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Department of Energy

Richland Operations Office
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MAY 25 1995

Mr. Steve M. Alexander
Perimeter Areas Section Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 W. Fourth Avenue
Kennewick, Washington 99336-6018

Mr. Douglas R. Sherwood
Hanford Project Manager
U.S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, Washington 99352-0539

Dear Messrs. Alexander and Sherwood:

RESPONSES TO COMMENTS ON THE LIMITED FIELD INVESTIGATION REPORT FOR THE
100-HR-2 SOURCE OPERABLE UNIT, DOE/RL-94-53, DRAFT A

Attached are responses to comments submitted by the State of Washington, ⁴²¹⁵
Department of Ecology (Ecology), dated May 15, 1995, on the subject document.

The U.S. Department of Energy, Richland Operations Office (RL), understands
that the comments received from Ecology represent comments from both Ecology
and the U.S. Environmental Protection Agency (EPA). After agreement with the
comment responses is received from Ecology and EPA, RL will proceed with
revising the document and issuing the final version of the report. RL is
available to discuss the comment responses with Ecology and EPA to finalize
resolution of all comments as soon as possible.

If you have any questions, please contact Ms. A. C. Tortoso at 373-9631

Sincerely,

[Signature]
for K. Michael Thompson
Hanford Project Manager

RSD:ACT

Attachment

cc w/attach:
D. P. Holland, Ecology
K. J. Oates, EPA

cc w/o attach:
G. R. Eidam, BHI
R. S. Hajner, BHI
C. W. Hedel, BHI



**RESPONSES TO COMMENTS BY THE WASHINGTON STATE
DEPARTMENT OF ECOLOGY AND THE U.S. ENVIRONMENTAL PROTECTION
AGENCY ON THE LIMITED FIELD INVESTIGATION
REPORT FOR THE 100-HR-2 OPERABLE UNIT
(DOE/RL-94-53), DRAFT A**

May 22, 1995

1. Executive Summary, Page ES-1, Paragraph 4, sentence 4:

Comment: Refer to either the calculated risk value or the determining risk threshold value and delete the term "medium" in reference to human health risk. The use of qualitative risk characterization values as shown in 2.10.1.3 are not acceptable.

Response: Text in the document will be rewritten to make it clear that the words "high," "medium," or "low" refer to the priority or ranking of the sites for cleanup rather than a characterization of the level of risk. The fourth sentence of the fourth paragraph on page ES-1 will be rewritten as follows: "Using the analogous site data the 118-H-5 burial ground has a medium priority for remediation based on human-health risk under the occasional use scenario and an environmental hazard quotient rating of > 1 ."

2. Table ES-1

Comment: Use calculated values or a value range. Do not use the high, medium, etc. terminology

Response: See resolution to comment 1, above. The heading of the second column of Table ES-1 will be changed to "QRA Remediation Priority."

3. Section 1.1, paragraph 2:

Comment: Add the following sentences. "These two human health scenarios assume a future restricted use of groundwater and agriculture for at these sites. In an expanded frequent use scenario, the percent contribution of the groundwater ingestion and crop ingestion pathways to the incremental cancer risk (ICR) of several COPC's are significant ($> 90\%$ of total ICR) and have not been included in this QRA." Reference: Process Document Draft B, Appendix B "Sensitivity Analysis Report."

Response: The second paragraph of Section 1.1 will be rewritten as follows:

"This LFI report includes the QRA for solid waste burial grounds in the 100-HR-2 Operable Unit. The purpose of the QRA is to

focus on a predefined set of human and environmental exposure scenarios to provide sufficient information to assist the parties to Tri-Party Agreement in making defensible decisions on the necessity of an IRM. It is not intended to replace or be a substitute for a baseline risk assessment. Per agreements stated in the HSB RAM (DOE/RL 1993b) the QRA for a source operable unit considers only two human health scenarios (frequent and occasional use) with three exposure pathways (soil ingestion, fugitive dust inhalation, and external radiation exposure), and a limited ecological evaluation. The QRA does not include evaluation of pathways for ingestion of groundwater or agricultural crops."

4. Section 2.1, paragraph 2, first sentence:

Comment: Suggest changing "burial ground" to "**Operable Unit**" or "burial grounds."

Response: "Burial ground" will be changed to "burial grounds."

5. Section 2.3.4, paragraph 3, sentence 2:

Comment: Spell out or add "PPE" to the acronym list

Response: The acronym "PPE" referring to "Personal Protective Equipment" will be added to the list of acronyms.

6. Section 2.3.5, paragraph 2:

Comment: How will this area be addressed? Please explain the pathway for addressing this site. Will it be listed as a low priority site and addressed with the others? If included with the low priority sites it should be listed with the others in Section 1.2.2, paragraph 2.

Response: The following two paragraphs will be inserted before the last paragraph on page 2-3:

"The analysis of the radiation survey results (Appendix B) shows that the 19-acres of underground radioactive material is contaminated with radionuclides characteristic of single pass reactor effluent, and the adjacent 116-H-1 liquid waste disposal trench has been suggested as a possible source. In-situ measurements indicate that "most of the area has levels of contamination barely above the natural background." (Appendix B, page B-31). This area will be considered a part of 116-H-1, and remediated (to the extent necessary) as part of that trench. In the interim, the area is planned to be posted as an Underground Radioactive Materials area.

"South of this 19 acre area were two hot spots with gamma energy spectra signatures different than the contamination in the 19 acres. The spectra from these spots indicated that most of the contamination was from Cs-137. These sites are reported to have been decontaminated (Appendix B, Page B-5), along with the rest of the 165 spots of speck contamination found during the survey."

7. Section 2.6, paragraph 3:

Comment: Replace "impacts" with "conditions" in the first sentence.

Response: The first time the word "impacts" appears in the first sentence of the third paragraph of Section 2.6 it will be replaced with "conditions."

8. Section 2.7.2:

Comment: Were tumbleweeds sampled? What were the results of the referenced site wide surveillance and facility monitoring programs? Please provide this information, if available.

Response: The following paragraph will be inserted on page 2-6, section 2.7.2, after the 1st paragraph:

"Schmidt et al (1993) report that only Sr-90 was above detection limits in 100-H area vegetation samples, at 0.067 pCi/g, in 1992. The species of vegetation sampled were not given. Samples were collected on or near facilities that were used to dispose of radioactive waste. Landeen et al (1993) show soil sampling results from eight animal and harvester ant burrows adjacent to 100-H area waste sites. A maximum of 0.5 pCi/g Cs-137, and a maximum of 0.36 pCi/g Sr-90 were detected in these samples. Vegetation sampled by Landeen et al (1993) was taken from the shoreline near the 100-H area, rather than at specific waste sites. Weiss and Mitchell (1992) summarize historical vegetation sampling results, which show steadily declining levels of contamination in biota at the 100-H area, to the current levels reported by Schmidt et al (1993).

9. Section 2.10:

Comment: There needs to be a discussion of "protection of groundwater" as required by MTCA for contaminants left below 15 feet. Source units must consider impact to groundwater when they determine their remedial action.

Response: The second paragraph of Section 2.10.1.1 will be rewritten as follows:

"The conceptual model for the 100-HR-2 Operable Unit (Figure 2-3) shows the general exposure pathways for human receptors. Figure 2-4 displays the site model used in evaluation of the QRA for a source operable unit. The potential impact of the 100-HR-2 Source Operable Unit on the groundwater in the 100-HR-3 Groundwater Operable Unit is discussed in Section 5.1.3. Groundwater exposure pathways are evaluated in the 100-HR-3 Operable Unit Work Plan (DOE/RL 1992d) and LFI (DOE/RL 1993d). The reader is also referred to applicable portions of Section 2.11 of this document that discuss interim remedial action goals and their relation to groundwater protection."

10. Page 2-8, Section 2.10.1.1, paragraph 3:

Comment: Change sentence three to indicate assumed restrictions; such as, "...residential receptor living at each waste site with agricultural and groundwater use restrictions in place."

Response: See the response to comment 3. Paragraph 3 of Section 2.10.1.1 will be rewritten as follows:

"Under current site conditions, there are no residents at the 100-HR-2 Source Operable Unit, and institutional controls prevent inadvertent intrusion into waste sites. Thus, exposures and associated risks evaluated in the QRA are not actual risks but are estimates of potential risks assuming only two human health scenarios (frequent and occasional use) with three exposure pathways (soil ingestion, fugitive dust inhalation, and external radiation exposure). The QRA does not include evaluation of pathways for ingestion of groundwater or agricultural crops. The frequent-use scenario represents exposures of a hypothetical resident (i.e., long term exposure) to each burial ground from the three selected exposure pathways. The occasional-use scenario approximates the exposures to hypothetical intruders (i.e., short term exposure) from the three exposure pathways."

11. Section 2.10.1.1, paragraph 6:

Comment: Delete the current sentence and insert, "Since the groundwater ingestion exposure pathway was not used, no modeling of contaminant transport through the vadose zone to the confined aquifer was considered."

Response: The suggested change will be made.

12. Section 2.10.1.1, paragraph 11:

Comment: Delete the first sentence. The purpose of the LFI is to characterize, not determine land use. This sentence is redundant.

Response: The second sentence of the referenced paragraph will be deleted because use of the RESRAD software has not been used in evaluation of waste site risk. The paragraph will now read:

"Assuming that soil excavation activities do not occur in the occasional-use scenario, the radiation shielding provided by clean-fill soil covering the waste sites can reduce external radiation exposure of human receptors. This shielding was not considered in this QRA because of the assumptions made in using analogous site comparisons. Insufficient sampling data are available for the top 1.8 m (6 ft) of soil at these waste sites. Therefore, no risk reduction from the shielding effect of clean-fill soils could be estimated."

13. Section 2.10.1.3, paragraph 3, sentence 1:

Comment: Change to read, "...COPC ICR contributions from the three selected pathways."

Response: The suggested change will be made.

14. Section 2.10.1.3, paragraph 4:

Comment: Use calculated values or relative values, explaining their qualitative origins and limitations, rather than the terms "high, medium, low and very low." This applies to Table 2-4.

Response: See the response to comment 1. The second sentence of Section 2.10.1.3, paragraph 4 will be rewritten as follows: "The remediation priority for each waste site is qualitatively described with respect to the following levels of the total lifetime ICR:

Remediation Priority	Total Lifetime ICR
high	> 1E-02
medium	< 1E-02 and > 1E-04
low	< 1E-04 and > 1E-06
very low	< 1E-06

15. Section 2.10.1.4.1:

Comment: In this section or Section 2.10.1.4.3, add a paragraph explaining the uncertainty associated with limited exposure pathways for contaminants whose primary risk pathways were not considered (primarily groundwater and crop ingestion). This results in an underestimation of risk and should be mentioned as an additional perspective to the recurring emphasis this chapter has on overestimation of risk.

Response: The second paragraph of Section 2.10.1.4.3 will be rewritten as follows:

"The major contributions to exposure assessment uncertainties result from assumptions concerning land-use scenarios, exposure parameters, exposure pathways, soil concentrations, and appropriateness of analogous sites. The QRA does not include evaluation of pathways for ingestion of groundwater or agricultural crops based on methodology agreed to by the Tri-Parties concerning the scope of the QRA (DOE/RL 1993b), and because of the lack of information regarding appropriate input parameters. While these factors result in uncertainty during the decision-making process, all of the sites which were evaluated in the LFI are recommended to remain IRM candidates."

16. Section 2.11:

Comment: This whole section needs to be rethought and rewritten reflecting current regulatory approach. A description of the MTCA based cleanup standard for nonradionuclide contaminants and the anticipated 15 mRem for radionuclides should be included. Also, a discussion is needed on the possibility of a negotiated "action level" for sites where cleanup standards are not technically feasible nor economically practical. We need to discuss this section.

Response: Section 2.11 will be rewritten as follows:

"Remedial investigations and planning activities for the 100 Areas have been conducted in accordance with the *Hanford Past-Practices Strategy* (DOE/RL 1991) to streamline the remedial action process, with emphasis on early action at high-priority sites through expedited response actions and interim remedial measures (IRM). Corrective action at the 100-HR-2 Operable Unit is generally required to comply with federal and state environmental laws and promulgated standards, requirements, criteria, and limitations that are legally applicable or relevant and appropriate under the circumstances presented by the release or threatened release of hazardous substances, pollutants, or contaminants.

"The public has provided input to the DOE on the future use of the 100 Area through various forums including the **Hanford Future Site Uses Working Group**. However, a final land use determination for the 100 Area of the Hanford Site has not been established. Remedial action objectives and cleanup goals may be revisited if land use and groundwater use determinations are inconsistent with the goals presented in this plan. Ecology, EPA, and DOE have agreed to cleanup goals that, to the extent practical, would support a goal not to limit future uses of the 100 Area land due to contaminants resulting from Hanford Site operations. This would be accomplished through remediation of the sites to address the potential direct effects of exposure, as well as potential releases to air and groundwater. Remediation would minimize ecological and cultural impacts. The development of mitigation plans to address site-specific ecological and cultural resources will occur during the remedial design phase that follows after the ROD is signed.

"Interim remedial action goals represent contaminant concentrations in soils that are considered to be protective of human health and the environment. Cleanup goals are based upon the three laws and the proposed standard which are discussed in the following four bullets.

- State of Washington *Model Toxics Control Act* guidelines for organic and inorganic chemical constituents in soil to support unrestricted (residential) use.
- Protection of groundwater such that contaminants remaining in the soil after remediation do not result in an impact to groundwater that could exceed Maximum Contaminant Levels under the *Safe Drinking Water Act*. This applies to waste sites where groundwater has not been impacted.

- Protection of the Columbia River such that contaminants remaining in the soil after remediation do not result in an impact to groundwater and, therefore, the Columbia River that could exceed the Ambient Water Quality Criteria under the *Clean Water Act* for consumption of fish. This applies to sites where groundwater has already been impacted.
- Draft EPA and Nuclear Regulatory Commission proposed standard of 15 mrem/yr in soils above background for radionuclides for human health.

"The extent of remediation may be balanced against several factors, including reduction of risk by decay of radionuclides, protection of human health and the environment, costs, sizing of the Environmental Restoration Disposal Facility, worker safety, presence of ecological and cultural resources, the use of institutional controls, and long term monitoring costs. Negotiated "action levels" may be considered for sites where cleanup standards are either not technically feasible nor economically practical. In the event that contaminated soil above cleanup goals is left in place, additional public comment may be solicited.

"Potential corrective action requirements (CARs) are presented in Tables 2-6 and 2-7, and the TBCs are presented in Table 2-8. Potential location-specific CARs are identified for the 100 Areas because of the presence of threatened or endangered species and archaeological resources. In addition, potential location-specific CARs based on possible impacts to wetlands and floodplains are included. These are included in Tables 2-9 and 2-10; TBCs are in Table 2-11."

18. Table 2-8:

Comment: Suggest adding Toxic Substance Control Act requirements for PCBs.

Response: PCBs have not been found and were not expected to be found in the 100-HR-2 Operable Unit.

19. Table 2-9:

Comment: Where are the laws protecting Native American Rights included?

Response: Table 2-9 will be expanded to include:

Description: American Indian Religious Freedom Act; Citation: 42 USC 1996 and U.S. DOE 1987; Requirement: Federal land managers are directed to act in such a way as to protect and preserve the access of Native American people

to sacred lands and their rights to worship in their traditional manner;
 Remarks: "An agency undertaking a land use project will be in compliance with AIRFA if in the decision making process, it obtains and considers the views of Indian leaders." (Chatters 1989)

20. Section 3.1.7, paragraph 2:

Comment: Delete qualitative terms, "medium, low, and very low." Please check other site descriptions and make the same type changes.

Response: See the response to comment 1. Text in the document will be rewritten to make it clear that the words "high," "medium," or "low" refer to the priority for remediation or ranking of the sites for cleanup rather than characterizing the level of risk. The second and third paragraphs of Section 3.1.7 will be rewritten as follows:

"The QRA results for analogous burial ground 118-B-1 are as follows:

- No COPC are found to have an ICR $> 1E-06$ in the ingestion or inhalation exposure pathways for the frequent-use scenario. The ICR for cesium-137, europium-152, and europium-154 represent a low priority for remediation (ICR between $1E-06$ and $1E-04$); the ICR for cobalt-60 represents a medium priority for remediation (ICR between $1E-02$ and $1E-04$) from the external exposure pathway in the frequent-use scenario. In the occasional-use scenario, the ICR for cobalt-60 represents a low priority for remediation (ICR between $1E-06$ and $1E-04$) from the external exposure pathway. External radiation exposure is the primary pathway contributing to ICR. Cobalt-60 is considered to be the greatest contributor to ICR in both the frequent- and occasional-use scenarios.
- The total ICR anticipated, if the onset of the frequent-use scenario exposures is delayed until the year 2018, represents a low priority for remediation (ICR of $4E-05$) for the frequent-use scenario and very low priority for remediation (IRC of $3E-07$) for the occasional-use scenario. The primary pathway contributing to ICR in the year 2018 would remain the external radiation pathway.
- The total dose to the Great Basin pocket mouse from radionuclides does not exceed the EHQ (1 rad/day).

While no concentration data are available through process knowledge for any of these solid waste burial grounds, Table 3-4 presents risk-based concentrations that would result in a medium priority for remediation (ICR of $1E-04$) for radionuclides with an external exposure hazard. Ingestion and inhalation concentrations are not reported because of the nature of solid waste.

The large majority of the solid waste and radionuclide inventory is irradiated reactor parts and therefore will not migrate. Other buried material, such as rags, paper, demolition waste, and filters, may have surface contamination. However, the nature of the site hydrology (little, if any, natural recharge from precipitation) and low potential for intrusion by biota (because of lack of soil for plant growth and because of the depth of burial) diminish the potential for radionuclide ingestion or inhalation."

The first sentence of the footnote to Table 3-4 will be revised as follows: "The risk-based concentration reported (ICR of 1E-04) for radionuclides with an external exposure hazard, is defined as having a "medium" priority for remediation in this QRA."

21. Section 3.1.7, paragraph 3:

Comment: The relationship between the nature of the solid waste and relevance to the inhalation and ingestion pathways is helpful. What is the relationship between Ni-63 which is listed at 2.63E+02 curies and the potential for exposure via the groundwater and crop ingestion pathways, which account for 98% of the ICR for this contaminant.

Response: The nickel is contained in buried reactor parts. No pathway exists to convey Ni-63 to receptors via groundwater or crop ingestion.

23. Section 4.1.2:

Comment: Add a paragraph or statement including the uncertainty associated with excluding the groundwater ingestion and crop ingestion pathways.

Response: See the response to comment Ecology-15. The first paragraph of Section 4.1.2 will be rewritten as follows:

"The human health risks presented in the QRA are conditional estimates that reflect multiple assumptions and related uncertainties. The sources of uncertainty considered to have the greatest influence on the conclusions of the 100-HR-2 Operable Unit QRA are provided in the following paragraphs. The QRA does not include evaluation of pathways for ingestion of groundwater or agricultural crops based upon methodology agreed to by the Tri-Parties concerning the scope of the QRA (DOE/RL 1993b) and because of lack of information regarding appropriate input parameters."

24. Table 4-1

Comment: Put in calculated values or relative values.

Response: See the resolution to comment 2. The heading of the second column of Table 5-1 will be changed to "QRA Remediation Priority."

25. Section 5.1.1, paragraph 1 and Table 5-1:

Comment: Use calculated values or a value range. Do not use the high, medium, etc. terminology.

Response: See the resolution to comment 2. The headings of the second and third double columns of Table 4-1 will be changed to "QRA Remediation Priority in the Year 1994" and "QRA Remediation Priority in the Year 2018," respectively.

26. Table 5-3:

Comment: Check MTCA Method B values against the 1/95 and 8/31/94 updates.

Response: The 1/95 MTCA update did not affect the Method B values in Table 5-3. The 8/31/94 update affected five of the MTCA Method B values in Table 5-3 as shown in the following table. The values for all of the other analytes are unchanged. The title of Table 5-3 will have the following phrase added to it: "(Revised per 1/95 and 8/31/94 MTCA Method B Updates)" Also, the footnote for the MTCA Method B value in Table 5-3 should be "f", not "g".

TABLE: New MTCA Method B Values for Analytes in Table 5-3

Analyte	MTCA Method B (mg/kg)
Arsenic	60 (1.43) ^d
Cadmium	80 (0.164)
Copper	2,960
Manganese	11,200
Nitrate	128,000

^dCarcinogen risk-based concentration in parenthesis