START
United States
Environmental Protection
Agency

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

0022808

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EPA

August 13, 1992

Paul M. Pak
U.S. Department of Energy
P.O. Box 550, Mail Stop A5-19
Richland, Washington 99352

Re: B-Plant Aggregate Area Management Study Review Comments

Dear Mr. Pak:

Enclosed is a copy of the U.S. Environmental Protection Agency's review comments on the B-Plant Aggregate Area Study . Overall the report was very well written and generally meets the intent of the Tri-Party Agreement milestone.

If you have any comments or questions pertaining to these comments, please call me at 376-8665.

Sincerely,

Paul R. Beaver
Unit Manager

Enclosure

cc: Audree DeAngeles, PRC
Larry Goldstein, Ecology
Ward Staubitz, USGS
Nancy Uziemblo, Ecology
[redacted]
Administrative Record (B-Plant AAMS)

9212654168

TECHNICAL REVIEW COMMENTS

B PLANT SOURCE AGGREGATE AREA MANAGEMENT STUDY REPORT

HANFORD SITE
RICHLAND, WASHINGTON

INTRODUCTION

U.S. Environmental Protection Agency and Washington State Department of Ecology, and their contractors have reviewed the B Plant Source Aggregate Area Management Study Report, Draft A (DOE/RL-92-05) for the Hanford Site located in Richland, Washington. The document was prepared by the U.S. Department of Energy (DOE) and is dated June 1992. The comments presented below are based on a technical review of the report. General comments are presented first, followed by specific comments.

GENERAL COMMENTS

In general, the report thoroughly addresses the scope of the B Plant Source Aggregate Area management study (AAMS). However, deficiencies exist that need to be addressed. Since this report is a guide for preparing a work plan for B Plant, it should contain as much information as possible from available reference resources instead of merely citing references. Although facility, process, and operational history descriptions are thoroughly presented, some information is missing for certain facilities and this concern is addressed in the specific comments section. The types of waste received by each waste management unit (WMU) are identified. However, the origin of the waste generated and the suspected or known constituents in each waste type are not clearly discussed, but should be. The text should include more information on the following topics:

y	Overflow from the 201-B Settling Tank
y	Cell drainage and other liquid wastes
y	Decontamination construction waste
y	Basic difference between low salt and high salt neutral/basic waste
y	Second cycle waste supernatant from the 221-B Building
y	Construction waste from the 221-B Building (Section 2.3.3.5)
y	Scavenged tributyl phosphate supernatant waste from the 221-U Building (Section 2.3.3.12).

Instead of discussing sample collection and analytical parameters, results of analysis and the quality assurance/quality control aspects should be provided and discussed. Dry well logs and radiation monitoring data for monitoring wells from each WMU should also be included in an appendix. Lists of chemicals discharged to each WMU should be tabulated and referenced in the text. If a list of chemicals discharged to each WMU cannot be obtained, then it will be necessary to tabulate a list of chemicals used at the B Plant, chemicals that were stored at the B Plant Aggregate Area, and a list of chemicals that were used at any and all areas that sent waste to the B Plant Aggregate Area.

There is no indication of the time frame for the submission of the limited field characterization activities report to meet DOE's objective to "conduct limited new site characterization work if data or interpretation uncertainty could be reduced by the work" (Section 1.2.2, page 1-5 and Section 1.3, page 1-9). Some of the unplanned releases and WMUs (Table 5-1) are evaluated as low-priority sites on the basis of hazard ranking system (HRS) scores and radiation monitoring data. For example, the 216-B-Trench is evaluated as a low-priority site. This WMU received a substantial amount of scavenged tributyl phosphate waste, which contained 4.4 Ci of ^{60}Co; 1,500 Ci of ^{137}Cs; 790 Ci of ^{90}Sr; 1.3 g of plutonium; and 350 kg of uranium (Section 2.3.5.15). The November 1991 survey detected spots of up to 80,000 dis/min beta activity. The text states that this is an increase from the previous survey (Section 4.1.2.5.20). Limited field characterization data gathered from samples collected at these unplanned releases and WMUs may indicate current risks to human health and environment and may thus support decisions for expedited, interim, or limited actions.

The B Plant process description on page 2-6 is very helpful and should be included in other AAMS.

Tables 2-3 and 2-4 are excellent sources of information and should be included in all 200 Area AAMS.

SPECIFIC COMMENTS

1. Figure 1-5, Page 1F-5

A legend is needed for this figure to interpret the shaded areas.

2. Section 2.3.1.1.3, Page 2-8, lines 23-26

According to the text, the source wastes will be addressed under a separate decommissioning and decontamination program. A list of the various source wastes located within the B Plant aggregate area should be provided at the beginning of this chapter under section 2.3, and the reason(s) for not including them in this document must be given to avoid confusion and misinterpretation.

3. Section 2.3.1.1.6, Page 2-8

Justification is needed for not including 292-B building.
This comment is also for Section 2.3.1.1.7, 242-B building.

4. Section 2.3.2.1.2, Page 2-13, lines 16-17

The text states, "The . . . tank has undergone initial stabilization and interim isolation and considered sound." Provide the date of interim isolation. Provide the type of integrity tests used and the date they were conducted. This comment is applicable for other SSTs described in the text.

5. Section 2.3.2.3, Page 2-24

The text should make some reference to radiation monitoring wells for the 241 BY Tank Farm.
This comment is applicable for other Tank Farms also.

6. Section 2.3.2.5, Page 2-30, second paragraph

If available, the text should state the volume of waste released.
This comment is applicable for all other unplanned releases.

7. Section 2.3.2.12, Page 2-33, lines 19-24

The text should contain the results of past leak detection and air monitoring either in this section or, if elsewhere, a statement is needed in this section describing its location in the text.

8. Section 2.3.3, Page 2-33, lines 40 and 41

Deficiency: The discussion of water retention capacity in this section and others is generally inaccurate and misleading and should be corrected. Section 2.3.3 notes that "most cribs, drains, and trenches were designed to receive liquid until the unit's specific retention or radionuclide capacity was met. The term "specific retention" is defined as the volume of waste liquid that may be disposed to the soil and be held against the force of gravity by the molecular attraction between sand grains and the surface tension of the water, when expressed as a percent of the packed soil volume" and references Bierschienk, 1959 as the source of this definition.

In Section 2.3.3.12 it is noted that "the 216-B-43 crib received 2,100,000 L (554,000 gal) of waste in November 1954. Maxfield (1979) reports that the crib was taken out of service when the specific retention capacity of the soil under the crib was reached." Assuming the crib has dimensions of 30 x 30 ft and the depth to ground water is about 200 ft, then 554,000 gal of waste discharged to this crib (and therefore the estimated specific retention capacity of the soil) equals 40 percent of total soil volume underlying the crib. This estimate of specific retention is equal to or greater than the total porosity of the Hanford sands, which is clearly not possible. The Hanford sands are not able to retain water in 100 percent of the pore spaces against gravity drainage.

Bierschienk (1959) states that "after extended drainage, the specific retention capacity of columns of soils beneath the 200-West Area was estimated to be roughly 2 percent volume, whereas beneath 200-East Area it was estimated to be less than 1 percent." From this statement it is clear that the volume of waste discharged to the 216-B-43 crib far exceeded (by about 20-40x) the specific retention capacity of the soil. Bierschienk goes on to note that the specific retention capacity of the soils can be interpreted, with respect to

waste management, as a property varying as a function of time. He notes that "gravity water" drains quickly, but "there is apparently no limit to the period during which slow drainage will continue." Using a centrifuge technique and 3 Hanford formation sands, Bierschienk estimated that for samples equivalent to a 10 meter soil column, the specific retention capacity of the soil (the amount of water retained in the soil) after 30 years ranged from 3.3 - 7.8 percent of the total soil volume and after approximately 6,000 years it ranged from 0.7 - 3.4 percent by volume. This indicates that after 30 years, between 10 and 15 percent of the water in a formerly, fully saturated soil column has yet to drain. For the 60 m soil column underlying the B Plant waste units, the quantity of undrained water may even be greater.

This data has significant implications that are totally overlooked by the B Plant AAMS report. If soils underlying the B Plant cribs and trenches still have significant drainable waste water in the soil column, they may serve as a lingering source of ground-water contamination for many years to come. In the 216-B-43 crib noted earlier, there may be as much as 40,000 - 50,000 gallons of drainable waste still in the soil column underlying the crib, and in the case of 216-B-22, a "typical" trench, there may be as much as 250,000 gallons of drainable waste still in the soil column. In summing all of the trenches and cribs in the B Plant Area, there is potentially as much as 10 million gallons of drainable waste still in the soil.

Recommendation: The discussion of the specific retention capacity of the soil underlying the B Plant waste management units should be reevaluated and/or redefined with respect to Bierschienk (1959) and the time varying aspects of specific retention should be noted. The potential existence and estimated quantity of drainable waste in soils underlying the B Plant should be noted in the conceptual model of the vadose zone, Sections 4.1.1.5 and 4.2.2.1.2, and the amount of current drainage of waste water from soils underlying B Plant waste management units should be noted as a data gap in Section 8.2.3.

9. Section 2.3.3, Page 2-33, lines 40 and 41 and page 2-34, lines 1 through 6
A qualitative definition is provided for radionuclide capacity. The text should explain quantitatively the specific radionuclide capacity for the cribs, drains, and trenches. Also, the WMUs that did not meet their radionuclide capacity should be identified.

10. Section 2.3.3.1, Page 2-34, line 20 through 34
The text refers to settling tanks 201-B through 204-B and Tank 5-6 which held wastewater before it was discharged to cribs. The following information should be provided for the settling tanks: size, location, tank description, years in service, status, waste volume received, final disposal of settled sludge, operable unit to which it is attached, radionuclide and chemical waste inventory, nature and extent of contamination, and hazardous ranking score.

The "other liquid wastes from Tank 5-6" (lines 26 and 27) and "some inorganic liquids" (line 34) should be specified.

11. Section 2.3.3.2, Page 2-35, lines 4 through 16, 22, and 23
The text states that the 216-B-8TF Crib and Tile Field is connected to the 241-B-110, -111, and -112 single-shell tanks and receives waste types including second-cycle waste supernatant, cell drainage, and decontamination and cleanup waste. The single-shell tanks (241-B-110, -111, and -112) received bismuth phosphate first- and second-cycle waste, fission product waste, 221-B Building high-level waste, ion exchange waste, and other wastes. It is not clear whether the crib received the above wastes from the single-shell tanks. The text should be clarified.

In lines 22 and 23, the text states that citric and hydrochloric acid are added to the crib to keep it in operation. But the chemical waste inventory summary (Table 2-4) does not contain the quantities of citric and hydrochloric acids added at the crib. Quantities of reported chemicals should be included wherever they are missing.

12. Section 2.3.3.12, Page 2-40, lines 35 and 36
The 216-B-43 through B-50 cribs are described as having dimensions of 15 x 15 x 30 ft and Figure 2-23 is referenced. Figure 2-23 shows the cribs have dimensions of 30 x 30 x 15 ft. This discrepancy in dimensions should be resolved in
that these dimensions are important for calculating the specific retention capacity of the soils underlying the crib.

13. Section 2.3.3.25, Page 2-47, line 5
The volume of waste received at the 216-B-62 Crib should be included or tables listing the volume should be referenced.

14. Section 2.3.3.26, Page 2-47, line 14
The description for the location of the chemical tile field presented in this section is inconsistent with the text in Section 4.1.2.3.27. This discrepancy should be addressed and the text should be changed where appropriate.

15. Section 2.3.3.27, Page 2-47, line 26
The text states that "the french drain contains less than 0.004 g/m^3 potential plutonium." It is not clear whether the reported value represents the concentration of plutonium per cubic meter in the french drain. The text should be clarified.

The reported volume (28 m^3) of waste discharged at the french drain is not consistent with the values (21 m^3) presented in Tables 2-1 and 2-3. This discrepancy should be corrected where appropriate.

16. Section 2.3.5, Page 2-50, line 11
It is noted that "Table 4.4 compares the volume of waste discharged to a unit with its specific retention capacity." Table 4-4 actually is a summary of gamma-ray logs and does not include information on specific retention. We found no other table that included specific retention data. Table 4-14 does include pore volume data upon which specific retention can be estimated, but not the specific retention values themselves.

17. Section 2.3.5.1, Page 2-51, lines 5 & 6, and line 27

The text states that "...the 216-B-3-3 Ditch which drains into the 216-B-3-3 Ditch..." does not make sense. Does this ditch drain into itself?
The text states that several hazardous, nonradioactive discharges have reached the 216-B-3 Pond. However, waste inventory summary data are not provided in Table 2-4, but should be.

18. Section 2.3.5.6, Page 2-54, line 2
A definition for "p/m" is not provided, but should be.

19. Section 2.3.5.7, Page 2-54, lines 18 and 19
The text in this section states that the 216-N-8 Pond "contains relatively high amounts of radionuclides having the highest gross alpha concentrations of all the 200 Area ponds." Conversely, the text in Section 4.1.2.5.7 states that "the actual concentrations of radionuclides did not reveal any unusual levels of activity." This inconsistency should be addressed and the text should be changed where appropriate.

20. Section 2.3.5.10, Page 2-55, lines 35 and 36
The unit for the concentration of radionuclides should be consistent throughout the report. The unit "µCi/ml" (microcurie per milliliter) is used here. In other sections, "pCi/L" (picocurie per liter) is used (Sections 4.1.2.5.5 and 4.1.2.5.6). It is difficult to compare the magnitude of concentrations levels provided in µCi/mL with any standards, administrative control values, or derived concentration guide (DCG) values. For example, the maximum concentration of ^{90}Sr in water samples from the 216-3-3 Pond is reported as 1.7×10^{-3} µCi/mL during the UPR-200-E-138 release. If this value is converted to pCi/L, the maximum concentration of ^{90}Sr is 1.7×10^{6} pCi/L, approximately 4.5 orders of magnitude higher than the administrative control value and 3 orders of magnitude higher than the DCG value. This comment is also applicable wherever appropriate (for example, Sections 4.1.2.5.7 and 4.1.2.5.13).

21. Section 2.3.5.11, Page 2-56, line 6

The text states that the 216-B-2-3 Ditch no longer carried any wastewater after 1973. But the operational history for the ditch in Figure 2-17 indicates that the ditch operated until 1987. This discrepancy should be addressed.

22. Section 2.3.5.12, Page 2-56, lines 27 through 29

Unplanned release UPR-200-E-34 is estimated at 10,000 Ci (also reported in Section 4.1.2.5.16). But a release of 2,500 Ci is reported in Section 4.1.2.5.15. This inconsistency should be addressed and the text should be changed where appropriate.

23. Section 2.3.5.14, Page 2-57, line 19

The types of wastes carried in the past and wastes currently carried by the 216-B-3-3 Ditch should be provided or a table listing these wastes types should be cited.

24. Section 2.3.6.12, Page 2-72, line 7

The text contains the units, cubic meters for volume while other volumes are in gallons of liters. The text needs to be consistent.

25. Sections 2.3.6.12 and 2.3.6.13, Page 2-72

The text states that the septic tank and tile field contain no radionuclides or hazardous chemicals. This can only be assumed and should be stated here.

26. Section 2.4, Page 2-86

The text contains two abbreviations, WESF and NCAW, that should be included in the list of acronyms and abbreviations.

This comment also pertains to MIBK located in Section 2.4.10, page 2-97, NPH in Section 2.5, page 2-98.

27. Section 2.6, Page 2-99, lines 28 through 37

The text states that the Closure/Post Closure Plan <u>was</u> to have been submitted to Ecology and EPA... Also, the 200-E-8 Borrow Pit Demolition Site Closure Plan <u>was</u> scheduled for submittal ... The text should state what the current

status of these plans are at the present time. (ie; did the plans ever get submitted? And if not, why!)

28. Figure 2-14, Pages 2F-14a and 14b

This figure is an excellent figure and should be contained in all other AAMS Reports if applicable.

This comment also pertains to figure 2-15, 2-16, and 2-17.

29. Figure 2-17, Page 2F-17d

Crib 216-B-14, Cribs 216-B-16 through 216-B-19, and Cribs 216-B-43 through 216-B-48 do not show how long they receive waste or if they are still active. This information should be included.

This comment also pertains to all other applicable cribs in this figure.

30. Section 3.3.1, Page 3-4:

It is noted that surface drainage from the Horse Heaven Basin enters the Pasco Basin. As shown in Figure 3-7, the Horse Heaven Basin does not drain into the Pasco Basin.

31. Section 3.3.3, Page 3-5, first paragraph

The surface hydrology should specifically mention that the 216-N-8 natural pond is fed by the 216-A-25 Gable Mountain Pond. Also, the text should mention how the Gable Mountain Pond (216-A-25) was filled, the quality of water, and its source. A map showing the locations of 216-A-25 and 216-N-8 ponds should accompany the text for clarification.

32. Section 3.3.3, Page 3-5, lines 35-38

Figures 2-1 and 2-5 do not show the locations of various ponds such as 216-B-3, 216-B-3A, 216-B-3C, etc., as mentioned in the text. These ponds are located in figure 2-6. The text needs to be corrected.

33. Section 3.4.3, Page 3-16, second paragraph

The text states that a legend is located on page 3-15. The legend does not contain enough information. The legend should include everything that is contained in the accompanying figures (ie;c/z, c/b along with any other

pertinent information). Also, all figures need a legend or details on where it can be found, such as "Legend found on page 3F-15".

34. Section 3.5.3.1.1, Page 3-30, line 34

It is noted that vadose-zone samples were taken from wells near the 216-U-12 crib in the U Plant Aggregate Area and "Because of the nearly identical stratigraphy, it is probable the B Plant Aggregate Area vadose zone is similar and it can be assumed that the collected data are correct for this study area." We disagree with this statement. U Plant and the 216-U-12 crib are in the 2-West Area. As shown in the U Plant AAMS report, in addition to the Hanford formation, the vadose zone in the vicinity of the U Plant is comprised of the "Palouse" Soil, Plio-Pleistocene Unit, and the Middle Ringold Formation, none of which are found in the vadose zone below the B Plant. We therefore question the statements that the stratigraphy is the same in both the U Plant and B Plant Aggregate Areas and that the vadose-zone properties measured at U Plant are representative of the B Plant Area.

35. Section 3.5.3.1.2, Page 3-31, lines 11-18 (second paragraph)

Information stated in the second paragraph contradicts statements made in the first paragraph of Section 3.5.3.1.2. The first paragraph states that the likelihood of perched water in the 200 East Area is low; however, the text in the second paragraph describes the presence of perched water which was identified in several boreholes. Clarify Section 3.5.3.1.2 with respect to perched water zones.

36. Figure 3-8, Page 3F-8

The figure does not show the "Structural Provinces of the Columbia Plateau" as the title indicates, but rather shows the "Columbia Plateau and Surrounding Structural Provinces." Consider changing the title.

37. Figure 3-14, Page 3F-14

Two different wells in the center of the B Plant Area are identified as E27-5. It appears that for the B to B′ cross section, wells E24-6 and 42-45 shown on Figure 3-14 are respectively identified as E24-5 and E43-45 on Figure 3-17, and well E26-13 shown on Figure 3-17 is not shown at all on Figure 3-14. Well

42-45 shown on Figure 3-14 also appears to be identified as well 43-45 in Figure 3-18.

38. Figures 3-14, 3-25, and 3-31

The stippled area, which probably represents the exposure of basalt bedrock above the water table, is not identified or explained in these figures.

39. Figure 3-15, Page 3F-15

The legend for the cross sections does not identify all of the strata shown in Figures 3-16 to 3-18. The legend is missing explanations for the Hug, Hun, Hlg, Em, RRL, and R units. The legend is also not clear with respect to the grain size section in that the SP, C/Z, and C/B abbreviations shown in Figures 3-16 to 3-18 are not explained.

40. Figure 3-19, Page 3F-19

The reference point used as 0 for the contour lines should be given on the figure.

This comment is applicable for all other Isopach maps.

41. Figure 3-20, Page 3F-20

An explanation is needed to indicate what the list of numbers are representing. Example; for A1-128.32, an explanation of what each number represents is needed.

This comment is applicable for all other figures showing similar information.

42. Figure 3-31, Page 3F-31

This figure shows 100 ft thickness of the Hanford formation in the northeast corner of the B Plant Aggregate Area, but the isopach maps of the Hanford sequences shown in Figures 3-26, 3-28, and 3-30 indicate that the Hanford formation is absent in this area. Which is correct?

43. Section 4.1.2.3.1, Page 4-15, lines 13 through 25

Radiation monitoring data from vadose wells 299-E33, -58, -59, and -73 should be included and discussed to show the extent of radiological contamination beneath the crib soil column. Also, the March 1989 radiological survey data

and the groundwater test results for well 299-E33-18 should be included to facilitate an evaluation of the extent of contamination at the cribs.

44. Section 4.1.1.1, Page 4-4, lines 1 through 4

The text states that Table 4-11 summarizes data over the last 5 years but Table 4-11 does not show data that corresponds to any years. If the data is available, the Table should show data for each of the last five years. If the data is not available, the text should be changed to reflect the Table.

45. Section 4.1.1.2.3, Page 4-7, second paragraph

The text should state where the locations of these samples are, such as a figure or plate.

46. Section 4.1.1.5, Page 4-9 and Table 4-14, Page 4T-14a

The potential for liquid wastes to migrate through the vadose zone to ground water is noted as being "conservatively estimated" by comparing the volume of waste discharged to the estimated pore volume of the soil column underlying the waste management unit. As described in our comments on Section 2.3.3, we do not believe that equating the estimated pore volume of the soil column to its water retention capacity is either accurate or conservative. Over a long period of time, most soils should be able to hold only a very small percent of their total pore volume against gravity drainage. We therefore believe that the potential migration of liquid waste to the unconfined aquifer is underestimated for several of the units listed in Table 4-14, specifically the 216-B-16, -17, -43 cribs and the 216-B-25, -27, -35, -38, -39, -41, -42, -54 trenches.

The assumption (number 2, lines 27 and 28) that there is not significant change in liquid volume being introduced due to precipitation is also nonconservative. In units with coarse cover soils and no vegetative cover (such as cribs and trenches), annual infiltration of 10+ cm of precipitation is possible and this additional water would have the effect of driving waste-water in the soil column to ground water.

Recommendation: Revise the discussion of the relationship of liquid waste volume to contaminant transport to more accurately represent the water-

retention capacity of the soil. Include a discussion of the time dependency of moisture retention with respect to waste migration as described by Bierschienk. Also note the effects that retardation will have on contaminant migration. Note that this analyses (Table 4-14) pertains to waste-water and nonsorbing contaminants and that the analyses are indeed conservative with respect to contaminants with non-zero retardation coefficients.

47. Section 4.1.2.3.1, Page 4-15

Water sample test results indicate that ^{137}Cs was detected in ground water from well 299-E33-18 and that the suspected source was the 216-B-7A and 7B cribs. Table 2-4 indicates that large volumes of acid were not discharged to these cribs and Table 4-25 indicates that for nonacidic waste, the recommended distribution coefficient for Cesium is 200 - 1,000. Under the conditions described for the 216-B-7A and 7B cribs, Cesium should be sorbed in the vadose zone. What is the explanation for its occurrence in ground water in this area?

48. Section 4.1.2.3.2, Page 4-15, lines 31 through 35.

The information on the inventory of radionuclides presented in this section is not consistent with the text in Section 2.3.3.2. For example, 30 g of plutonium, 45 kg of uranium, and 116 Ci of radionuclides were reportedly present in the waste stream at the time of discharge. The period of discharge is not stated. In Section 2.3.3.2, the text states that approximately 95 g of plutonium and 2,050 Ci of fission product were discharged to the crib between August 1948 and January 1950. This discrepancy should be addressed and the text should be changed accordingly.

49. Section 4.1.2.3.2, Page 4-15, lines 37 through 40

Radiation monitoring data from vadose wells 299-E33-16, -66 through -72, and -89 should be included and discussed to show the extent of radiological contamination beneath the crib soil column. This comment is also applicable wherever appropriate (for example, Sections 4.1.2.3.3, 4.1.2.3.6, and 4.1.2.3.7).

This paragraph should also include the evaluation of potential groundwater contamination based on estimated pore volume under the crib and the volume of

effluent disposed from Table 4-14. This comment is also applicable wherever appropriate (for example, Section 4.1.2.3.3, 4.1.2.3.4, 4.1.2.3.5, and 4.1.2.3.7).

50. Section 4.1.2.3.26, Page 4-23, line 12

The text reports current activity in monitoring wells averaging about 15 pCi/L. It is not clear whether the reported current activities are for water samples from the vadose wells. The text should be clarified.

51. Section 4.1.2.3.27, Page 4-23, lines 20 through 24

The text in this section states that the tile field is an inactive waste site and received mixed waste while in operation. Conversely, Section 2.3.3.26 states that the tile field is an active management unit and may have received mixed waste from an unknown source while in operation. This inconsistency should be addressed and the text should be changed where appropriate.

52. Section 4.1.2.4.2, Page 4-24, line 34; page 4-25, lines 4 through 9

In line 34, the extent of groundwater contamination is reported as less than 20×10^{-7} µCi/L (microcurie per liter), that is 2 pCi/L, extending approximately 2,000 feet from the reverse well. Conversely, it is reported as less than 20×10^{-7} pCi/L (page 4-25, line 9). The references cited for these values are different. This inconsistency should be addressed and the text should be changed where appropriate.

Also, the text does not clearly state whether the reported concentration is for alpha or beta activity or for a specific radionuclide detected in the groundwater samples. This deficiency should be addressed.

Lines 4 and 5 (page 4-25) state that groundwater contamination near the reverse well shows that radiation levels are orders of magnitude less than drinking water standards. Data supporting this statement should be included.

53. Section 4.1.2.4.4, Page 4-26, first paragraph

The text states that contaminants were detected 22.9 (7 ft) below...etc. 22.9 does not equal 7 ft. The text should be changed appropriately.

54. Section 4.1.2.5.1, Page 4-26, lines 36 through 41; page 4-27, lines 1 through 12

The text discusses the samples and analyses for water and sediments from the 216-B-3 Pond but does not address the results of analyses for the nature and extent of contamination at the pond. Analytical results for pond water, pond sediments, and groundwater should be included and evaluated for the nature and extent of contamination. This comment is also applicable wherever appropriate (for example, Sections 4.1.2.5.3, 4.1.2.5.7 and 4.1.2.5.18).

55. Section 4.1.2.5.2, Page 4-27, lines 16 through 17

The text in this section and in Section 2.3.5.1 states that the UN-200-E-14 Unplanned Release area was removed from radiation zone status in December 1970. However, Table 2-6 indicates that this release area is listed in the tri-party agreement. The text should refer to the inclusion of this release in the tri-party agreement.

56. Section 4.1.2.5.6, Page 4-28, lines 36 through 40

This paragraph discusses the concentration levels of ^{90}Sr. The text does not explain whether the concentration levels are provided for water samples from the pond or for groundwater samples at this pond. The period of observation for the reported values is also not stated. The sampling medium and period of observation should be provided.

Also, the concentration levels of ^{90}Sr are compared with the administrative control value of 74 pCi/L and DCG value of 1,000 pCi/L. It is unclear whether the administrative control and DCG values are provided for pond water or for groundwater. For example, in Section 4.1.2.5.5, the total alpha concentration in the groundwater is compared with the DCG limit. The text should be clarified, and a reference source should be provided for the administrative control and DCG values.

57. Section 4.1.2.5.7, Page 4-29, third paragraph

The text contains the units of pCi/ml. The text should read as pCi/L to be consistent with the remainder of the text.

58. Section 4.1.2.5.10, Page 4-30, lines 20 through 22

The 216-B-2-1 Ditch is surveyed semiannually, but only the results of the April 1991 survey are reported. The trend of radiological contamination at the ditch should be explained using past and present survey data. The text refers to Table 2-4 for current inventory data for the ditch, but the ditch inventory is not listed in the table. This deficiency should be addressed.

59. Sections 4.1.2.5.36, 45, 46, 47, and 48, beginning on Page 4-37, third paragraph

In both sections, the text reads "Vadose Boreholes .... beneath the trenches." It is unclear whether these boreholes listed, only monitor the trench discussed in the section or monitor other trenches as well. This needs to be clarified.

60. Section 4.1.2.5.49, Page 4-41, lines 1 through 8

This section addresses the 216-B-59 Trench. The trench location, description, and years in service are provided neither in this section nor in Section 2.3.5, but should be.

61. Section 4.2.2.1.4, Page 4-60, line 36

The text discusses the remobilization of uranium beneath the 216-U-1 and 216-U-2 cribs in the U Plant Aggregate Area. A reference is not, but should be provided for this discussion.

62. Section 4.2.4, Page 4-65, lines 13 and 16

The text refers to Table 4-20 as listing radioactive and nonradioactive chemical substances. However, Table 4-20 summarizes sanitary wastewater and sewage volumes. The correct table is 4-22.

The text refers to Table 4-21 as summarizing known or suspected contamination at individual waste management units. However, Table 4-21 summarizes sediment sampling for the 216-B-3 pond system. The correct table is 4-23. In

addition, the text describes individual waste management units, but should be modified to include unplanned releases.

63. Section 4.2.4, Page 4-65, lines 38 through 40

In line 38, the text states that Table 4-22 lists the contaminants of concern. However, Table 4-22 lists the candidate contaminants of potential concern and Table 4-24 lists the contaminants of concern. In line 39, the reference to Table 4-20 is incorrect. The sentence should reference Table 4-22. The text should be corrected to reflect the appropriate tables.

64. Section 4.2.4.2, Page 4-67, lines 40 and 41

Table 2-4 indicates that 10's of thousands of kg's of FeCN were released in the B Plant Aggregate Area. FeCN should be noted here.

65. Section 4.2.4.3.1, Page 4-68, line 24

The text states that Table 4-23 represents a summary of soil-water distribution coefficients. However, the correct table is 4-25. The text should be corrected here and also on page 4-69, line 4.

66. Section 4.2.4.3.1, Page 4-69, line 10

The text incorrectly refers to Table 4-24 when discussing mobility class ranking. The correct Table is 4-26. This discrepancy should be addressed.

67. Section 4.2.4.4, Page 4-70, lines 24 and 26.

The text incorrectly refers to Table 4-26 during the discussion on persistence. The correct table is 4-28. This discrepancy should be addressed.

68. Section 4.2.4.5.1, Page 4-71, line 41

The text incorrectly refers to Table 4-27 when discussing excess cancer risks for radionuclide exposure. The correct table is 4-29. This discrepancy should be addressed.

69. Section 4.2.4.5.1, Page 4-72, line 3

The text refers to "EPA 1991b" when discussing excess cancer risks posed by radionuclide exposure. In the Section 10 references, "EPA 1991b" is the Integrated Risk Information System. However, the information presented in the text is found in the 1991 Health Effects Summary Assessment Tables (HEAST). The text reference should be corrected and the HEAST reference should be listed in Section 10.

70. Section 4.2.4.5.1, Page 4-72, lines 5-18, and 25

This paragraph discusses slope factors used in the determination of excess cancer risks. The discussion on the method to be used for radionuclides without slope factors (lines 9-12) should be deleted because the 1992 HEAST contains slope factors for radionuclides. The reference to Table 4-27 is incorrect. The correct table is 4-29.

71. Section 4.2.4.5.2, Page 4-72, line 39

The text incorrectly refers to Table 4-28 when discussing adverse health effects. The correct table is 4-30. The text should indicated that these health effects may be associated with either human or animal data.

72. Table 4-6, Page 4T-6

The table contains a column labeled "Total". What is this the total of, or should it be labeled differently (ie; average)?

73. Table 4-8, Page 4T-8a

Ce-141 is listed at the top and bottom of the table with different values reported.

74. Table 4-12, 4T-12a

The results of surface-water sampling indicate that many of the radionuclides were below the detection limit, yet the detection limits are not noted in the table.

75. Table 4-21, Page 4T-21b

Footnote 1 indicates that the "Threshold values are the calculated upper tolerance limits", but the tolerance limit values are not stated.

76. Section 5.0, Page 5-1, line 19

The text incorrectly refers to Table 4-22 when discussing potential contaminants of concern. The correct table is 4-24. This discrepancy should be addressed.

77. Section 5.3, Page 5-6, lines 29-33

The text refers to criteria used in the HRS scoring. Certain criteria have changed since the finalization of the HRS on December 14, 1990. Explain if the scoring was conducted by using the old or new system.

78. Section 5.3, Page 5-7, lines 5-8

The text should indicate which HRS scores did not take into account mHRS criteria. The text should clarify that the previous HRS did not consider these factors.

79. Section 5.3, Page 5-7, lines 12-22

The fourth paragraph of section 5.3 does not specify who assigned the scores in Table 5-1. Table 5-1 does not indicate which of the rankings were derived from an authoritative reference, and which were assigned based on similarity.

Specify which of the rankings were derived from an authoritative reference, and which were assigned based on similarity. Specify who assigned the scores in Table 5-1. Specify which ranked unit was used as the analog for which analogously ranked unit. Put the analogously ranked units in a separate column (with the qualitatively ranked units), perhaps with explanatory footnotes.

80. Section 5.3, Page 5-7, lines 24-33

The fifth paragraph of section 5.3 does not quantitatively specify the discharge volume used for assigning a qualitative indicator of migration potential. Specify this volume. An additional criteria of radioactive inventory should be added to determine priority of sites. Put the

qualitatively ranked units in a separate column (with the analogously ranked units), perhaps with explanatory footnotes.

81. Section 7.5, Page 7-13, line 40

The text indicates Alternative 3 (excavation and soil treatment) may not be applicable to treat volatile organic compounds. However, it is reported in Section 7.4.4, Alternative 3--Excavation, Soil Treatment, and Disposal, that thermal desorption with off-gas treatment could be used if organic compounds are present. The text should be changed to include volatile organic compounds in Alternative 3.

82. Section 8.1.3, Page 8-10, lines 26-28

The following text needs to be revised: "The best indication of the validity of the data is the reproducibility of the results, and this indicates that validity (completeness) is one of the less significant problems with the data." Reproducibility of results does not "validate" the data, this only indicates that the methodology can be reproduced, whether it is reproduced correctly or not. To truly "validate" data, instrument calibrations and blanks, standards, matrix spikes, and other QA/QC protocols should be followed.

83. Section 8.1.3, Page 8-11, line 2

This should read "...possible, where contamination may or may not be present."

Section 8.3.1 Page 8-22, line 28

The sentence should read "Although existing data are <u>unvalidatable</u>, the data ..."

84. Section 8.2.2.5, Page 8-20, line 10

This section states that "precision and accuracy objectives are governed by the capabilities of the available methodologies." It should be noted that the precision and accuracy should be selected to meet the remedial actions goals. The analytical methodologies should be chosen to meet the selected precision and accuracy and are governed by the data quality objectives.

85. Section 8.3.3.4, Page 8-27

This section points out the need for soil investigations to determine physical and chemical properties of the soil. It is not indicated exactly what properties are suggested or whether these properties are to be measured on a site specific or aggregate area basis. If an aggregate area approach is recommended, it should be stated here, because future work plans are likely to be site specific in nature and an aggregate area approach may be considered outside the scope of individual LFI's.

86. Section 8.3.3.7, Page 8-28

The information presented in Chapter 3 indicates that perched water zones, caliche layers, and the Plio-Pleistocene unit are all largely absent from the 2-East Area. Why are they identified as an information need here? It is likely that the greatest need for geophysics in the B Plant Aggregate Area will be to identify the bedrock surface by seismic or other techniques.

87. Section 9.1, Page 9-3, lines 32-36

A rationale should be provided for using surface contamination greater than 2 mR/hr for exposure rate, 100 count/min beta/gamma above background, alpha greater than 20 ct/min, or Environmental Protection Program ranking of greater than 7 to designate a site as an interim remedial measure (IRM) candidate.

88. Section 9.2.1, Page 9-9

There is little or no justification for the selection of the 216-B-5 reverse well as the sole candidate for an ERA. We do not argue with the need to remediate 216-B-5, but we would like to be informed of the Department of Energy's reasoning in selecting this for the sole ERA and why other reverse wells in the B Plant Aggregate Area were not selected as well.

89. Section 9.2.1.1, Page 9-11, lines 14 and 15

Cribs and trenches with collapse potential are evaluated as candidate expedited response action (ERA) units and are recommended for disposition under the Radiation Area Remedial Action (RARA) program. But the text in lines 14 and 15 states that an engineering study is planned under the RARA program for 1993 to evaluate the potential for crib collapse. There is no reason that an immediate remedial action cannot be undertaken under the RARA program when there is a threat from a sudden collapse. Such a collapse could

bring contaminated dust from the cribs, trenches, and burial grounds to the surface. When a WMU meets all the criteria for an ERA (Section 9.2.1), an interim action should be considered under an ERA path to reduce the potential for release of hazardous substances and radioactive or mixed waste contaminants. This deficiency should be addressed.

90. Section 9.2.1.1, Page 9-11, lines 17 and 18

Pressure grouting void areas within the cribs is considered as one of the response actions to prevent collapse under the RARA program. But additional investigation may be necessary at these cribs because surface contamination cleanup under the RARA program may not address subsurface contamination. Soils treated with pressure grouting may interfere with drilling activities during subsurface investigation and cause difficulty during sample collection, so pressure grouting may not be a potential response action at WMUs that undergo additional subsurface investigation. Alternative action, such as the addition of clean fill material over the cribs or trenches, may be more appropriate for these WMUs.

91. Section 9.2.1.2, Page 9-11, lines 22 through 32

This section reports that deactivation of 11 active liquid effluent units is planned by June 1995. In the interim, hazardous wastes will not be discharged to these units. Although hazardous wastes will not be discharged to these units, the liquid effluent discharged through these units is a potential transport pathway for migration of radioactive and nonradioactive contaminants from nearby or adjacent inactive WMUs to groundwater. For example, the 216-B-3-3 Ditch is parallel and close to the 216-B-3-2 Ditch (Figure 2-6). The 216-B-3-2 Ditch received an estimated 10,000 Ci of short- and long-lived fission products from an unplanned release (UPR-200-E-34) (Section 4.1.2.5.16). Instead of deliberately discharging the effluent through contaminated facilities, an alternate disposal option should be implemented as early as possible to prevent further degradation of groundwater beneath the site.

92. Section 9.2.3.6, Page 9-16, line 20

Fourteen unplanned releases are stated; however, fifteen releases are cited in lines 24-38.

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