

START

100-DR-1

ERRATA SHEET

**100-DR-1 SOURCE OPERABLE UNIT QUALITATIVE RISK ASSESSMENT, HANFORD SITE, RICHLAND, WASHINGTON
WHC-SD-EN-RA-005, Revision 0**

MAY 26, 1994

The 100-DR-1 Qualitative Risk Assessment (QRA), Revision 0, was submitted by the Department of Energy (DOE) to the Environmental Protection Agency (EPA) and the Washington Department of Ecology (Ecology) for review in August, 1993. Ecology and EPA comments for the 100-DR-1 QRA were received by DOE in September, 1993. This errata sheet summarizes the edits to the 100-DR-1 QRA, in response to EPA and Ecology comments, which have been agreed to among EPA, Ecology, and DOE.

ERRATA

Edits to the 100-DR-1 QRA are provided here in the order in which they would occur in the document. The section number of the edit is provided first, followed by the page number. The paragraph number indicates the paragraph in which the edit occurs on the referenced page (counting from the first full paragraph of the page, bullets are considered separate paragraphs). The sentence number indicates the sentence within the referenced paragraph to which the edit applies.

1. Executive Summary, Background section, page ES-1, paragraph 2, sentence 2

The text of this sentence should read, "It is streamlined to consider only two human health exposure scenarios (frequent-use and occasional use) with four exposure pathways (soil ingestion, fugitive dust inhalation, inhalation of volatile organics from soil, and external radiation exposure) and a limited ecological evaluation". Additional text for insertion after the corrected second sentence should read, "Evaluation of potential risk to groundwater associated with each high-priority waste site is addressed in the LFI. The exposure parameters used in the frequent-use and occasional-use exposure scenarios are identical to those presented in Appendix A of the HSBRAM (DOE-RL 1993) for residential and recreational exposure scenarios, respectively. However, the terms "occasional-use" and "frequent-use" are used to describe the exposure scenarios in the QRA because the QRA scenarios represent a general bounding of conditions for potential frequency of human site-use."

2. Executive Summary, Background section, page ES-1, paragraph 2, last sentence

The text of page ES-1, paragraph 2, last sentence, should read, "The pocket mouse is used because its home range approximates the size of many waste sites, and these mice are a key part of the terrestrial food chain at the Hanford Site."

3. Executive Summary, Background section, page ES-1, paragraph 3, sentence 2

The second sentence of paragraph 3 of the Background section of the Executive Summary should read, "The maximum concentration of each analyte detected above 15 ft at a waste site was selected from tabulated historical and LFI data



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for evaluation in the QRA." *Additional text for insertion after the corrected second sentence should read, "Constituents present below 15 ft will be evaluated in the LFI for potential impact to groundwater".*

4. Executive Summary, results section, page ES-1

The first paragraph of the Results section of the Executive Summary will be changed to read, "This QRA evaluates a total of 25 high-priority waste sites as specified in the Remedial Investigation/Feasibility Study Work Plan for the 100-DR-1 Operable Unit (DOE-RL 1992a). One site (the 120-D-1 Pond) was eliminated from consideration because it is an active Resource Conservation and Recovery Act (RCRA) treatment, storage, and disposal facility. A second site (Burial Grounds No. 4A, 4B, and 18) lacks any available data on potential contaminants. Of the remaining 23 sites, 8 sites are evaluated using risk-based concentrations for potential contaminants identified by LFI data collected at depths exceeding 15 feet, or by process knowledge. Two of these eight sites (process effluent pipelines and the 116-D-9 crib) are evaluated using information from analogous sites in other operable units. Fifteen of the 25 high-priority waste sites are then evaluated by calculation of site risk using available LFI and historical sample data. Some of these fifteen high-priority waste sites are combined in the QRA when similar wastes from identical facilities were disposed in each."

5. Executive Summary, Results section, page ES-2, paragraph 1, second sentence

The second sentence of the second paragraph of the Results section of the Executive Summary should read, "Seven of the fifteen sites for which risks were calculated using a combination of LFI and historical data were rated as having a high human health risk potential under the frequent-use scenario in 1992."

6. Executive Summary, Results section, page ES-2, paragraphs 1 and 2

On page ES-2, throughout paragraphs 1 and 2, where "14" sites appears, it should be replaced by "15" sites.

7. Executive Summary, Results section, page ES-2, paragraph 3

*The 3rd paragraph of page ES-2 should be changed to read, "One site (116-DR-9 retention basin) shows a potential ecological risk from strontium-90 at both the 0-6 ft and 0-15 ft depths, and one site (116-D-7 retention basin) shows a potential ecological risk from chromium, also at both the 0-6 ft and 0-15 ft depths. The evaluated receptor, the Great Basin pocket mouse, generally burrows to a maximum depth of 6 ft. The 0-6 ft level was proposed to provide a possible external exposure pathway through burrowing activity. The 0-15 ft exposure scenario will identify most contamination that is likely to be available to the surface through biotic transport, *i.e.*, rooting depth. The only vegetation that will root below the 15 ft level are big sagebrush and certain trees. Most of the common vegetation in the 100 Area does not root much below 3 meters."*

8. Executive Summary, Results section, page ES-2, paragraph 4, sentence 2

The second sentence of paragraph 4, page ES-2, should read, "In the case of 100-DR-1 terrestrial wildlife, the risk assessment assumed that the key receptor organism, the Great Basin pocket mouse, was a frequent site user and was exposed to the maximum concentration of soil contaminant to a depth of 15 ft in an individual waste site."

9. Executive Summary, Results section, page ES-2, paragraph 4, sentence 3

The 3rd sentence of paragraph 4, page ES-2, should read, "In this regard, the qualitative environmental evaluation is used as a comparison (using the calculated doses as a scale) among waste sites and not a stand alone assessment.."

10. Executive Summary, Results section, page ES-2, paragraph 4, sentences 4 and 5

The fourth and fifth sentences of paragraph 5, Results Section of the Executive Summary, should be deleted and the following text should be inserted after sentence 3, "Ecological benchmarks for radionuclides and hazardous chemicals were used as measure of risk. An ecological benchmark is a concentration/dose that is used as a threshold above which a receptor response is expected. Exceeding this value would indicate risk."

11. Executive Summary, Results section, page ES-2, paragraph 5

The sixth paragraph of the Results Section of the Executive Summary, page ES-2 should be deleted.

12. Executive Summary, Uncertainties section, pages ES-2 and ES-3

The Uncertainties section of the Executive Summary should read as follows:

"Uncertainty exists in the results of the human health and environmental evaluations for the 100-DR-1 source operable unit because of uncertainties in the contaminant concentration data, in the assumptions of the exposure scenarios analyzed, and in the toxicity values for both human and ecological receptors. Where uncertainties exist, parameter estimates are generally biased in a conservative manner. Consequently, this QRA provides risk estimates which are biased toward the protection of human health and ecological integrity, considering the qualitative nature of the available data.

Identification of contaminants and concentrations are based on a limited sampling program and historical data of unvalidated quality. It is unlikely that the available data fully characterize many of the waste sites. Maximum representative (rather than average) concentrations are used in the risk evaluation due to the limited number and quality of waste site sample data. Additional uncertainty is introduced by assuming that contaminants are uniformly distributed across the waste sites when it is known that the LFI and historical sampling programs were intended to take "snapshots" of likely "hot spots" suspected of being contaminated based upon process knowledge.

The assumptions of the exposure scenarios and the risk evaluation itself lead to uncertainty in the application of the results, although the evaluation is meant to

be an upper bound of potential risk. The two human health scenarios (frequent- and occasional-use) evaluated to provide estimates of hazard or risk do not currently occur in the 100-DR Area. In the ecological risk evaluation no allowance is made for radioactive decay, bioavailability, or dilution effects.

There are uncertainties associated with the toxicity values used in both the human health and ecological risk assessments. These values are often based on limited acute animal studies with the effects extrapolated to the lower chronic dose levels associated with environmental contamination. Additional uncertainty is introduced by applying these values to humans or to animal species other than those evaluated in the studies."

13. Section 2.3, page 2-4, paragraph 6

The first paragraph of Section 2.3 (QRA Overview) should read: "As described in Section 1.1, the intent of the QRA is to provide information to be used in the LFI report in support of a decision whether an IRM is necessary at each high-priority waste site. The results and conclusions of the QRA for each high-priority waste site are presented in the text and tables of Chapter 3, and summarized in the text and tables of Chapter 4."

14. Section 2.3.1.2.1, page 2-5, paragraph 7

Following the first sentence of Section 2.3.1.2.1, additional text should read: "The exposure parameters used in the frequent-use and occasional-use exposure scenarios are identical to those presented in Appendix A of the HSB RAM (DOE-RL 1993) for residential and recreational exposure scenarios, respectively. However, the terms "occasional-use" and "frequent-use" are used to describe the exposure scenarios in the QRA because the QRA scenarios represent a general bounding of conditions for potential frequency of human site-use."

15. Section 2.3.1.2.1, page 2-6, paragraph 1, sentences 1 and 2

The sentences should read, "For the purpose of evaluating external exposure to radionuclides, an additional occasional-use exposure scenario is presented in Appendix F. This evaluation recognizes that contaminants that are located at depth are not accessible to receptors."

16. Section 2.3.1.2.1, page 2-6, paragraph 1, last sentence

The last sentence of paragraph 1 on page 2-6 should be deleted.

17. Section 2.3.1.2.4, page 2-7

The last sentence of paragraph 4 of Section 2.3.1.2.4 should be deleted.

18. Section 2.3.1.4.1, page 2-8 and 2-9,

An additional bullet should be added after bullet three in Section 2.3.1.4.1 which should read: "Categorization of human health risks using the relative risk classifications of high (ICR > 1E-02), medium (ICR 1E-02 to 1E-04), low (ICR 1E-04 to 1E-06), and very low (ICR < 1E-06)."

19. Section 2.3.2.1.1, page 2-12, paragraph 1

The last sentence of the 3rd paragraph in Section 2.3.2.1.1. should read, "Data on vegetation sampling from the waste sites, collected under the facility monitoring program, is included as background information in Appendix D (Tables D-4a, D-4b and D-4c). However, it should be noted that biological uptake factors were evaluated from a soil source term for this QRA as onsite monitoring data does not provide all of the information needed to compute soil-to-plant uptake factors."

20. Section 2.3.2.1.1, page 2-12, paragraph 3, sentence 4

The fourth sentence of paragraph 3 on page 2-12 should read, "Total daily doses to an organism can be estimated as the sum of doses received from all radioactive elements ingested, residing in the body, and available in the organism's environment".

21. Section 2.3.2.1.2, page 2-12, paragraph 5, sentence 1

The first sentence in Section 2.3.2.1.2 should read, "The measurement endpoints are the health and mortality of the Great Basin pocket mouse. Assessment endpoints are beyond the scope of the QRA, since it is not an ecosystem level study."

22. Section 2.3.2.1.3, page 2-13, paragraph 2

An additional sentence should be appended to the last paragraph of section 2.3.2.1.3 which reads, "The home range of the Great Basin pocket mouse varies from 508-4005 sq. m for parts of the Hanford Site (O'Farrell et al. 1975.)"

23. Section 2.3.2.2.1, page 2-14, paragraph 2, sentence 2

The second sentence of paragraph 2, page 2-14, should read, "It was assumed the receptor spends all of its life in the site."

24. Section 2.3.2.2.1, page 2-14, paragraph 2, last sentence

The last sentence of paragraph 2, page 2-14, should read, "Schmidt-Nielson (1948) and Kritzman (1974) state that this species does not need free water but occasionally eats green vegetation when available."

25. Section 2.3.2.2.1, page 2-14, paragraph 3, last sentence

The last sentence of paragraph 3, page 2-14, should read, "The equations use to calculate radiological and hazardous chemical doses are provided in Appendix D."

26. Section 2.3.2.2.2, page 2-14, paragraph 4, sentence 2

The second sentence of paragraph 4, page 2-14, should read, "The only regulatory driver for radionuclides in the environment is DOE Order 5400.5, which requires exposure limits for aquatic organisms to be less than 1 rad/day."

Additional text should be inserted after this sentence, "The regulatory benchmark for terrestrial organisms has not been formally established. However, until a formal benchmark is established, hazard quotients for terrestrial ecological exposure are based on an exposure limit of 1 rad/day (NCRP 1991) for radionuclides and a no observable effect level (NOEL) dose for non-radionuclides."

27. Section 2.3.2.2.2, page 2-15, paragraph 2, sentence 1

The first sentence of paragraph 2, page 2-15, should read, "To evaluate the toxicity of a chemical to the Great Basin pocket mouse, intake values for a given contaminant were compared with the NOEL."

28. Section 2.3.2.2.2, page 2-15, paragraph 3, sentence 1

The first sentence of paragraph 3, page 2-15, should read, "Intake of contaminants by the Great Basin pocket mouse was estimated using intake parameters obtained from either published literature or derived from EPA formulas (EPA 1988a)."

29. Section 2.3.3, pages 2-16 to 2-17

Section 2.3.3, Characterization of Groundwater Impacts, should be deleted

30. Sections 3.1.6, 3.2.6, 3.3.6,...3.18.6, and 3.20.5

The sections addressing potential impacts to groundwater in Chapter 3, sections 3.1.6, 3.2.6, 3.3.6,...3.18.6, and 3.20.5, should be deleted.

31. Section 3.7.5, page 3-30, paragraph 2

Sentences two and three of Section 3.7.5 should be changed to read, "The total dose rate for soil maximums above 15 ft and above 6 ft was 30 rad/day, of which 99 % was attributable to strontium-90. This dose is above the 1 rad/day benchmark."

32. Section 3.8.5, page 3-34, paragraph 7, sentence 4

Beginning with sentence four, paragraph 7, page 3-34 should read, "The radiological dose was not above the 1 rad/day benchmark. However, the non-radiological dose for chromium exceeds the NOEL of 0.20 mg/kg/day."

33. Section 3.11.5, page 3-48, paragraph 4, last sentence

The last sentence in Section 3.11.5 should read, "The dose for chromium, in both soil depth scenarios, was above the wildlife NOEL of 0.20 mg/kg/day."

34. Table 3-7g on page 3T-7g

The value for strontium-90 listed in the fourth column of Table 3-7g should be changed to 3.0E+01.

35. Table 3-7h on page 3T-7h

In Table 3-7h, the values in columns 3 through 6 for strontium-90 should be changed to the same as those in Table 3-7g, with a total strontium-90 dose of $3.0E+01$ and a total dose from all radionuclides of $3.0E+01$.

36. Section 4.1.2, page 4-2, paragraph 5, sentence 1

The first sentence of paragraph five, page 4-2, should be replaced with: "For the QRAs, the following terminology is used to provide relative risk classifications for sites where human health risks are calculated; high (ICR > $1E-02$), medium (ICR $1E-02$ to $1E-04$), low (ICR $1E-04$ to $1E-06$), and very low (ICR < $1E-06$). These classifications are used to categorize the waste sites in a single operable unit based upon their potential risk to human health, in accordance with the objective of the QRA to provide information for the prioritization of waste sites for cleanup activities."

37. Section 4.1.2, page 4-2, paragraph 6, last sentence

The last sentence of the last paragraph of section 4.1.2 should read, "Hazard quotients for ecological exposure are based on an exposure limit of 1 rad/day (NCRP 1991) for radionuclides and a no-observable-effect level (NOEL) dose for non-radionuclides."

38. Section 4.3, page 4-7, paragraph 1, sentence 4

The fourth sentence of paragraph 1 on page 4-7 should read, "Total daily doses to an organism can be estimated as the sum of doses received from all radioactive elements ingested, residing in the body, and available in the organism's environment".

39. Section 4.3, page 4-7, paragraph 2

The Endpoints Section on page 4-7 should be changed to read: "The measurement endpoints are the health and mortality of the Great Basin pocket mouse. Risk is evaluated for the pocket mouse based on a two-step accumulation model (soil-to-plant and plant-to-mouse). The dose to the pocket mouse was used to screen the level of risk associated with an individual waste site."

40. Section 4.3.1, page 4-7, paragraph 7

Paragraph 1 of Section 4.3.1 should be changed to read "A qualitative ecological risk assessment was completed for the 100-DR-1 operable unit. Site 116-DR-9 Retention Basin/107-DR Sludge Disposal Trenches and Site 116-D-7 Retention Basin/107-D Sludge Disposal Trenches exceeded the 1 rad/day with an EHQ > 1 (Table 4-4). For non-radiological constituents, the 116-DR-1/116-DR-2 Trenches, the 116-D-7/107-D Sludge Disposal Trenches, and the 116-DR-9 Retention Basin/107-DR Sludge Disposal Trenches exceeded the NOEL for chromium (Table 4-5).

41. Section 4.3.1, page 4-7 and 4-8

The corrected first sentence of paragraph 3 of section 4.3.1 should read, "The estimated dose from strontium-90 to the Great Basin pocket mouse exceeded 1 rad/day at the 116-DR-9 Retention Basin and 107-DR Sludge Disposal Trenches (Table 4-4)."

42. Section 4.3.2, page 4-8, paragraph 5, sentence 3

The corrected third sentence of the fifth paragraph of section 4.3.2, reads, "The assumptions of the model include non-Hanford specific soil-to-plant transfer coefficients, plant root contact with a contaminant, and uniform contaminant distribution within the plant."

43. Section 4.4, page 4-9

Section 4.4, Qualitative Overview of Potential Groundwater Impacts, should be deleted.

44. Tables 4-2 and 4-3, pages 4T-2 and 4T-3, respectively

The final column in each table should be deleted.

45. Table 4-2, page 4T-2

The text of footnote (a) should read, "Qualitative risk rating is not particular to any specific exposure scenario. Rating is based on process information..."

46. Table 4-2, page 4T-2

The text of the "Rationale for Rating" column for the 103-D building in Table 4-2 should read,, "process knowledge; results of surface smear sampling".

47. Table 4-2, page 4T-2

The text of the "Rationale for Rating" column for the 132-D-1 building in Table 4-2 should read, "building decommissioned using ARCL methodology; decontaminated building rubble buried under fill."

48. Table 4-2, page 4T-2

The text of the "Rationale for Rating" column for the 132-D-2 building in Table 4-2 should read, "contaminated equipment removed; decontaminated rubble buried under 3 ft of fill".

49. Table 4-4 on page 4T-4

Below is the corrected Table 4-4 on page 4T-4

Table 4-4. Environmental Hazard Quotients Summary for Radionuclides by Waste Site.

WASTE SITE	Depth (feet)	Dose Rate Exceeds EHQ of 1.0
108-D Office Building and Decon Station	0 - 6	no
	0 - 15	no
116-D-1A and 116-D-1B Fuel Storage trenches	0 - 6	no
	0 - 15	no
116-D-2A Pluto Crib	0 - 6	no
	0 - 15	no
116-D-3 and 116-D-4 Cribs	0 - 6	no
	0 - 15	no
116-D-5 Outfall Structure and Process Pipelines	0 - 6	no
	0 - 15	no
116-D-6 French Drain	0 - 6	no
	0 - 15	no
116-D-7 Retention Basin and 107-D Sludge Disposal Trenches	0 - 6	yes
	0 - 15	yes
116-DR-1 and 116-DR-2 Liquid Waste Disposal Trenches	0 - 6	no
	0 - 15	no
130-D Gasoline Storage Tank	0 - 6	no
	0 - 15	no
Sodium Dichromate Tanks	0 - 6	no
	0 - 15	no
116-DR-9 Retention Basin and 107-DR Sludge Disposal Trenches	0 - 6	yes
	0 - 15	yes

50. Table 4-5 on page 4T-5

Below is the corrected Table 4-5 on page 4T-5

Table 4-5. Environmental Hazard Quotient Summary for Non-radiological Contaminants by Waste Site.

WASTE SITE	Depth (feet)	Dose Rate Exceeds EHQ of 1.0
108-D Office Building and Decon Station	0 - 6	no
	0 - 15	no
116-D-1A and 116-D-1B Fuel Storage Trenches	0 - 6	no
	0 - 15	no
116-D-2A Pluto Crib	0 - 6	no
	0 - 15	no
116-D-3 and 116-D-4 Cribs	0 - 6	no
	0 - 15	no
116-D-5 Outfall Structure and Process Pipelines	0 - 6	no
	0 - 15	no
116-D-6 French Drain	0 - 6	no
	0 - 15	no
116-D-7 Retention Basin and 107-D Sludge Disposal Trenches	0 - 6	yes (chromium)
	0 - 15	yes (chromium)
116-DR-1 and 116-DR-2 Liquid Waste Disposal Trenches	0 - 6	no
	0 - 15	yes (chromium)
130-D Gasoline Storage Tank	0 - 6	no
	0 - 15	no
Sodium Dichromate Tanks	0 - 6	no
	0 - 15	no
116-DR-9 Retention Basin and 107-DR Sludge Disposal Trenches	0 - 6	yes (chromium)
	0 - 15	yes (chromium)

51. Section 5.0, pages 5-1 to 5-4

The following references should be added to Section 5.0:

DOE 1990, *Radiation Protection of the Public and the Environment*, DOE Order 5400.5, U.S. Department of Energy, Washington, D.C.

EPA 1988a, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final*, EPA/540/G-89/004, OSWER 9355.3-01, U.S. Environmental Protection Agency, Washington D.C.

(N.B.-EPA 1988 in reference and text of QRA should be changed to 1988b)

Landeem, D.S., M.R. Sackschewsky, and S.G. Weiss, 1993, *100 Areas CERCLA Ecological Investigations*, WHC-EP-0620, Westinghouse Hanford Company, Richland, Washington.

O'Farrell, T.P., 1975, "Small Mammals, Their Parasites and Pathological Lesions on the Arid Lands Ecology Resrve, Benton County, Washington", *American Midland Naturalist*, Vol. 93, pp. 377-387.

Schmidt, J.W., A.R. Johnson, S.M. McKinney and C.J. Perkins, 1993, *Westinghouse Hanford Company Operational Environmental Monitoring Annual Report, CY 1992*, WHC-P-0573-1, Westinghouse Hanford Company, Richland, Washington.

Wintczak, T.M., 1993, Letter to R.D. Freeberg, DOE, *Validated Data for the 100 Aggregate Area Biota Sampling*, Correspondence No. 9352382D, March 24, 1993, Westinghouse Hanford Company, Richland, Washington. (Approximately 1000 pages)

52. Table A-7, page A-9

The title of Table A-7 on page A-9 should be revised to read, "Sampling Results for Total Petroleum Hydrocarbons for Tank 130-D-1 Evaluated as Historic Data (Sheet 1 of 2)"

53. Appendix D, page D-4 and D-5

The last sentence of the reptile section should be changed to read, "The only reptile with Federal or state classification is the striped whipsnake, a state candidate species."

54. Appendix D, page D-5, paragraph 1, sentence 3

Sentence 3, paragraph 1, page D-5 should be replaced with, "The predominant taxa include ground-dwelling darkling beetles (family Tenebrionidae), and shrub-dwelling bugs (order Homoptera), grasshoppers (order Orthoptera), true bugs (order Hemiptera), and spiders (order Araneida) (Rogers 1979, ERDA 1975, Weiss and Mitchell 1992). The two latter references contain tables of insect species found on the entire Hanford Site."

55. Appendix D, page D-5, paragraph 2

A sentence should be appended to paragraph 2, page D-5, which reads, "The code was verified subsequent to publication of the document."

56. Appendix D, page D-7, definition of terms for equation (8)
The definition of the variable FI should read, "FI = fraction ingested from contaminated source = 1".

57. Appendix D, tables

The following tables should be appended to Appendix D:

Table D-4a. Vegetation Sample Results (pCi/g) From Waste Sites in the 100-DR-1 Operable Unit, as Reported by Schmidt et al. (1993)
(See Schmidt et al. 1993, pages E-4 and E-36, for sample locations and additional radionuclides reported).

Site	Cs-137 (pCi/g)	Sr-90 (pCi/g)
116-DR-1	-1.19E-03	1.63E-02
overall error	$\pm 5.48E-02$	$\pm 6.17E-03$
107-DR-Sludge Disp. Tr.	-1.73E-02	1.48E-01
overall error	$\pm 5.07E-02$	$\pm 2.86E-02$
116-D-7	3.23E-02	1.52E-02
overall error	$\pm 5.61E-02$	$\pm 6.89E-03$
116-DR-9	-4.11E-02	5.21E-02
overall error	$\pm 9.29E-02$	$\pm 1.79E-02$

Table D-4b. Average Radionuclide Concentrations (pCi/g) Detected in 100-D/DR Area Vegetation Samples from 1981 to 1992, as reported by Schmidt et al. (1993) (see Schmidt et al. 1993, page 4-12, for additional radionuclides reported)

Year	Cs-137	Sr-90
1981	1.6E-01	NR
1982	2.7E+00	NR
1983	1.4E-01	NR
1984	1.7E+00	2.8E-01
1985	6.8E-01	6.9E-02
1986	1.7E+00	1.5E-01
1987	6.3E-01	9.5E-02
1988	9.6E-02	1.8E-01
1989	2.8E-01	1.5E-01
1990	6.2E-01	9.5E-02
1991	1.8E-01	8.3E-02
1992	2.3E-02	5.8E-02

Table D-4c. Radionuclides (pCi/g) and chromium (mg/kg) in Ant- and Mammal-Excavated Soil Adjacent to Waste Sites (as reported in Landeen et al. 1993, see that report for additional information on inorganic contaminants)

Site	Cs-137	Sr-90	Chromium
116-DR-9 (ant soil)	0.36 ±0.13	0.42 ±0.32	6.10
116-DR-9 (ant soil)	0.34 ±0.12	0.11 ±0.30	5.20
116-DR-9 (mammal soil)	0.17 ±0.10	0.055 ±1.6	7.70
116-D-4 (ant soil)	0.43 ±0.13	0.096 ±0.24	6.60
116-D-3 (mammal soil)	not detected	0.18 ±0.24	9.30
116-D-1 (mammal soil)	0.16 ±0.096	0.077 ±0.24	8.00

58. Appendix D, References, pages D-8 to D-11

The following references should be added to the list in Appendix D:

Coughtrey, P.J., D. Jackson, C.H. Jones, P. Kane, and M. C. Thorne, 1985, *Radionuclide Distribution and Transport in Terrestrial and Aquatic Ecosystems*, A. A. Balkema, Rotterdam, Netherlands.

DOE, 1992, *Site-Wide Characterization Report, Fernald Environmental Management Project, FEMP-SWCR-3*, U.S. Department of Energy, Fernald Field Office, Fernald, Ohio.

ERDA, 1975, *Final Environmental Statement Waste Management Operations, ERDA-1538, Vol. 1*, Energy Research and Development Administration, Richland, Washington.

Miller, M. L., et al., 1977, *Radiochemical Analysis of Soil and Vegetation Samples Taken from the Hanford Environs. 1971-1976*, BNWL-2249, Pacific Northwest Laboratory, Richland, Washington.

Routson, R. C., and D. A. Cataldo, 1978, A Growth Chamber Study of the Effect of Soil Concentration and Plant Age on the Uptake of Sr and Cs by Tumbleweed, *Communications in Soil Science and Plant Analysis*, Vol. 9, pp. 215-230.

Weiss, S.G. and R.M. Mitchell, 1992, *A Synthesis of Ecological Data from the 100-Areas of the Hanford Site*, WHC-ET-0601, Westinghouse Hanford Company, Richland, Washington.

Whicker, F. W., and V. Schultz, 1982, *Radioecology: Nuclear Energy and the Environment, Vol. II*, CRC Press, Inc., Boca Raton, Florida.

59. Table F-3, (Sheet 4 of 4), page FT-11, footnotes a and b

Footnote a in Table F-3 should read, "Shaded area indicates maximum concentration exceeds external risk-based concentration at an ICR of 1E-04."

Footnote b in Table F-3 should read, "Shaded area indicates maximum concentration exceeds external risk-based concentration at an ICR of 1E-06."