § 300.5 for the new definition.

3-44 **Deficiency/Recommendation:** Section 3.2.1, p. WP 3-44

Change the title of this table include "Initial" as the first word. This list will most likely change during the RI.

3-45 **Deficiency:** Section 3.2.1, p. WP 3-44

In Table 3-15, "Contaminants of Concern in the 100-KR-1 Operable Unit," only two organics are reported. From the discussion of waste-generating processes and deactivation and decontamination activities, it appears that various other chemicals, such solvents, were also used during normal operations. Pesticide use was also cited in the discussion.

Recommendation:

Include pesticides and solvents in the list of "contaminants of concern."

3-46 **Deficiency:** Section 3.2.1.1, p. WP 3-45

The text states, "federal chemical-specific requirements come from five main citations in the Code of Federal Regulations (CFR)." However, there are nine citations in the subsequent subsections. What are the five main citations?

Recommendation:

List the main five citations first, followed by any other citations.

3-47 Deficiency/Recommendation: Section 3.2.1.1.9, p. WP 3-47

The citation of this ARAR should be changed from 40 CFR Part 1910 to 29 CFR Part 1910.

3-48 Deficiency: Section 3.2.1.2, p. WP 3-47

The text states, "State of Washington chemical-specific requirements are listed in five regulations and are discussed individually below." However, only four regulations are cited in the subsequent subsections.

Recommendation:

Include the fifth regulation in this section.

3-49 Deficiency: Section 3.3.1.5, p. WP 3-61

The text refers to how animals can be exposed by "direct contact and consumption of contaminated plants." However, no mention is made of potential direct contact and consumption of contaminated soil.

Recommendation:

Add the words, "and soil" to the end of the last sentence.

3-50 Recommendation: Section 3.3.1.5, p. WP 3-61

It should be noted that a future resident of the site may be a farmer and that he would likely be irrigating the land which may drive contaminants om the subsurface to the groundwater. The farmer may also be using the groundwater as a drinking water supply. Include this scenario with calculated exposures in Table 3-36.

3-51 Deficiency: Section 3.3.2, p. WP 3-62

The sentence beginning "Information is currently lacking concerning ..." lacks any mention of radionuclides.

Recommendation:

Revise the sentence as follows: "Information is currently lacking concerning concentrations of radionuclides, nonradioactive inorganics, PCBs, herbicides/pesticides or

other organic chemicals in the soil to adequately evaluate the risk assessment. However, a preliminary evaluation is made based on the available information and data gathered."

3-52 **Deficiency:** Section 3.3.1.5, p. WP 3-62, top of page

A list of pathways is given. Dermal contact is not mentioned.

Recommendation:

Add "dermal contact with contaminated soil" to list.

3-53 **Deficiency:** Section 3.3.3.1, p. WP 3-63

This section is confusing, because of the weakness of the first paragraph. The paragraph mentions known or potential chemical contaminants, including sulfate, chlorine ions, chromium VI, copper, mercury, and PCBs. The following paragraphs then discuss the toxicities of chromium VI, copper, mercury, and PCBs, but not sulfate or chloride ions. While sulfate and chlorine ions are fairly innocuous, a statement about their toxicities is warranted.

Recommendation:

Reword the first paragraph so that the reader knows what topics will be discussed and in what order. Include a brief statement about the toxicities of sulfate and chloride ions.

3-54 **Deficiency/Recommendation:** Section 3.3.3.1, p. WP 3-63, first paragraph

In the first sentence, radionuclides should be included. In the last sentence of this paragraph, substitute "chloride ions" for "chlorine ions."

3-55 **Deficiency:** Section 3.3.3.1, p. WP 3-63

We find no "table of maximum contaminant concentrations." We also find no discussion of organic acids which are noted as known or potential contaminants, nor do we find these constituents listed as contaminants of concern.

Recommendation:

Include the appropriate information in the work plan. If this statement refers to existing information sources, please include the reference.

3-56 **Deficiency:** Section 3.3.3.2, p. WP 3-64

The first sentence lists persistent contaminants as chromium VI, copper, mercury, PCBs, and radionuclides. Each is then discussed except for PCBs.

Recommendation:

Include a statement about the persistence of PCBs.

3-57 **Deficiency:** Section 3.3.3.3, p. WP 3-64

The mobility of chromium VI, mercury, radionuclides, sulfate, and chloride is discussed. The mobility of PCBs is not.

Recommendation:

Discuss the mobility of PCBs.

3-58 **Deficiency:** Section 3.3.3.4, p. WP 3-65, top of page

Unitless bioconcentration factors are given for some of the contaminants found in the 100-KR-1 area (see Table 3-21, p. 3-65). Many contaminants of concern as listed in Table 3-15 (p. 3-44) are not given. Also, the valence for chromium is not specified.

Recommendation:

Include a brief statement regarding the missing contaminant bioconcentration factors. Are they unavailable? Were they looked for? Also, specify the valence of chromium.

3-59 **Deficiency:** Section 3.3.3.5, p. WP 3-65, mid-page

This section is entitled "Contaminants of Concern." This section follows Section 3.3.3, entitled "Contaminant Characteristics." Contaminant characteristics should not be discussed before the contaminants are identified.

Recommendation:

Place the "Contaminants of Concern" section before the "Contaminant Characteristics" section.

3-60 **Deficiency:** Section 3.3.4, p. WP 3-65

This section focuses only on chemical contamination, and specifically mentions PCBs, mercury, chromium, and copper. A broader focus, which includes radionuclides and any other chemical hazard that may be encountered, is needed.

Recommendation:

Include the word radioactive in sentence number three, so that it reads "magnitude of chemical and radioactive contamination." Modify sentence number four so that it reads "hazardous substances such as but not limited to PCBs, mercury."

3-61 Deficiency/Recommendation: Section 3.4.1, p. WP 3-66

Restate the primary objective in the first sentence Since this section discusses the feasibility study, the objective should be the one in §300.430 (e)(1) of the NCP.

3-62 Deficiency/Recommendation: Section 3.4.2, p. WP 3-67

Change the reference, "40 CFR 300.68 (f)(1)(v)" to "40 CFR 300.430 (e)(6)."

Paragraph 2, last sentence is confusing. Please rewrite.

3-63 Deficiency/Recommendation: Section 3.4.4, p. WP 3-71

The range of alternatives required by the new NCP is shown in §300.430 (e)(3), (5)(6). The alternatives should be incorporated into this section of the work plan and in Sections 5.3 and 5.5.

This section should also include a brief discussion on the interface of site remediation with other site remediation at Hanford.

4-1 Deficiency: Section 4.1.4, p. WP 4-5, first paragraph

The first sentence describes existing data that are insufficient to determine what contaminants are present, their exact location, and their potential to migrate. The concentrations of the contaminants are not included in the text.

Recommendation:

Include "contaminant concentrations" after "what contaminants are present."

4-2 **Deficiency/Recommendation:** Table 4-1, p. WP 4-8

Under the column "Data types" for Data Objectives "Vadose," "Air," and "Terrestrial Biota," substitute "chemical and radiological properties" for "chemical properties."

Explain the term "source data compilation."

The data types for the terrestrial biota investigation should include a field survey in addition to a literature search.

4-3 **Deficiency/Recommendation:** Table 4-3, p. WP 4-11

Page 1 of 3, under the column "Data use," add "WS" to correspond to soil gas survey measurements.

4-4 **Deficiency/Recommendation:** Section 4.2.3.1, p. WP 4-13

Several notes at the end of this table need clarification. Distinguish between the following terms: "standard operating procedures," "laboratory analytical protocol," and "standard laboratory methods."

4-5 **Deficiency:** Section 4.2.5, p. WP 4-16, first paragraph

The text states, "Approximately 80% of the samples collected will be Level III; 20% will be Levels IV and IV." The statement is unclear; Level V is not included.

Recommendation:

Revise the text to show that approximately 80% of the samples collected for non-radioactive chemicals will be Level III and 20% will be Level IV. All samples for radionuclides will be Level V.

4-6 **Deficiency:** Section 4.3.1, p. WP 4-17

The last bulleted item states that if the short-term potential risk is greater than 10^{-4}, interim response actions will be taken. No reference or basis for this criterion is presented.

Recommendation:

Provide a reference or reasoning behind the 10^{-4} criterion.

4-7 **Deficiency/Recommendation:** Section 4.3.2, p. WP 4-18 and WP 4-19

Substitute "vadose zone and ground-water contamination" for "groundwater contamination" wherever applicable in these pages.

4-8 **Deficiency:** Section 4.3.3.1, p. WP 4-22

The text states, "Several investigations of the retention basins, cribs, trench, and outfall structures have provided information concerning the concentrations of radionuclides present." No such information for outfall structures is provided in this work plan.

Recommendation:

Delete "outfall structures" from the above statement.

4-9 **Deficiency:** Section 4.3.3.4, p. WP 4-23, second paragraph

The second sentence states that "Biased sampling will be conducted to ensure needed information on known or suspect sources is obtained".

Recommendation:

Explain how "biased sampling" will achieve this goal.

4-10 **Deficiency:** Section 4.3.3.4, p. WP 4-23

The site-wide background soil data collection program has not been finalized, nor to the best of our knowledge, has it been formally proposed. We, therefore, question whether this program will be funded and completed by the time background data is required for the 100-KR-1 RI/FS. It is our understanding that the current approach to developing a background soils data base is to incorporate background data collected at individual operable units into a comprehensive data base. This approach is likely to require the collection of background soils data in the vicinity of the 100-KR-1 operable unit.

Recommendation:

Devise a strategy for determining background soil quality in the vicinity of the 100-KR-1 operable unit and note that this strategy will be incorporated into the site-wide effort.

4-11 **Deficiency:** Section 4.3.3.4, p. WP 4-23

It is noted that "best professional judgement will be used to identify sampling locations and numbers of samples collected." This is clearly not adequate to meet the requirements of regulatory oversight. The location and frequency of Phase I samples should be clearly specified in the RI/FS work plan based on a thorough examination of existing information and current site conceptual model. To defer developing a detailed sampling plan defeats the purpose of developing the RI/FS work plan, especially for a site with as much existing information as Hanford has.

Recommendation:

Delete the "best professional judgement" statement, include a detailed sampling plan within this work plan, and note that this sampling plan is based on an evaluation of best available information and that the plan can and will be revised as new information becomes available.

4-12 **Deficiency:** Section 4.3.4, p. WP 4-25, last paragraph

This RI/FS work plan is for the 100-KR-1 operable unit, which does not deal with ground water, surface water, and sediments. The last sentence includes "surface water and sediments, groundwater" in the decision-making process for the RI Phase I.

Also, Figure 4-1 is "Decision Tree for RI/FS Groundwater Sampling," which is not covered in this work plan.

Recommendation:

Delete "surface water and sediments, groundwater" from the last sentence. Also delete "Figure 4-1" from the sentence. Figure 4-1 should not be used in this work plan.

4-13 **Deficiency/Recommendation:** Figure 4-2, p. WP 4-27

This figure includes soil, surface water, sediment, air, and biota sampling. However, this work plan is for the 100-KR-1 operable unit, which involves only sampling for sources, vadose zone, air, and biota. This figure should be changed.

5-1 **Comment:** Section 5.2, p. WP 5-4

Task 4 - Surface Water and Sediment Investigations, and Task 6 - Groundwater Investigations are not within the scope of the 100-KR-1 RI/FS, and should be deleted from this work plan.

5-2 **Deficiency/Recommendation:** Section 5.2, p. WP 5-5, fourth paragraph

Substitute "particulate" for "particular" in the second bullet.

5-2 **Deficiency/Recommendation:** Section 5.2, p. WP 5-5, last paragraph

The text states, "The primary sources of contamination at or near the surface must be investigated early in the characterization effort." Explain clearly what "at or near surface" means.

5-4 **Deficiency/Recommendation:** Section 5.2.2, p. WP 5-6, first paragraph

The text states, "The available information on the operation of site facilities within the 100-KR-1 operable unit is relatively complete." It appears from the discussion of previous sections in this work plan that the available information is insufficient. More information from past records is to be collected. (See Section 5.2.2.1, second paragraph.)

5-5 **Deficiency:** Section 5.2.2, p. WP 5-7, first paragraph

In the second sentence, the phrase "...high risk problems..." is used without adequate definition.

Recommendation:

Define "high-risk problems."

5-6 **Recommendation:** Section 5.2.2.1, p. WP 5-7

In addition to interviewing individuals with personal knowledge of past activities at the site, we recommend including a number of these individuals in the area walkover survey.

5-7 **Deficiency/Recommendation:** Section 5.2.2.3.1, p. WP 5-8, second paragraph

The text states that data on indigenous fauna will be gathered. This is not mentioned in Subtask 2C in the Field Sampling Plan. Clarify.

5-8 **Deficiency:** Section 5.2.2.3.2, p. WP 5-9, second paragraph

The last sentence states, "The collection of Hanford Site Background soil quality data will be used to determine background surface radiation levels for comparative purposes." It is not clear from the statement whether only surface radiation levels will be used for background soil quality data or whether surface radiation levels and soil characteristics from the off-site sampling stations will be used as background soil quality data.

Recommendation:

Explain how this activity will be carried out and integrated with the work plan for the 100-KR-4 operable unit.

5-9 **Deficiency/Recommendation:** Section 5.2.2.3.3, p. WP 5-10

Define the term "anomalous subsurface areas."

5-10 **Deficiency:** Section 5.2.2.3.5, p. WP 5-11

In the coarse and dry sediments that comprise the surficial materials of the Hanford Reservation, ground penetrating radar can be expected to produce good results well below the 15 feet noted in the work plan.

Recommendation:

Investigate the application of ground penetrating radar at Hanford, revise the discussion in the work plan as appropriate, and consider using ground penetrating radar for applications deeper than 15 feet as necessary in the 100-KR-1 RI.

5-11 **Deficiency/Recommendation:** Section 5.2.2.3.6, p. WP 5-12, third paragraph

If the radiation levels are within acceptable levels, the pipelines could be visually inspected for structural failure.

5-12 **Deficiency/Recommendation:** Section 5.2.2.3.6, p. WP 5-12

There remains some question as to whether or not these pipelines are active. A contingency plan should be specified.

5-13 **Deficiency/Recommendation:** Section 5.2.2.3.7, p. WP 5-13

Include the sludge burial site in the listing of known and potential waste sources.

5-14 **Deficiency:** Section 5.2.2.3.7, p. WP 5-13

Test pits have been proposed as a preferred sampling technique in the 100-BC-1 work plan. Why are test pits considered acceptable as a sampling technique at one operable unit, but not at another? There should be close coordination of data collection techniques between operable units so that data will be comparable.

Recommendation:

Reconsider the use of sampling pits and coordinate sampling techniques with other 100 Area operable units.

5-15 **Deficiency:** Table 5-2, p. WP 5-17

In the last paragraph of Section 5.2.3.4, it is noted that the soils and geologic data obtained during the vadose investigation will be used to "estimate flux and velocity of contaminants in the vadose zone, to develop vadose flow and transport models." As described in the work plan, the field and laboratory tasks of the vadose zone investigation will not provide adequate information to meet the data evaluation task. To estimate flux and develop flow and transport models requires site specific information on soil hydraulic properties such as the unsaturated hydraulic conductivities and the matric potential and their respecitive relations to soil moisture content.

Recommendation:

Note in Section 5.2.5.2 that soil physical and hydraulic properties will be a focus of the vadose investigation. Add unsaturated hydraulic conductivut and matrix potentials to the list of physical properties in Table 5-2 and Table FSP-2. Describe the appropriate field and laboratory techniques to be used in measuring the soil hydraulic properties in Section 6 of the field sampling plan, as well as the location and depth intervals where these measurements will be made.

5-16 **Deficiency:** Section 5.2.2.3.7.1, p. WP 5-19

No mention is made in the work plan of investigating either the integrity of the concrete pads that support the retention basins or the integrity of the basins themselves. This information could help in contaminant source tracing.

Recommendation:

Include a visual inspection of the basins and the concrete pads in the site walkover and the soil/sludge sampling inside the basins.

5-11 **Deficiency:** Section 5.2.2.3.7.1, p. WP 5-19

This section discusses the sampling of basin contents in the 116-KE-4 and 116-KW-3 retention basins. One small test hole is to be dug within each basin to collect sludge and soil samples. Since the basins are about 250 ft in diameter, sampling from one small hole may not be representative.

Recommendation:

In addition to one test hole for sampling and observation, samples should be collected at four different locations within the basins at selected intervals based on the observations from the open test hole. The samples will be composited for a long list of chemical and radiological analysis, as listed in Table 5-2 of this work plan.

5-12 **Deficiency:** Section 5.2.2.3.7.2, p. WP 5-19

As noted in comments to the 100-KR-4 work plan, chemical characterization of the aquifer matrix and its interaction with specific contaminants is necessary to understand the dominant environmental fate and transport mechanisms upon which the baseline risk assessment will be developed The aquifer matrix likely to be most contaminated and potentially serving as a contaminant source term is that directly underlying the waste management units. However, the collection and analyses of soil samples from bore holes installed at the waste management units are proposed to stop at the water table.

Recommendation:

We recommend extending the bore holes drilled through the waste management units to a depth of 10 feet below the existing water table and collecting aquifer matrix samples at depths of 5 and 10 feet below the water table. These samples should be used for chemical characterization of the aquifer matrix and for contaminant leaching (desorbtion) experiments to be done under the scope of work in the 100-KR-4 work plan.

5-13 <u>Deficiency:</u> Section 5.2.2.3.7.7, p. WP 5-21, third paragraph

The text states that physical properties such as porosity, density, and water content will be measured to correlate sedimentary facies from borehole geophysical logging. However, the parameters such as "porosity and density" were not included in Table 5-2 under "Physical Parameters."

<u>Recommendation:</u>

Include "porosity and density" in Table 5-2 under "Physical Parameters."

5-14 <u>Deficiency/Recommendation:</u> Section 5.2.3, p. WP 5-23

In the sixth line, substitute "Laboratory analysis and data validation" for "Laboratory analysis."

5-15 <u>Deficiency:</u> Section 5.2.3.2, p. WP 5-23

Variations in soil minerology are noted as a site specific data need for the 100-KR-1 operable unit. We agree with the importance of this data, yet find this data need is not addressed in Table 5-2, nor anywhere else in the work plan.

<u>Recommendation:</u>

Describe how soil minerology will be evaluated, what analytical techniques will be used, what samples will be analyzed, and from what depth interval the samples will be taken. Also discuss what efforts will be made to evaluate the effects that waste discharges have had on soil minerology.

5-16 <u>Deficiency:</u> Section 5.2.3.3, p. WP 5-24

This section states that "A well-defined approach to physical testing is not presented because of potential mitigating factors such as radioactivity and chemical contamination levels of samples." This is unacceptable. The work plan should present a thorough analysis of existing information on the nature and distribution of contaminants and the physical characteristics of the operable unit and use this information to develop a thorough, well organized approach to site characterization, including definition of physical properties. Without a well-defined, well thought out approach, there is no assurance that the site characterization activities will provide appropriate information required to conduct a defensible risk assessment. Delaying the development of a well-defined approach to physical testing puts the whole RI at risk.

Recommendation:

Develop and clearly describe a comprehensive strategy for physical testing of the vadose zone soils in the 100-KR-1 operable unit. Include a description of the approach to characterize soil hydraulic properties. Also describe the locations and depth intervals for sample collection and the techniques for sample analyses.

5-17 **Deficiency:** Section 5.2.3.3, p. WP 5-24

It is noted that no samples will be sent for physical analysis if detectable levels of radioactivity or chemical contamination are found during field screening. This protocol will not be acceptable. The discharge of large volumes of water at elevated temperatures may have altered the chemical and physical characteristics of the soils underlying the waste management units by dissolution of minerals on the soil surface or precipitation of chemical consitutents found in the waste waters. The physical (and therefore hydraulic) properties of these soils may differ greatly from those in adjacent areas that did not receive large volumes of waste water. Therefore, the physical characteristics of the soils underlying waste management units must be measured directly, and since these soils are likely to be contaminated with detectable levels of radioactivity, it is likely that physical analysis will need to be conducted on samples with detectable levels of radioactivity or chemical contamination.

Recommendation:

It is our understanding that a physical properties laboratory (377 Hot Physical Properties Lab) capable of handling hot samples is being organized. We recommend using this laboratory for conducting the required physical analyses of contaminated samples.

5-18 **Deficiency/Recommendation:** Section 5.2.5.2.3, p. WP 5-27, first paragraph

Specify the soil boring techniques and the type of equipment to be used.

5-19 **Deficiency/Recommendation:** Section 5.2.5.2.3.1, Figure 5-2, p. WP 5-28

In the figure, show the area filled to prevent ponding. In addition, show topographic features such as depressions and drainage channels to support the selection of proposed sample locations.

5-20 **Deficiency/Recommendation:** Section 5.2.5.2.3.3, Figure 5-2, p. WP 5-28

The figure should show the 90-acre area contaminated by the effluent crib failure.

5-21 **Deficiency:** Section 5.2.5.3, p. WP 5-34

In the second paragraph, it is noted that "contaminant data determined by standard laboratory methods and laboratory screening methods will also be statistically compared to background values to determine the feasibility of using screening methods to reduce analytical costs." We are confused by this statement. We assume it relates to the use of field and laboratory screening techniques such as head-space GC-MS or X-ray fluorescence as proposed in the 300-FF-1 work plan. However, this single paragraph is confusing and provides little guidance in the use of field and laboratory screening techniques for this RI/FS.

Recommendation:

Provide a more detailed discussion of how field and laboratory screening techniques will be applied to the 100-KR-1 RI/FS. Refer to the 300-FF-1 work plan and other appropriate Westinghouse guidance documents, and specifically describe the strategy for testing and applying these techniques in the 100-KR-1 work plan.

5-22 **Deficiency:** Section 5.2.7.3, p. WP 5-36

This section states that "significant" airborne contaminants are defined by site-specific ARARs. This is inappropriate. "Significant" should be defined by action levels establish in the Health and Safety Plan.

5-23 **Deficiency:** Section 5.2.11.1, p. WP 5-43, first paragraph

The last sentence discusses the basis for selecting contaminants. To be consistent with the previous sections (Contaminant Characteristics, Section 3.3.3, p. WP 3-62), persistence and mobility should also be listed.

Recommendation:

Include persistence and mobility in the last sentence.

5-24 <u>Deficiency:</u> Section 5.2.11.2, p. WP 5-44

Numerical models are proposed for use in predicting the fate and transport of contaminants along appropriate exposure pathways, such as groundwater migration, yet the specific models proposed for use are not noted in the work plan.

<u>Recommendation:</u>

In order to transfer and compare results from one operable unit to another, it was agreed that a standard set of models would be used at Hanford. Both saturated and unsaturated flow and solute transport models have been selected and are being supported by site contractors for use in the Hanford RI/FS investigation. The models: Unsat-H, VAM 2D, and PORFLO-3 should be used in the 100-KR-1 RI/FS and they should be specifically noted in Section 5.2.11.2.

5-25 <u>Deficiency/Recommendation:</u> Section 5.3.2.3, p. WP 5-48

It would be more appropriate for this operable unit if the hypothetical example used to illustrate the remedial technology identification process was for soil contamination.

TECHNICAL REVIEW COMMENTS
100-KR-1 OPERABLE UNIT
RI/FS WORK PLAN ATTACHMENT 1, PART 1
FIELD SAMPLING PLAN

1. Deficiency/Recommendation: Table of Contents, p. FSP-iii and FSP-iv

   In the table of contents, substitute:

   "Project Management" for "Source Investigation" in 2.0 Task 1.

   "Source Investigation" for "Geologic Investigations" in 3.0 Task 2.

   "Data Compilation and Review" for "Field Activities" in 8.1 subtask 7a

   "RI Phase I Report" for "RI Phase Report" in Task 12.

2. Deficiency: Section 3.3, p. FSP-5

   It is not clear whether the north-south orientation of the survey grid will use true north or K area north.

   Recommendation:

   Specify which coordinate system will be used to designate north for the survey grid.

3. Deficiency/Recommendation: Section 3.3.7.1.1, p. FSP-13

   This section describes the proposed sampling points and sampling procedure inside the 116-KE-4 and 116-KW-3 retention basins. The FSP proposes one test hole in each basin. This will not sufficiently characterize the contaminants present within each basin. Additional sampling is suggested to provide more representative data.

4. Deficiency: Section 3.3.7.1.1, p. FSP-13

   This section states that investigation derived waste will be placed back into the borehole. This is not proper.

   Recommendation:

   State that the waste will be handled according to EII 4.2.

5. **Deficiency/Recommendation:** Table FSP-1, p. FSP-15

Make the following changes in the footnotes:

In "a," substitute "Figure FSP-1" for "Figure 5-1"

In "b," substitute "Table FSP-1" for "Table 5-2"

In "e," substitute "analyzed" for "analyzes"

6. **Deficiency:** Table FSP-1, p. FSP-15

At the bottom of page 2, footnote "d" states, "Level IV and V analyses on two sample intervals, level III on remaining intervals." It is not clear which two intervals are meant for Level III. Also, the levels of analysis for "short chemical analyses list" are not indicated in the text.

Recommendation:

Indicate in the text or in the footnotes of the table which two sample intervals will be analyzed for Level IV and V. Specify the levels of analyses for the "short chemical analyses list."

7. **Deficiency:** Table FSP-2, p. FSP-16

In Table FSP-2, "cyanide" is listed under "metals."

Recommendation:

List "cyanide" under "General chemical parameters."

8. **Deficiency/Recommendation:** Table FSP-1 and Table FSP-2, p. FSP-14 - FSP-17

Several parameters are listed for which corresponding analytical methods and data quality objectives have not been included in the QAPP, such as 2,4,5 TP Silvex, Gross Alpha, Sulfamate, etc. Under the "short list" herbicides, pesticides, etc. need to include specific parameters or reference a specific parameter list. "General" and "Chemistry" are listed as parameters under Field Parameters. List correct parameters or lists.

9. **Deficiency:** Section 3.3.7.1.2, p. FSP-19, second paragraph

The text states, "Instead, a 2 ft (.7 m) interval may be collected per every 3 ft (0.9 m) of linear drilling." It is not clear from the statement whether the sampling interval is every two feet or every three feet.

Recommendation:

Explain clearly the sampling interval.

10. Deficiency/Recommendation: Section 3.3.7.1.3, p. FSP-19, first paragraph

The text states, "The remaining two soil borings (K2-4 and K2-5 in Figure FSP-1) will be sampled from ground surface to 40 ft (12 m) in the same intervals described above." Explain the decision to stop sampling at 40 ft from ground surface.

11. Deficiency/Recommendation: Section 3.4, p. FSP-21, first paragraph

In line three, substitute "will be performed" for "are performed."

12. Deficiency: Section 3.4, p. FSP-21

The collection of one sample per lithologic unit for physical analyses will provide a data set for calculating average values for the physical characteristics of a given lithologic unit, but will provide no way to evaluate the vertical distribution of soil physical and hydraulic properties. Characterizing the vertical distribution of soil physical properties will be necessary for simulating the vertical and horizontal migration of containments through the unsaturated zone. This is particularly important in light of the nonhomogeneous, partially layered nature of the Hanford formation, which comprises most of the unsaturated zone in the 100-KR-1 Area.

Recommendation:

Conduct a complete vertical characterization of the soil physical properties in about 20 percent of the boreholes installed in the 100-KR-1 and 100-KR-4 operable units. Collect samples for physical properties at 5 foot intervals from the ground surface to the water table and at significant changes in soil texture or lithology.

13. Deficiency/Recommendation: Table FSP-3, p. FSP-26

Make the following changes in the footnotes:

In "a," substitute "Figure FSP-2" for "Figure 5-2."
In "b," substitute "Table FSP-2" for "Table 5-2."
In "d," substitute "analyzed" for "analyzes."

14. <u>Deficiency:</u> Table FSP-3, p. FSP-26

At the bottom of the table in footnote "c", the text sates, "Level IV and V analyses on two sample intervals, level III on remaining intervals." The two sampling intervals for Level IV and V analyses are not specified.

<u>Recommendation:</u>

Specify the two sampling intervals analyzed for Level IV and V.

15. <u>Deficiency:</u> Section 6.2.2.1.1 through 6.2.2.1.3, pp. FSP-28 through FSP-30

These sections discuss the sampling locations and protocols for vadose zone investigation. The number of boreholes suggested may not be sufficient to determine the spatial distribution of contaminants around the basins as well as around other sources.

<u>Recommendation:</u>

According to the information and data provided in the work plan, it appeared that the contaminants had migrated in all directions during the period of reactor operation. For this reason, additional boreholes should be drilled, as shown in Figure FSP-2 (Revised), to better define the extent of contamination from past practices.

16. <u>Deficiency/Recommendation:</u> Section 6.3, p. FSP-31, first paragraph

In line 3 and 5, substitute "will be performed" for "are performed."

17. <u>Deficiency:</u> Section 14.1.4, p. FSP-38

This section discusses the sample coding system. The code for the specific operable unit is not included.

<u>Recommendation:</u>

Include the code for the specific operable unit in the overall sample code.

18. <u>Deficiency/Recommendation:</u> Section 14.3, p. FSP-39

All sample handling should be conducted in accordance with DOT Federal regulations and the EPA User's Guide (EPA, 1988c).

TECHNICAL REVIEW COMMENT
100-KR-1 OPERABLE UNIT
RI/FS WORK PLAN ATTACHMENT 1, PART 2
QUALITY ASSURANCE PROJECT PLAN

1. **Deficiency/Recommendation:** Table of Contents, p. SAP/QAPP-ix and SAP/QAPP-x

   Substitute page numbers "SAP/QAPP-1 to SAP/QAPP-24" for "QAPP-1 to QAPP-24" to be consistent with page numbers in the text.

   Since this work plan is for the 100-KR-1 operable unit, delete "and Surface Water Analysis" from the table titles QAPP 1 and QAPP 2.

2. **Deficiency/Recommendation:** Section 1.4, p. SAP/QAPP-3

   Substitute "Surface Water" for "Source Water" in Task 4.

   Substitute "Cultural Resources Investigations" for "Other" in Task 9.

3. **Deficiency/Recommendation:** Section 3, p. QAPP-5 and QAPP-6

   The data quality levels presented are not consistent with the EPA data quality levels cited in the EPA Data Quality Objectives (DQO) document (EPA, 1987). Phrases such as "a CLP-qualified laboratory" and "approximate the requirements of the CLP for Level IV analysis" are too vague. Also, the CLP does not have a qualification program per se. Ensure that these levels are consistent with McCain and Johnson, (1990)

4. **Deficiency/Recommendation:** Table QAPP-1, p. QAPP-7

   The table is incomplete for many parameters, and inappropriate methods have been referenced for others. For all target Analyte List (TAL) and Target Compound List (TCL) parameters the corresponding CLP Statement of Work (SOW) methods should be used and cited. In particular, EPA 600 series methods should not be cited. The EPA 600 series methods are not EPA-60014-79-020 methods as indicated by the footnote "d." The footnote "e" does not appear in the table, but only in the key. For several general chemical parameters, EPA methods exist and should be cited instead of "NA." Accuracy values for many of these parameters can also be determined and should be included. Target detection

limits for all parameters should be set. The use of "Westinghouse" in all the columns for radionuclides is meaningless. Values for radionuclides must be determined prior to analysis of environmental samples.

5. <u>Deficiency:</u> Table QAPP-1, p. SAP/QAPP-7

The table gives the detection limits for ground-water and surface water analyses. It is not for soil analyses. Further, the table presents parameters such as biochemical oxygen demand (BOD), dissolved oxygen (DO), etc., that are not relevant to this work plan.

<u>Recommendation:</u>

Revise the table to include the parameters of concern for soil analyses (be specific and consistent with the previous tables in the work plan and FSP) with reference to the available methods and techniques used in the past for soil analyses and for radionuclides in the soil.

6. <u>Deficiency/Recommendation:</u> Section 3.0, p. QAPP-9

Analytical procedures should be established prior to QAPP approval and not "After individual laboratory statements of work are negotiated and procedures are developed and approved."

7. <u>Deficiency/Recommendation:</u> Table QAPP-2, p. QAPP-10

Inappropriate or incomplete references have been given for several methods.

8. <u>Deficiency:</u> Table QAPP-2, p. SAP/QAPP-10

The table gives the analytical method and handling requirements for ground-water and surface water samples. It is not for soil samples. The table also presents methods and handling requirements for other parameters, such as BOD, DO, etc., that are not relevant to this work plan. Container requirements may not be applicable to this work plan for soil sampling and analysis.

<u>Recommendation:</u>

Revise the table with the parameters of concern for soil analysis. Refer to the available methods and techniques used in the past. The data for the lithology of the site, suggests that soil samples will contain sand, gravels, boulders, cemented gravels, etc. Consideration should be given to container requirements and handling requirements. This should be addressed clearly in the text of QAPP.

9. **Deficiency/Recommendation:** Section 4.1.1, p. QAPP-11

All procedures should be reviewed by regulatory personnel. A specific request to the "Technical Lead" to review procedures should not be required.

10. **Deficiency/Recommendation:** Section 6.0, p. QAPP-13

Level IV calibration procedures are not addressed. Reference CLP SOW calibration procedures for Level IV methods.

11. **Deficiency/Recommendation:** Section 7.0, p. QAPP-14

Westinghouse is described as the organization to approve methods and procedures. The EPA should be the approving organization. The referenced methods will result in Level III data quality for TCL parameters. Level III data quality may not meet the goals of the RI/FS process for risk assessment and engineering data. Level IV quality data would result from use of CLP SOW methods.

12. **Deficiency/Recommendation:** Section 8.0, p. QAPP-15

All supporting documentation should be included in all data packages.

13. **Deficiency/Recommendation:** Section 8.2, p. QAPP-16

The percentage of data to be validated has been omitted. Include what percent of the data and which data types will be validated.

14. **Deficiency/Recommendation:** Section 8.2.2, p. SAP/QAPP-17

In the title for Subsection 8.2.2, substitute "Level III, IV, and V Validation Report Preparation" for "Level III Validation Report Preparation."

15. **Deficiency/Recommendation:** Section 8.2.2, p. QAPP-17

Validation of Level IV data is not discussed. Validation procedures for Level IV data are suggested for conducting validation on Level III data (EPA, 1988a and 1988b). Clarify intent and identify what level the resulting validated data is supposed to be.

16. <u>Deficiency/Recommendation:</u> Section 9.0, p. QAPP-19 through QAPP-21

Only Level III and V analyses are addressed. Level IV data should be included. Use of SW-846 (EPA, 1986) will result in Level III data. The use of these methods should be re-evaluated. SW-846 (EPA, 1986) methods are not cited in Tables QAPP-1 and QAPP-2.

The percentage of split samples and blind samples should be given or the criteria to be used by the Technical Lead to direct the taking of such samples should be given. Internal QC checks for Level IV laboratory analyses have been omitted. This information should be included.

Change "greater" to "less" in the last sentence of both the matrix spiked samples and QC reference sample bullets.

17. <u>Deficiency/Recommendation:</u> Section 12.0, p. QAPP-22

It is stated that the laboratory will validate data. State whether 100% of the data will be validated and what criteria will be used by the laboratory.

18. <u>Deficiency/Recommendation:</u> References, p. QAPP-28

"EPA, 1988c" should be a more recent version, "EPA, 1989."

TECHNICAL REVIEW COMMENTS
100-KR-1 OPERABLE UNIT
RI/FS WORK PLAN ATTACHMENT 2
HEALTH AND SAFETY PLAN

1. **Deficiency:** Section 1.1, p. HSP-1, first paragraph

   In the last sentence, the text states, "These activities will include drilling and sampling boreholes, well installation, and environmental sampling in areas of known chemical and radiological contamination." Other activities during this RI, such as the walkover survey, pipe integrity testing, and activities in areas of unknown chemical and radiological contamination are not addressed.

   Recommendation:

   In the last sentence, the text should be "These activities will include but not be limited to drilling and sampling boreholes, well installation, and environmental sampling in areas of known or unknown chemical and radiological contamination."

2. **Deficiency/Recommendation:** Section 2.1.1, p. HSP-8

   In the third bullet, include "safety glasses, protective footwear, etc." after "protective gloves."

3. **Deficiency/Recommendation:** Section 2.1.2, p. HSP-10

   Delete the text in the fourth bullet since it is not required for the 100-KR-1 Work Plan.

4. **Deficiency:** Section 3.0, p. HSP-12, fourth paragraph

   The second and last sentences state, "More recently, two river pumphouses have been assigned 100-KR-1 waste unit numbers. Table HSP-2 provides the chemical inventory of these sites." These statements are not discussed earlier in the work plan.

   Recommendation:

   Explain why this information was discussed earlier. Are there any sampling activities in and around the two river pump houses? Discuss these issues in the work plan.

TECHNICAL REVIEW COMMENTS
100-KR-1 OPERABLE UNIT
RI/FS WORK PLAN ATTACHMENT 4
DATA MANAGEMENT PLAN

1. <u>Deficiency/Recommendation:</u> Tables DMP-1, DMP-2, and DMP-3

   The title for these tables do not match the titles given in the table of contents. It should be corrected.

2. <u>Deficiency/Recommendation:</u> Figures DMP-1 and DMP-2

   The third box down on the left side refers to a "RFT/CMS Technical Coordinator". Should be "RI/FS Technical Coordinator".

MISCELLANEOUS COMMENTS

1. Acronym List, p. iii

   In line 6, "ASME" should be substituted for "ATSM"

   In line 16, "Laboratory should be substituted for "liability"

2. Acronym List, p. iv

   In line 3, "EDMC" should be substituted for "EDMS"

   In line 4, "EII" should be substituted for "EEI"

   In line 13, "Field" should be substituted for "Feasibility"

   In line 14, "System" should be substituted for "Plan"

3. Acronym List, p. v

   In line 26, "pollutant" should be substituted for "pollution"

   In line 30, "Nuclear" should be substituted for "National"

4. Acronym List, p. vi

   In line 32, "RMCL" should be substituted for "RMCI"

5. Acronym List, p. vii

   In line 4, "Innovative" should be substituted for "innovation"

6. Tables, p. WP-vii through WP-ix

   In Table 3.2, Summary of Radionuclide Inventories in the 100-K Retention Basins in 1978, "1976" should be substituted for "1978"

   Most of the table titles in the "TABLES" do not match the titles of the tables in the text.

7. Figure 2-12. Fecht et al. 1984, is noted as a source, but is not included in the list of references in Chapter 8.

8. Figure 2-13. Our report is missing this figure.

9. Section 2.2.3.2.2.2, p. 2-60. The fifth sentence of paragraph 1 states "or these may not be of sufficient hydraulic head..." This is awkward wording, please revise.

10. Table 2-7, p. 2-65. Bensen et al. 1963, is noted as a source, but is not included in the list of references in Chapter 8.

11. Table 3-9, p. 3-23. The units of measurement are not noted in the table. We assume the units are pCi/g.

12. Section 3.1.7.2, p. 3-41. In the second sentence at the top of the page, "contaminants remaining in the saturated zone..." should probably read unsaturated zone.

13. Table QAPP-1, p. QAPP-8. "Westinghouse" is noted numerous times for the analytical method, precision accuracy, etc., of radionuclides in the table.

References

EPA*, 1989a. U.S. EPA Contract Laboratory Program, Statement of Work for Organic Analysis, 1989.

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EPA, 1987. Data Quality Objectives for Remedial Response Activities, Development Process, Office of Emergency and Remedial Response, Office of Waste Programs Enforcement, EPA/540/G-87/003, March 1987.

EPA, 1986. EPA-SW-846, Test Methods for Evaluating Solid Waste, third edition, November 1986.

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*U.S. Environmental Protection Agency

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