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DEC 21 1999

Ms. Laura J. Cusack  
Project Management Section Manager  
Nuclear Waste Program  
State of Washington  
Department of Ecology  
1315 W. Fourth Avenue  
Kennewick, Washington 99336-6018

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JAN 12 2000

EDMC

Mr. Douglas R. Sherwood  
Hanford Project Manager  
U.S. Environmental Protection Agency  
712 Swift Boulevard, Suite 5, MSIN B5-01  
Richland, Washington 99352

Dear Ms. Cusack and Mr. Sherwood:

TRANSMITTAL OF DOE/RL-98-18, DRAFT C, "100 AREA BURIAL GROUNDS FOCUSED FEASIBILITY STUDY" AND DOE/RL-99-59, DRAFT A, "100 AREA BURIAL GROUNDS PROPOSED PLAN"

Enclosed are ten copies each of DOE/RL-98-18, Draft C, "100 Area Burial Grounds Focused Feasibility Study", and DOE/RL-99-59, Draft A, "100 Area Burial Grounds Proposed Plan" for initiation of the regulatory review. Five copies are provided for the State of Washington Department of Ecology (Ecology) and five copies are for the U.S. Environmental Protection Agency (EPA).

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The Focused Feasibility Study presents the evaluation of alternatives for remediation of 45 burial grounds located in the 100 Areas. The proposed plan identifies preferred alternatives for remediation of these burial grounds.

Submittal of these documents completes the Hanford Federal Facility Agreement and Consent Order major milestone M-15-00A (December 31, 1999). Based on submittal of these documents by December 31, 1999, the scheduled review period for the regulatory review is 45 calendar days from the receipt of the document.

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Ms. Cusack and Mr. Sherwood

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Also enclosed are the final responses to EPA and Ecology comments on these documents. If you have any questions, please contact Glenn I. Goldberg at (509) 376-9552.

Sincerely,

A handwritten signature in black ink, appearing to read "George H. Sanders", followed by the word "For" in a smaller, less distinct script.

George H. Sanders, Program Manager  
Office of Regulatory Liaison

ERD:GIG

Enclosures:

1. DOE/RL-98-18, Draft C,  
100 Area Burial Grounds Focused Feasibility Study
2. DOE/RL-99-59, Draft A,  
100 Area Burial Grounds Proposed Plan
3. Comment Response Package

cc w/encl:

J. R. Wilkins, CTUIR  
R. Bond, Ecology  
R. F. Stanley, Ecology  
D. A. Faulk, EPA  
D. R. Sherwood, EPA  
J. S. Hertz, FDH  
M. B. Reeves, HAB  
P. Sobotta, NPT  
M. L. Blazek, OOE  
R. Jim, YN  
TPA Administrative Record, FDH

cc w/o encl:

J. G. April, BHI  
E. T. Coenenberg, BHI

**Responses to the Official EPA/Ecology Comments on DOE/RL-98-18, Draft B  
100 Area Burial Ground Focused Feasibility Study  
(October 1, 1999)**

**General Comments**

1. **Comment:** EPA and Ecology disagree with the U.S. Department of Energy's (USDOE's) preferred alternative. EPA and Ecology have no interest in writing a phased Record of Decision (ROD). The regulatory agencies believe that remove, treat, and dispose (RTD) is the appropriate alternative for the 100 Area burial grounds. In addition, EPA and Ecology recommend that instead of remediating all the small sites first, a strategy of combining a mix of small sites and large sites is more appropriate and will help levelize material to Environmental Disposal Restoration Facility (ERDF).

**Response:** The recommended alternative presented in the Draft B FFS (Section 8) and references to the recommended alternative will be deleted. The RTD alternative will be revised to include use of existing RCRA regulatory provisions to reduce remediation costs and promote a cost-effective remedy. Specifically, RL would like to work with EPA and Ecology to reduce characterization, handling, and treatment costs associated with the excavation and land disposal of restricted waste.

A RTD strategy for leveling the flow of burial ground waste materials to the ERDF will be developed through the ongoing ERC remediation baseline planning process. As suggested by EPA and Ecology, the material flow the ERDF could be leveled by remediating a mix of small sites and large sites.

2. **Comment:** EPA and Ecology have a fundamental concern that the containment alternative is inconsistent with the 100 Area interim action ROD (9 September 1995) for liquid waste disposal which selected the RTD alternative and allowed for the unrestricted use of all land surface areas. Leaving contaminants in the ground, particularly unknown contaminants, and restricting the land use through institutional controls is not prudent for lands so close to the Columbia River.

**Response:** The 100 Area interim action ROD (September 1995) addressed liquid waste sites that are significantly different than burial ground sites. The burial grounds received solid, low-level radioactive wastes associated with reactor operations. Remediation of burial ground sites is expected to be significantly different with respect to RTD costs, implementation, and worker hazards from exposure to radioactive waste. In addition, the existing 100 Area ROD acknowledges that future land use was undecided and calls for a re-evaluation of cleanup objectives and goals if the future land use determination is inconsistent with the unrestricted land use goal used in the ROD. The land-use decisions being promulgated through the revised draft HRA-EIS do not include scenarios involving residential use of the 100 Area. The existing ROD acknowledges situations where waste might be left in place based on considerations that include worker safety and cost. Although the existing ROD anticipated that this would be a consideration only for deeper contamination, it demonstrates an understanding that there may be some factors that will result in restricted use of sites.

3. **Comment:** There is no regulatory citation in the Model Toxics Control Act (MTCA) for a "Restricted Rural Residential" or "Recreational" use. Under the current regulations, Ecology used Method B cleanup values for residential use.

**Response:** MTCA was expressly designed with the flexibility to establish site specific cleanup levels for other land uses, such as agricultural and recreational use. (See *Responsiveness Summary on the Amendments to the Model Toxics Control Act Cleanup Regulation*, February 1991; also see WAC 173-340-740(1)(d)). Ecology has considered recreational land use in selecting cleanup actions elsewhere in the state. For example, the Cleanup Action Plan for Gasworks Park in Seattle is largely based on continued recreational land use. The restrictions in the "Restricted Rural Residential" land use scenario are not inconsistent with land use restrictions present in any city in the state, including Richland.

In addition, current MTCA requirements allow containment as a cleanup option. Regulations contained in WAC 173-340-740(6)(d) state: "The department recognized that, for those cleanup actions selected under WAC 173-340-360 that involve containment of hazardous substances, the soil cleanup levels will typically not be met at the points of compliance specified in (b) and (c) of this subsection [groundwater and direct contact pathways, respectively]. In these cases, the cleanup action may be determined to comply with cleanup standards, provided the compliance monitoring program is designed to ensure the long-term integrity of the containment system, and the other requirements for containment technologies in WAC 173-340-30(8) are met."

4. **Comment:** The RTD alternative is clearly the preferred cleanup action based on the requirements of MTCA as specified under Washington Administrative Code (WAC) 173-340-360, Selection of Cleanup Actions. WAC 173-340-360(3)(a) states: "containment of hazardous substances and/or institutional controls are not permanent solutions."

WAC 173-340-360(4)(a) states that the "cleanup of hazardous wastes sites shall be conducted using technologies which minimize the amount of untreated hazardous substances remaining at a site." With regard to selecting technologies for remediation, this same section of MTCA gives a higher priority to on-site or off-site disposal at an engineered facility than to isolation or containment with engineering controls. WAC 173-340-360(5)(e)(iv) states that "a cleanup action relying primarily on institutional controls and monitoring shall not be used where it is technically possible to implement a cleanup action alternative that utilizes a higher preference cleanup technology for all or a portion of the site."

**Response:** The FFS will be revised to clearly state that MTCA promotes the use of permanent solutions, but that WAC 173-340-360(5)(d) states that Ecology recognizes that permanent solutions may not be practicable for all sites and defines criteria that must be used to determine whether a permanent solution is practicable. It will also be noted that the selection of containment in lieu of excavation is compliant with MTCA.

5. **Comment:** Throughout the FFS you discuss the Applicable or Relevant and Appropriate Requirements (ARAR) of 15 mrem/yr above background but fail to mention that the EPA guidance (EPA, 1997) states that this level should be in effect for 1000 years following remediation (as you did state in Appendix C, page C1-2).

**Response:** The 1,000 year qualifier will be added to the ARARs. However, the EPA guidance limit of 15 mrem/yr above background for 1,000 years following remediation ensures that the proposed standard accounts for the decay of radionuclides to daughter products that are more radioactive. As stated in the RDR/RAWP for the 100 Area ROD (September 1995), the development of cleanup standards for the 100 Area will not be affected because the principal radionuclides of concern do not decay to daughter products that are more radioactive. Therefore, the dose associated with the burial grounds decreases with time; it never increases.

6. **Comment:** With regard to the time frame of effectiveness as discussed above, EPA and Ecology also is concerned about the long-term effectiveness and permanence of the containment alternative. Is 100 years really long enough for the radioactive wastes to decay to acceptable levels or will a significantly longer period (up to 1000 years) possibly be needed? If a time frame longer than 1000 years is chosen, cost table will need to be changes to reflect this.

**Response:** Under the Containment alternative, a surface barrier or other access restrictions would need to be maintained for approximately 500 years to preclude exposure to radionuclides above 15 mrem/yr above background and chemical contaminants (metals and asbestos). The radioactive and chemical contaminants in the 100 Area burial grounds are primarily bound in stable metal or other solid objects. The only radionuclide substantially contributing to dose after 100 years is silver-108m, based on inventory information presented in Estimates of Solid Waste Buried in 100 Area Burial Grounds (WHC-EP-0087). Silver-108m is an impurity of the lead-cadmium alloy "poison pieces" used to control the reactors because of the alloy's high neutron-absorption characteristics. Silver-108m was one of the radionuclides frequently measured during the 118-B-1 Burial Ground Excavation Treatability Study. This study showed that the silver inventory reported in WHC-EP-0087 was overly conservative. Further measurements during excavation would help to substantiate silver-108m inventories.

Cost estimates in the FFS will be run out to 1,000 years. Using the present worth method (identified in EPA guidance and required by 40 CFR 300.430[e][9][iii][G]) the cost difference between 100 years and 1,000 years is very minor and has no significant impact on the cost of the Containment alternative.

7. **Comment:** The FFS seems to reiterate throughout the entire document land use discussions contained in the Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan (HRA-EIS). It would be useful to have the land use discussion in one area versus repeat it throughout the entire document.

**Response:** RL will revise the FFS to consolidate the HRA-EIS discussion to the extent practicable. RL believes that it may still be necessary to include abbreviated discussions of upcoming land-use decisions at certain locations in the revised draft HRA-EIS to clarify the information being presented.

8. **Comment:** USDOE's preferred alternative for the 118-F-2 burial ground is capping even though the wastes in this burial ground could come in contact with aquifer during high water conditions. This makes no sense, how can capping 118-F-2 be protective of the environment?

**Response:** The FFS identifies the potential high water conditions at 118-F-2 as a concern with regard to the groundwater exposure pathway. The recommended 118-F-2 remedy will be changed to RTD in response to this comment.

9. **Comment:** The first half of the document makes many absolute statements regarding contaminants of concern, leachability, and stability of burial grounds. Other areas of the documents speak to the uncertainty of burial ground contents. EPA and Ecology agree with the latter statement and suggest the document be revised to highlight the uncertainty of burial ground contents.

**Response:** Burial ground waste uncertainties are of more concern for short-term worker exposure and safety than for the long-term protectiveness offered by the remediation alternatives presented. A primary feature of Containment is the ability to isolate the waste from people (including workers) and key environmental components. Although the RTD alternative ultimately achieves this same waste isolation in the ERDF, it initiates worker exposure to the waste and represents potential worker health risks.

10. **Comment:** EPA and Ecology questions the large discrepancy in the costs of the two alternatives. There is not enough cost detail provided in the FFS to know if the cost estimates and assumptions are valid. For example, the cost and source of capping and backfill material is unknown (all lumped together under Site Restoration), the cost to monitor contained sites may be significantly more if the time frame for containment is possibly 1000 years instead of 100 years, and costs details for Barrier #1 (Section 4.0 and page 4.8) should be included.

With regard to costs, the burial grounds cannot be capped without first having better knowledge of what you are capping, and characterization of the burial grounds will add significant cost to the containment alternative.

**Response:** The costs presented are based upon best available information and were derived from MCACES model runs, which were prepared for baseline (DWP) budget purposes. RL suggests all parties convene to discuss the cost assumptions used in the development of the FFS.

RL will provide cost estimates for maintaining caps for 1,000 years.

With regard to the significantly greater characterization to support capping a burial ground, RL does not agree that this is necessary. The cap chosen for the Containment alternative is not dependent upon more specific details on contaminants of concern or waste types. Instead, consistent with EPA guidance pertaining to the use of containment at landfill sites, characterization of landfill contents is generally very limited. In lieu of extensive characterization, long-term maintenance and monitoring can be used as a mechanism for managing the potential uncertainty associated with limited characterization. Further characterization would be required only to determine the perimeter of the unit to size the cap. This characterization effort has already been incorporated into the cost estimates.

Cost estimates for Barrier No. 1 (Section 4.0) were not included in the FFS because it was more expensive than Barrier No. 2, yet offered no more protectiveness. The modified design of barrier No. 2 took into account the arid conditions at the Hanford Site and the limitations associated with a typical RCRA-C barrier (i.e., the limited design life of the asphalt or synthetic membrane layers).

11. **Comment:** The costs presented in Table E-1 of Appendix E do not match the costs presented in Table 8-1 of Section 8.0. This discrepancy makes it difficult to review the document and accurately compare costs.

**Response:** The Appendix E tables will be corrected. The titles for Tables E-1 and E-2 were inadvertently switched, so the RTD costs presented are really Containment (and vice-versa). Also, the estimates presented in Tables E-1 and E-2 are MCACES costs only and do not include the O&M costs for Containment that are included in Table 8-1.

12. **Comment:** It cannot be stated with confidence at this time that the containment alternative is "protective and ARAR-compliant" because very little is known about what is contained in the burial grounds. Also, it is not known with certainty that the contaminants in the burial grounds are immobile as stated in the report. For example, it is true that there is no driving force for moving waste out of the burial grounds if in fact they contain only solid wastes. However, if liquid wastes are contained in some of the burial grounds, the potential for migration does exist. Also, it is not known whether high level radioactive wastes were disposed in some of these burial grounds.

**Response:** The FFS will be revised to clearly state that MTCA promotes the use of permanent solutions, but that WAC 173-340-360(5)(d) states that Ecology recognizes that permanent solutions may not be practicable for all sites and defines criteria that must be used to determine whether a permanent solution is practicable. It will also be noted that the selection of containment in lieu of excavation is compliant with MTCA.

The burial ground content conclusions are based on the information available at this time. Based upon historical information, 100 Area liquids were disposed through available liquid disposal systems and were excluded from the burial grounds. The only source of high level radioactive waste in the 100 Area would have been fuel elements. Records

exist on the disposition of every ruptured fuel element from the 100 Area Reactors and the system for handling the fuel elements prevented their loss.

13. **Comment:** The Risk Assessment Methodology presented in Appendix C seems incorrect in that the Rural Residential alternative should have the lowest risk because under this alternative the contamination has been removed. The risk of the Restricted Rural Residential alternative should be next because the contamination is left in place but is capped. The greatest risk would be associated with the No Action alternative.

**Response:** The risk assessments presented in this document are all estimated with existing burial ground contents in place (i.e., No action), per EPA protocol to determine if remediation is required to reduce potential risk under various exposure scenarios. This provides a baseline for subsequent remediation. Under this EPA protocol, the unrestricted rural resident would have the greatest exposure with the waste in place and the highest potential risk. Following this logic, the restricted rural resident would have less exposure with the waste in place and have a lesser risk. To make the risk methodology and results more clear, additional information from Appendix C will be included in FFS Section 3.

## Specific Comments

1. **Comment:** Page ES-4, 1<sup>st</sup> sentence at top of page: The containment alternative does not meet the remedial action objective of "unrestricted rural residential use for all surface areas" (see page ES-2, last paragraph) and is not compliant with ARARs. The text should be modified to reflect this.

**Response:** The remedial action objectives (RAOs) for the 100 Area burial grounds are presented on page 3-8 of the document. "Unrestricted rural residential use for all surface areas" is not an RAO, but could be interpreted to be an RAO as presented on page ES-2 (last paragraph). The text on page ES-2 will be revised as follows to clarify this point: "EPA and Ecology support the unrestricted use of all surface areas in the 100 Areas".

2. **Comment:** Page ES-1, 3<sup>rd</sup> paragraph: MTCAs should be included with the list of regulations.

**Response:** The text will be revised as noted.

3. **Comment:** Page ES-4, 2<sup>nd</sup> sentence from top of page: It is difficult to understand why the RTD alternative only performed "slightly" better than the containment alternative for long-term effectiveness and permanence. It would appear that RTD is better than leaving in place and capping with respect to long-term effectiveness and permanence. Please clarify.

**Response:** The radioactive and chemical contaminants in the 100 Area burial grounds are primarily bound in stable metal or other solid objects. The radioactive contents are primarily hard wastes (greater than 99% metallic) that include reactor equipment, process tubes, fuel element spacers, small tools, and control rods. Some radioactive soft (combustible) wastes containing radioactive tracers and low-level fission/activation products were buried in the F-Area burial grounds. The nonradioactive burial ground materials are primarily metal objects and miscellaneous debris (pipes, cadmium sheets, and carbon materials). Large quantities of liquids are not expected in the 100 Area burial grounds because they were discharged to reactor and other facility liquid waste systems.

The RTD alternative was found to perform only slightly better than the Containment alternative because most of the radioactive contaminants will decay before the stable metal and other hard objects they are part of decompose. Similarly, non-radioactive contaminants are part of stable metal or other solid objects. These objects are not expected to decompose or substantially decay over time and do not represent significant inhalation, ingestion, or dermal contact exposure pathways for human or ecological receptors. For this reason, the non-radioactive contaminants do not represent significant human health or ecological risk drivers and would not be expected to contribute to future contamination outside the burial grounds due to their stable, immobile nature. The sentence noted will be amended to include "... (because of the immobile nature of the contaminants in solid objects)".

4. **Comment:** Page ES-4, Top paragraph, 2<sup>nd</sup> to last sentence: In the long term, it seems that NEPA values (i.e., impacts to natural, cultural, and historical resources; socioeconomic impacts; cumulative impacts; and irreversible and irretrievable commitments of resources - FFS, page 1-2) would be fulfilled better under the RTD alternative rather than the containment alternative. Please explain.

**Response:** As stated in Section 7.1.8 of the FFS, the Containment alternative would require fewer natural resources than required by the RTD alternative (e.g., less transportation needs and backfill materials). ERDF resources would not be required for the Containment alternative. The Containment alternative presents a lower possibility of cultural resource disturbance than RTD. Cumulative impacts for both alternatives could occur at borrow sites and along transportation routes. For these reasons, the Containment alternative was found to fulfill NEPA values better than the RTD alternative.

5. **Comment:** Page ES-4, Top paragraph, last sentence: This sentence is misleading by stating that containment is less costly than RTD for both small and large burial grounds and that containment is significantly less costly than RTD for large burial grounds. In fact, the findings of the report (see Table 7-1) show that RTD is less costly than containment for the 21 smallest burial grounds and the costs are relatively close for the next 8 largest burial grounds. The text should be revised to reflect this.

**Response:** The text will be revised as follows: "RTD is less costly for the 21 smallest burial grounds, RTD and Containment costs are comparable for the next 8 smallest burial grounds, and Containment is less costly for the 16 largest burial grounds."

6. **Comment:** Page ES-4, Last paragraph: This paragraph states that "to address regulatory agency concerns regarding burial grounds contents, USDOE-RL recommends that the burial ground remediation process be phased." What regulatory agency concerns does this refer to? EPA and Ecology are unaware of specific concerns. In addition, EPA and Ecology believe the RTD alternative is the most appropriate alternative for burial grounds in the 100 Areas. The text should be revised to reflect this.

**Response:** The last paragraph on page ES-4 will be deleted and replaced with the following sentence: "The preferred alternative(s) in the subsequent Proposed Plan will reflect the recommendation(s) of RL, Ecology, and EPA and will be revised as necessary based on public comment."

7. **Comment:** Page 2-5, 2<sup>nd</sup> paragraph: This paragraph states that the only reason the rural residential scenario was retained in the FFS was because the USDOE land use plan "is not yet final." Several points should be clarified regarding land use plans. First, land use plans are subject to change over time, and second, cleanup levels do not automatically change if a land use plan is adopted.

**Response:** The last sentence of the paragraph will be revised as follows: "Based on this precedent, and to evaluate the potential risks associated with a broad range of potential future land uses, residential land use has been retained in this FFS for consideration."

Reasonably anticipated future land uses are a suitable basis for developing exposure scenarios and evaluating remedial alternatives. EPA documents, such as "*Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*" (1988) state that "...the expected use of the area in the future should be evaluated," and that "...the likely use (based on past and current trends, zoning restrictions, etc.) be evaluated." Similar direction is provided in the OSWER Directive 9344.7-04, "Land Use in the CERCLA Remedy Selection Process" (1995).

In addition, while cleanup levels do not automatically change if a different land use plan is adopted, previous Hanford Site documents direct a re-evaluation based on changing land uses. For example, the Interim Action ROD for liquid waste sites (EPA 1995) states that "Remedial action objectives and cleanup goals will be re-evaluated if future land use and groundwater use determinations are inconsistent with the goals presented in this ROD." If containment is selected, with the assumption of use restrictions, there would be a similar caveat to the effect that the appropriateness of containment would be re-evaluated if future land use determinations are inconsistent with the restrictions.

8. **Comment:** Page 2-5, 3<sup>rd</sup> bullet: This bullet should be expanded to discuss tribal uses.

**Response:** Tribal future land use alternatives are covered within the range of alternatives in the revised draft HRA-EIS as cited in the first two bullets. Any additional tribal uses that may be proposed and that are out of scope of the current proposed alternatives presented in the HRA-EIS are expected to be addressed under the third bullet, residential land use, which was also evaluated. The third bullet, first sub-bullet, will be revised to more clearly state that: "Most tribal uses would be supported by this land use."

9. **Comment:** Page 2-7, last bullet: This document had no regulatory review and is not a USDOE document. Please clarify.

**Response:** It is correct that this document has had no regulatory review and is not a USDOE document. It was used as a resource in developing this FFS because it contained pertinent information regarding the 100 Area burial grounds and their contents.

10. **Comment:** Page 2-11, Section 2.3.2: Include the North Slope burial grounds information in this section.

**Response:** The North Slope burial grounds were not included in this section of the FFS because they did not receive Hanford facility or process waste, but were trash dumps from pre-Hanford residents and from military bases. Their use, contents, and potential risks were not deemed as applicable for evaluating the 100 Area burial grounds as the other burial grounds cited.

11. **Comment:** Page 2-17, 2<sup>nd</sup> paragraph, last sentence: This statement assumes no irrigation of the 100 Area will occur based on the HRA-EIS. EPA and Ecology do not agree with this statement and remind USDOE that prior to the establishment of the Hanford Project the land use in the 100 Area was irrigated agriculture, and also that land use plans are subject to change. We recommend revising the paragraph to reflect this.

**Response:** Irrigation in the 100 Area is part of the unrestricted residential scenario risk evaluation in Section 3. This paragraph will be revised to make it clear that irrigation has been evaluated as part of the unrestricted residential scenario. Also, a statement will be added that for other land use scenarios, should irrigation occur in the future that could cause additional releases, the effectiveness and degree of protection provided by a remedy will be re-evaluated.

12. **Comment:** Page 2-18 2<sup>nd</sup> paragraph: This paragraph makes an absolute statement that the burial ground contents are stable and have low solubilities but provides no data to support this claim. Recommend changing the sentence to state that contents are assumed to be stable.

**Response:** The text will be revised as follows to address this Comment: "Based upon historic records and the *118-B-1 Burial Ground Excavation Treatability Test Report* (DOE-RL 1995b), the burial ground contents are stable, have low solubilities (i.e., unlikely to leach contamination), and have remained where they were placed."

13. **Comment:** Page 2-18, 1<sup>st</sup> paragraph following the bullets: This paragraph should be revised to discuss the effects of irrigation on burial ground contents.

**Response:** See Specific Comment Response 11. Text will be revised accordingly.

14. **Comment:** Page 2-18, last paragraph: Item 3 in this paragraph should be revised to reflect that under current conditions the burial grounds pose a low threat of leachability.

**Response:** The text will be revised as noted.

15. **Comment:** Page 3-2, 2<sup>nd</sup> paragraph: Cleanup standards are defined by ARARs. Please modify.

**Response:** The word "generally" will be removed from the last sentence in the first partial paragraph on page 3-2.

16. **Comment:** Page 3-2, last paragraph: This paragraph discusses future land use but fails to mention tribal uses. Revise paragraph accordingly.

**Response:** The fifth sentence of the last paragraph will be changed to "Since 1995, there have been ongoing efforts (e.g., workshops with stakeholders and tribes) to clarify..." The last sentence will be changed to state "...has evolved toward non-residential

scenarios (e.g., conservation, preservation, and recreation) by all involved parties, including two tribes, the local counties, and other government agencies.”

17. **Comment:** Page 3-3, 2<sup>nd</sup> and 3<sup>rd</sup> paragraph: The Restricted Land Use alternative is not consistent with the land use being applied to the liquid effluent waste sites located in the 100 Area and will not be acceptable for the 100 Area burial grounds. A final land use for the 100 Area has not been established, and as such, MTCA Method B and 15 mrem/yr will apply. Please explain your justification for the selection of a restricted land use scenario.

**Response:** Because no future land use has yet become final, the FFS has selected a broad range of land uses for evaluation, including an unrestricted residential land use as applied to the liquid effluent waste sites, recreational, and a restricted land use, compatible with the land use alternatives proposed in the draft HRA EIS.

18. **Comment:** Page 3-3, 3<sup>rd</sup> paragraph, last sentence: This sentence is confusing. What point is the sentence trying to convey? Please clarify.

**Response:** The phrase "...or the liquid effluent waste site interim action ROD (EPA 1995a)..." will be removed.

19. **Comment:** Page 3-4, 1<sup>st</sup> paragraph, 1<sup>st</sup> sentence: Isn't the unrestricted land use also compatible? Please clarify.

**Response:** A recreational land use, allowing campgrounds, is compatible with the range of alternatives in the HRA-EIS, as is a residence for a park ranger at the campground. However, an unrestricted residential land use would not be compatible with lands designated for protection under a conservation or preservation land use.

20. **Comment:** Page 3-4, 3<sup>rd</sup> paragraph: This paragraph indicates that seven days per year is based on EPA guidance. EPA and Ecology are not aware of this guidance. Is the text referring to HSRAM? If it is, the text should be changed to reflect that HSRAM is a Tri-Party Document. The last sentence regarding allowable time in a campsite is incorrect. In Washington, most campsites allow up to 14 days. Also, this paragraph makes no provision for multiple visits.

**Response:** Yes, the text refers to the HSRAM. The exposure frequency for the recreationist, as presented in HSRAM, is 7 days per week, 24 hours per day, with no consideration for activities such as hiking, swimming, hunting, and fishing that would be expected to take the receptor outside of a waste site. The last sentence will be removed.

21. **Comment:** Page 3-4, last paragraph: Which MTCA method, A, B, or C, was used to establish cleanup standards for a recreational use scenario? Please clarify.

**Response:** The sentence will be changed to read ""Cleanup standards for nonradioactive contaminants *will be* based on..." This will reflect the fact that cleanup standards for

scenarios other than recreational or industrial must be developed using mutually agreed upon site-specific exposure parameters.

22. **Comment:** Page 3-5, Section 3.3.1.2: This paragraph talks about exposure to burial ground waste under a rural residential exposure scenario. It is not clear if this paragraph is trying to portray risk if a residence was built in burial ground waste. Under the RTD alternative, the waste would be removed, and therefore, no residence would be built in waste material. Please clarify.

**Response:** For an FFS, EPA protocol calls for evaluation of risk in the absence of cleanup and under a range of scenarios to demonstrate the need for remedial action. Therefore, it does take into account a residence built on burial ground waste.

23. **Comment:** Page 3-5, Section 3.3.1.4: This paragraph discusses institutional controls. The second sentence indicates that institutional controls are conservatively assumed by NRC to be lost in 100 years. Did NRC use the word conservatively? If not, delete the word. It appears that Table B-1 has a different value than 500 mrem/yr for exposure to an inadvertent intruder. Please clarify. Also it appears that the last sentence does not take into account the 118-B-1 hot spot. Text should be revised to reflect this data.

**Response:** The second, third, and fourth sentences will be replaced as follows: "Based upon the kinds of material expected to be buried, the NRC determined that the minimum period of institutional control will be for 100 years after closure. Closure of a land disposal facility must ensure protection of an individual inadvertently intruding into the disposal site and occupying the site or contacting the waste at any time after active institutional controls over the disposal site are removed. The NRC has classified waste to account for whether a waste will be above or below dose limits deemed protective after 100 years (10 CFR 61.55)."

The institutional controls proposed for the Containment Alternative are presented in FFS Section 5.4.2. These controls include surveillance, land-use restrictions (deed restrictions preventing residential development on the burial grounds), public notices, and community relations efforts to supplement surveillance activities.

The 500 mrem originated in a NRC EIS that was developed in support of the 10 CFR 61 rule making, and will be included in the Appendix Table B-1.

The last sentence of the paragraph will be modified to read as follows: "Calculations of the potential dose to an inadvertent intruder (discussed in Appendix C, Section C2.0, Table C2-1) concludes that the contents of the most contaminated burial ground will be below the level of an acute exposure in less than 55 years."

In a human health or ecological risk context, a "hot spot" represents an area (or region) of a hazardous site where highly toxic or mobile waste may constitute a principal threat (e.g., short-term exposures could result in toxic effects). A single small item with an exposure rate of 2,000 mrem/hr and a specific activity of 6 Ci/m<sup>3</sup> due to cesium-137 was

found. In the above context, a "hot spot" was not found during the 118-B-1 Burial Ground Excavation Treatability Test.

24. **Comment:** Page 3-6, 3<sup>rd</sup> paragraph: This paragraph concludes that migration of contamination from burial grounds to the Columbia River is unlikely. Was irrigation considered? If not, it should be and the text modified accordingly.

**Response:** See Specific Comment Response 11.

25. **Comment:** Page 3-7, last paragraph: The last sentence states that ARARs will be negotiated between the parties. ARARs are not negotiable and will be finalized in the ROD. The text should be modified accordingly.

**Response:** The last sentence of Section 3.4 on page 3-7 will be changed to: "ARARs for the 100 Area Burial Grounds remediation activities will be finalized in a ROD."

26. **Comment:** Page 3-9, 1<sup>st</sup> paragraph following the bullet at top of page: The statement "it is unlikely that burial ground contamination would leach significantly and/or migrate to groundwater or the river" is too vague and uncertain. It does not provide any confidence that contaminants will not leach out of some burial grounds, especially when our knowledge of the burial grounds is limited. Please modify.

**Response:** The sentence containing this statement will be removed.

27. **Comment:** Page 3-9, Section 3.6, bullets under For Direct Exposure: How do we know if these standards are being met if the sites have not been characterized? The EPA guidance is 15 mrem/yr above background for 1000 years following remediation (EPA 1997) as stated in Appendix C, page C1-2. For the second bullet, MTCA does not recognize recreational and restricted residential scenarios. Please clarify.

**Response:** Meeting these ARARs, and by extension achieving RAOs, can be accomplished by reducing concentrations (or activities) of contaminants to remediation goal levels or by eliminating potential exposure pathways/routes. Elimination of potential exposure pathways by containment of the burial grounds would be expected to make only routine groundwater monitoring necessary. Long term groundwater monitoring is part of the containment alternative and is used as a tool for managing uncertainty, consistent with EPA CERCLA remedies selected elsewhere.

The 1,000-year requirement ensures that the proposed standard accounts for the decay of radionuclides to daughter products that are more radioactive. As stated in the 100 Area ROD sites RDR/RAWP, the development of cleanup standards for the 100 Area will not be affected because the principal radionuclides of concern do not decay to daughter products that are more radioactive.

The phrase "Under the recreational and restricted and unrestricted rural-residential scenarios" will be deleted from both bullets.

28. **Comment:** Page 3-10, 4<sup>th</sup> paragraph: This paragraph makes a statement that Preliminary Remediation Goals (PRGs) that are protective of human health are also protective of ecological receptors. This may not be true in all cases such as with strontium-90. Also, Cr<sup>+6</sup> cleanup levels will be set to be protective of aquatic life. The text on page 3-11 (Ecological Exposure) should be modified to reflect this.

**Response:** The following phrase will be added at the end of the last sentence of the paragraph: "...except for selected contaminants, such as strontium-90, when they are present and bioavailable.""

The last sentence under *Ecological Exposure* on page 3-11 will be modified to include: "...or eliminating exposure pathways or contaminant levels (such as for Cr+6) applicable to ecological receptors."

29. **Comment:** Page 3-13, 2<sup>nd</sup> paragraph: Delete the first sentence.

**Response:** The sentence will be deleted.

30. **Comment:** Page 4-2, Section 4.2, 2<sup>nd</sup> paragraph: This paragraph discusses natural attenuation. The paragraph discusses radionuclides but totally ignores other hazardous constituents. Text should be added to discuss the affects of natural attenuation on other hazardous constituents.

**Response:** The text will be revised as noted. The natural attenuation of chemical contaminant toxicity would be contingent on the stability of the contaminant and site-specific conditions. Unstable chemical contaminants (e.g., volatile organics) would naturally attenuate relatively quickly while more stable materials (e.g., metals in tools or equipment) would disintegrate much more slowly and still be immobile.

31. **Comment:** Page 4-3, 1<sup>st</sup> paragraph: What is the purpose of discussing hot spot removal? How would this achieve RAOs? Please clarify.

**Response:** The reference to hot spot removal will be deleted from the second sentence.

32. **Comment:** Page 4-3, 2<sup>nd</sup> and 3<sup>rd</sup> bullets under the 2<sup>nd</sup> paragraph: These bullets make no mention that both safety procedures and the documents for commitment of lands for ERDF are already in place. The text should be modified to reflect this.

**Response:** The text will be revised as noted to clarify that the safety procedures and land commitment documentation is already in place.

33. **Comment:** Page 4-5, 1<sup>st</sup> paragraph: The third to last sentence should be changed to reflect that this is true under today's conditions.

**Response:** The text will be changed to: "Under current conditions these wastes present little or no hazard through leaching or migration to groundwater or surface water".

34. **Comment:** Page 4-5, 3<sup>rd</sup> paragraph: The third sentence should not read that the 100 Area Burial Grounds "do not" contain Category 3 waste but should indicate we think they do not contain Category 3 waste.

**Response:** The sentence will be modified to read: "Existing data and burial ground process history information indicate that the 100 Area burial grounds do not contain Category 3 waste, so the Hanford Barrier is not required."

35. **Comment:** Page 4-5, 4<sup>th</sup> paragraph: The first sentence discusses design requirements. What design requirements? Please clarify. Also how does a barrier reduce regulatory compliance time? Please clarify.

**Response:** The pertinent design requirements for burial ground barriers (i.e., waste category, durability and long-term protectiveness) were discussed in paragraphs 2 and 3 and will be readdressed here. A clean soil cover or a standard RCRA Subtitle C barrier would not satisfy burial ground barrier durability or long-term protectiveness needs. The burial ground wastes are less than Category C and do not merit a Hanford Barrier.

A barrier would reduce the regulatory compliance time for the largest sites because it would take less time to build a barrier than RTD and restore the largest burial grounds. Also, because the estimated barrier costs are significantly less for the largest burial grounds than for RTD, remediation budget limitations would be less of a factor (e.g., more sites could be remediated within a given fiscal years' budget constraints).

36. **Comment:** Page 5-2, 1<sup>st</sup> paragraph: Please include text to describe the differences and the similarities between the municipal and military landfill remediation sites and the 100 Area Burial Grounds with regard to your statement that extensive waste characterization is not required (or encouraged) at these sites to support containment. Also, the text in this paragraph should be expanded to discuss the information gained from burial ground 118-B-1.

**Response:** The following text will be inserted following the 2<sup>nd</sup> sentence: "Some of the large 100 Area burial grounds have characteristics similar to municipal and military landfills. Although the 100 Area burial grounds do not contain large proportions of municipal-type wastes, they do contain large proportions of immobile/insoluble metallic equipment and construction debris as illustrated through the results of the 118-B-1 burial ground study (see Section 2.3.2.2 or DOE-RL 1995b)."

37. **Comment:** Page 5-3, Section 5.3.1, 1<sup>st</sup> paragraph: It needs to be identified where the soil backfill will come from for both the RTD and Containment alternatives. The location of the source will be a big factor in the cost of the alternatives and this factor has not been clearly addressed.

**Response:** Current Hanford Site information about backfill and surface barrier materials indicates borrow material is available onsite and will not need to be imported from offsite. Therefore, "onsite" will be inserted between "approved" and "borrow" in the second-to-last sentence in response to this comment.

38. **Comment:** Page 5-5, Section 5.4.1, 1<sup>st</sup> paragraph: Since the wastes in the burial grounds have not been characterized, how do we have nay confidence that 100 years of protection is enough? Please expand to clarify. Also see General Comment No. 6.

**Response:** See General Comment Response 6. Characterization data are available for many of the 100 Area burial grounds from past studies (e.g., Dorian and Richards). In addition, the waste characteristics for all the burial grounds are known based on 100 Area process history, burial ground records, and recent studies (e.g., the 118-B-1 Burial Ground Excavation Treatability Test Report). Any uncertainty in the protectiveness of the Containment Alternative is addressed through CERCLA 5-year evaluations of the remedy and ongoing site monitoring.

39. **Comment:** Page 5-5, 4<sup>th</sup> paragraph: EPA and Ecology understand that the materials from McGee Ranch are protected and will not be used for backfill. Please clarify.

**Response:** "McGee Ranch" will be removed as an example of a borrow area. A new borrow area has been identified in the ALE that would provide the silt material required for the surface barriers. This new borrow area would add about 6-miles to the round-trip transport cost currently associated with the Containment Alternative. This cost estimate adjustment will be made in the revision of the Draft B FFS.

40. **Comment:** Page 5-6, last paragraph: How can we say with confidence that existing information is adequate to predict the reduction of radiation for the 100 Area Burial Ground wastes if the burial ground wastes have not been characterized and are "unknown" as you stated on page 5-1, Section 5.1, in the 1<sup>st</sup> paragraph. Since the radiation levels are not known, they **will** need to be monitored. Please clarify.

**Response:** The first sentence of the second paragraph on page 5-6 will be modified to clarify that Containment alternative monitoring will include radioactive and non-radioactive contaminants.

The reference to "unknown" wastes (page 5-1) is to allow for contingencies for worker safety during removal operations for radioactive and non-radioactive wastes.

41. **Comment:** Page 6-9, 4<sup>th</sup> paragraph, last sentence: This statement should recognize that the expansion of ERDF has already been discussed with the public and an evaluation of impact to resources has already been completed. Modify the text to include.

**Response:** The text will be modified to include a statement that previous expansions to ERDF have been discussed and concurred with by the Tri-Parties and the public.

42. **Comment:** Page 6-9, last paragraph: This paragraph is based on work at 618-4 but totally ignores the work done at 118-B-1. EPA and Ecology believe most of the burial ground work will be similar to the work completed at 118-B-1 where no level B Personal Protective Equipment (PPE) was required. The text should be modified to reflect this. In addition, costs for RTD should be re-evaluated.

**Response:** Initial Level B PPE will be required for excavation work in the 100 Area Burial Grounds. This is a change in safety policy from when the 118-B-1 Burial Ground was excavated (although at 118-B-1, Level B was used for manual manipulation of waste for testing purposes) and is based on heightened safety concerns at the site, particularly in light of excavation work at the 618-4 Burial Ground.

It was not assumed that the workers would be in Level B during the entire excavation process. The assumption used for RTD cost purposes is that the workers will be in Level B for 15% of the work and will then be downgraded to Level C. Further clarification will be added to the text.

43. **Comment:** Page 6-11, last paragraph: Are the costs shown for the RCRA-compliant surface barrier only for that portion that would contain the wastes from the 45, 100 Area burial grounds? Please clarify.

**Response:** Yes, all cost estimates presented in this paragraph are associated only with the 45 burial grounds. The estimated cost is for a RCRA-compliant barrier over the 3 ERDF cells needed to dispose the waste from the 45 burial grounds. The estimated cost is presented as a range because several designs for the ERDF barrier are being considered.

44. **Comment:** Page 6-13, 1<sup>st</sup> and 4<sup>th</sup> paragraphs: These paragraphs are contradictory in that the 1<sup>st</sup> paragraph states "the surface barrier would also eliminate any potential for contaminants to migrate to the groundwater," whereas the 4<sup>th</sup> paragraph states "should a burial ground contain inventories of mobile contaminants, the containment alternative is still considered protective of human health and the environment" and "should groundwater be impacted, contingency plans would remain in place to provide corrective action." The main point here is that we don't know what is contained in the burial grounds, not even whether or not mobile wastes are contained in them. Under these circumstances, the containment alternative is not a viable option. Please modify as needed to be more consistent.

**Response:** The text will be revised consistent with General Comment 9 to make these two paragraphs consistent and clarify the rationale presented.

45. **Comment:** Page 6-13, Section 6.2.3.1.2: Compliance with ARARs - Please state specifically which ARARs the containment alternative is compliant with, and more specifically, list the ARAR for the restricted rural residential use scenario. Just saying "The containment alternative would be expected to comply with all ARARs is not definitive.

**Response:** Specific ARARs are defined in Appendix B of the document for each alternative. Specifically, Section B2.0 discusses compliance with standards for soil cleanup and groundwater, and river protection. The following statement will be added to this section that discusses the use of a Containment alternative in a particular land use scenario:

Current MTCA requirements allow containment as a cleanup option. Regulations contained in WAC 173-340-740(6)(d) state: "The department recognized that, for those cleanup actions selected under WAC 173-340-360 that involve containment of hazardous substances, the soil cleanup levels will typically not be met at the points of compliance specified in (b) and (c) of this subsection [groundwater and direct contact pathways, respectively]. In these cases, the cleanup action may be determined to comply with cleanup standards, provided the compliance monitoring program is designed to ensure the long-term integrity of the containment system, and the other requirements for containment technologies in WAC 173-340-30(8) are met." This allowance is without regard to the exposure scenario (MTCA Method B or C) contemplated as evidenced by Containment remedies chosen within many differing land use scenarios within the State of Washington.

In addition, the text will be changed to state that "The containment alternative would comply with all ARARs."

46. **Comment:** Page 6-14, 3<sup>rd</sup> paragraph: The document states that "nonradionuclide contaminants will require a longer period of time to attenuate to protective levels." In other parts of the document it is stated that the contaminants under the cap **will not be mobile**; therefore, there is no mechanism for many of these contaminants (i.e., metals) to attenuate since they do not decay or breakdown, and they will not disperse if they are not mobile. Please clarify.

**Response:** The text will be revised to remove the statement that natural attenuation of nonradionuclides is expected.

47. **Comment:** Page 6-14, Section 6.2.3.1.4: MTCA does not recognize attenuation as a treatment action and EPA and Ecology have not used decay as a treatment in past RODs. Please include this language. Also, the paragraph ignores all hazardous constituents that are not radioactive. The text should be modified to discuss hazardous constituents.

**Response:** MTCA regulations do not identify any specific treatment actions. The cited EPA guidance on monitored natural attenuation and the more recent guidance (OSWER 9200.4-17P, Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, April 21, 1999) does recognize attenuation, which includes radioactive decay in its definition, as a viable alternative at a site when combined with other components of a remedy. This guidance is relatively recent compared to past Hanford Site RODs, reflects current EPA guidance, and is consistent

with decisions within the State and nationally that recognize attenuation as an effective component of the overall remedy.

The text in Section 6.2.3.1.4 will be expanded to include a discussion of hazardous constituents.

48. **Comment:** Page 6-15, 2<sup>nd</sup> paragraph: This paragraph should discuss environmental impacts to borrow sites.

**Response:** This paragraph will be modified to make it consistent with Comment Response #37. A statement will be placed in the paragraph noted that borrow material locations may require NEPA evaluations to minimize impacts to ecological and cultural resources. Also, the NEPA section of the comparative analysis will be expanded to show that more borrow material will be required for the RTD alternative (for fill and, to a lesser extent, ERDF cover) than for the Containment alternative (cover alone).

49. **Comment:** Page 6-16, Section 6.2.3.2, 1<sup>st</sup> paragraph: There is no discussion of non-radioactive contaminants in this paragraph. Expand text to discuss the effects of natural attenuation on non-radioactive contaminants. Also, it is not true that "no future land use for the 100 Area considered by the USDOE would be affected by the containment alternative." Please clarify.

**Response:** The phrase "until the radioactive contaminants decay" will be removed and replaced with "until the site no longer presents threats to human health or the environment based on the determined land use." The statement "no future land use for the 100 Area considered by the USDOE would be affected by the containment alternative" is correct assuming the potential exists for mixed land use. Restricting uses at a few burial grounds would leave large tracts of land available for a range of other uses including recreational and residential uses. The sentence noted will be modified to state "...would be significantly affected..." Containment has been chosen at many sites within the State of Washington and nationally under varied land use scenarios.

50. **Comment:** Page 6-18 and 6-10, Tables 6-1 and 6-2: There is not enough data provided in the test or in Appendix E to know how the cost numbers presented in these tables were derived and why there is such a discrepancy in the costs for the two alternatives. More cost detail is needed to justify the much higher costs for the RTD alternative. Also see General Comments 10 and 12.

**Response:** Additional details will be added to Table 6-1, Table 6-2, and Appendix E. It is also recommended that a meeting be scheduled with EPA and Ecology to discuss the estimated remediation costs.

51. **Comment:** Page 7-1, Section 7.1.2, 1<sup>st</sup> paragraph: EPA and Ecology disagree that Containment alternative complies with ARARs (see general comments). Please add more specific justification. Also why is the discussion of I18-F-2 located here? Please delete.

**Response:** The FFS will be revised to clearly state that MTCA promotes the use of permanent solutions, but that WAC 173-340-360(5)(d) states that Ecology recognizes that permanent solutions may not be practicable for all sites and defines criteria that must be used to determine whether a permanent solution is practicable. It will also be noted that the selection of containment in lieu of excavation is compliant with MTCA.

The discussion of 118-F-2 will be removed.

52. **Comment:** Page 7-2, 3<sup>rd</sup> paragraph: This paragraph discusses long-term effectiveness of the barrier but the detailed analysis only carries out to 100 years. Given the unknown natural of burial ground contents, EPA and Ecology require the analysis to be carried out to 1000 years. Cost tables should be revised accordingly. Also see General Comment No. 4.

**Response:** To address this comment, the net present worth Containment costs for the 16 largest burial grounds will be presented for 300 and 1,000 years in Appendix E. Summaries of this information will be added to Sections 6.0, 7.0, and 8.0, as appropriate. As an example, the net present worth cost for containment of 118-D-3 (one of the largest 100 Area burial grounds) was also run for 300 and 1,000 years. The net present worth of containment for 118-D-3 is as follows:

100 years	\$4,095,000
300 years	\$4,123,850
1,000 years	\$4,123,866

Typical O&M costs associated with surface barriers have been factored into the Containment Alternative. RL would like to discuss the Containment O&M costs further with EPA and Ecology in anticipation of revising the FFS.

53. **Comment:** Page 7-3, 1<sup>st</sup> paragraph: On page 6-13, 1<sup>st</sup> paragraph it was stated that "the surface barrier would also eliminate any potential for contaminants to migrate to the groundwater" while in other places in the document you state that the contaminants beneath the cap will be essentially immobile. In this paragraph you are now saying that "an engineered surface barrier would limit infiltration, thereby **reducing** the mobility of any contaminants." You can't have it both ways and if containment can't guarantee that contaminants will not migrate to groundwater, the alternative is not acceptable. Please clarify.

**Response:** The text will be revised to make it consistent with the text on page 6-13.

54. **Comment:** Page 7-3, 2<sup>nd</sup> paragraph in Section 7.1.5: This paragraph states that multiple handling of material would be required. EPA and Ecology believe that most of the material will not require multiple handling. It is not clear how USDOE's assumption about multiple handling factored into the cost for RTD. Please clarify. Also, this paragraph should be modified to indicate that the waste sites are already located in disturbed areas. See General Comment No. 14.

**Response:** Multiple handling is a valid assumption for burial ground waste assuming that: (1) a fraction of the waste will be designated as dangerous waste or asbestos; (2) some of the waste will require volume reduction, and (3) these wastes would be subject to special treatment (e.g. asbestos packaging and pipe crushing) prior to ERDF disposal. Therefore, multiple handling should be retained in the discussion. The RTD cost assumptions include segregation of all burial ground materials. For multiple handling, the cost model (MCACES) assumes that as the material is excavated it is placed into a large stockpile (or multiple stockpiles) for visual segregation. This is the most realistic approach for proper waste designation. Once the material is segregated it is loaded into the proper container for treatment/disposal. This multiple handling technique is how the 618-4 and 1-D burial grounds were excavated and most likely would occur for excavation of any future burial ground. Multiple handling affects the estimated costs because it slows overall production rates and adds equipment, thereby increasing the overall costs. Cost assumptions for multiple handling also include an estimate that 15% of the waste will require LDR treatment (e.g., metallic equipment or lead shielding), 5% will require special handling (i.e., size reduction), and 15% will require asbestos packaging (see Appendix E for further details). RL would like to further discuss the potential cost savings associated with this option with EPA and Ecology.

The paragraph will be modified to indicate the burial grounds are located in disturbed areas.

55. **Comment:** Page 7-4, Section 7.1.7: Not enough information is provided to know if the cost differential is really accurate. For example, what were the assumed costs for transportation and backfill material for the RTD alternative, what were the assumed cost for transportation and cover material in the containment alternative, what were the assumed long-term monitoring and security costs for the containment alternative, and what will the containment costs be if the time frame is more than 100 years. Please provide additional information to clarify.

**Response:** See response to Specific Comment 50 and 52.

56. **Comment:** Page 7-5, Section 7.1.8, 2<sup>nd</sup> paragraph: it does not appear that excavation would cause much disturbance to cultural resources contained at the site because these area have already been excavated and disturbed when the materials were initially buried. Modify text.

**Response:** The text will be revised to indicate that the burial ground sites are in disturbed areas. However, the statement regarding RTD having potentially more of an impact to cultural resources is valid because RTD excavations will require a layback area, thus disturbing more area (subsurface in particular) that may not have been disturbed during burial ground construction and use.

57. **Comment:** Page 7-5, 2<sup>nd</sup> and 3<sup>rd</sup> paragraphs in Section 7.1.8: The whole discussion on irreversible and irretrievable commitments of natural resources is biased towards

containment. Please explain how the RTD alternative could impact the environment more than capping.

**Response:** The text will be modified to address this comment. More Section 6 information will be used to expand on the comparison (e.g., for borrow materials RTD will require 1,900,000 m<sup>3</sup> while containment will require only 612,000 m<sup>3</sup>).

58. **Comment:** Pages 7-10 and 7-11, Figures 7-1 and 7-2: These figures are useful but EPA and Ecology question the large discrepancies in the costs of the two alternatives. As discussed in some of the above comments, not enough cost data has been provided in the FFS to know if these cost numbers are realistic.

**Response:** See response to Specific Comment 50 and 52.

59. **Comment:** Page 8-1, Section 8.1, 2<sup>nd</sup> paragraph: EPA and Ecology disagree with the statement "the RTD would be significantly more costly to implement than the protective and ARAR compliant containment alternative." Given our earlier comments, the RTD alternative performs better than the containment alternative. EPA and Ecology believe the costs presented for RTD are overstated while containment has been minimized. Based on our previous comments, the text should be modified.

**Response:** The decision has been made to delete Section 8 from the FFS.

The cost estimates presented in the FFS meet the +50%, -30% CERCLA target and are based upon the best available information. The estimates were derived using the MCACES model, which is accepted for baseline (DWP) budget purposes. The cost estimate model inputs were based on actual 100- and 300-Area RTD practices and costs. Additional cost estimate details will be added to other sections of the FFS.

60. **Comment:** Appendix A, Page A-8, Table A-3: Table A-3 should include a column for the Operable Unit designation as per the Tri-Party Agreement (TPA).

**Response:** The operable unit designations will be added to the table.

61. **Comment:** Appendix B, Page B-2, Section B2.0, 2<sup>nd</sup> paragraph: The EPA guidance is 15 mrem/yr above background for 1000 years following remediation (EPA 1997) as you have stated in Appendix C, page C1-2. Please modify.

**Response:** The text will be revised as noted.

62. **Comment:** Appendix B, Page B-21 and B-24, Table B-2: Under the column Applicable, Relevant and Appropriate, to be Considered, all rows stating "Relevant and appropriate" for MTCA should also state "Applicable."

**Response:** MTCA will be changed to "applicable".

63. **Comment:** Appendix B, Page B-28, Table B-2: We question the last ARAR Citation, *Richland Pretreatment Ordinance*, City of Richland Ordinance No. 35-84. It should probably be removed from the table.

**Response:** Citation will be removed.

64. **Comment:** Appendix C, Page C1-2, Section C1.2: The MTCA requirements are clearly stated in the first paragraph of this section. The fact that "groundwater is unlikely to become contaminated through migration of burial ground contamination," as stated in the second paragraph of this section is not sufficient assurance that the MTCA requirements will be satisfied. Please clarify.

**Response:** The text will be modified to clarify compliance with MTCA requirements. See response to specific comment No. 45.

65. **Comment:** Appendix C, Page C1-11, Table C1-3: The risks presented in this table for Unrestricted Land Use are really the risks for the No Action alternative and should be labeled accordingly. Under the Unrestricted Land Use alternative, the waste would be removed and the risks should essentially be zero, not greater than the Restricted Land Use alternative. Please clarify.

**Response:** The text will be revised to clarify the risk presentation. (See response to General Comment 13.)

66. **Comment:** Appendix D, Pages D-1 and D-2, Table D-1: The "Relative Cost" for excavation and disposal (onsite) are listed as "Low" in this table whereas the "Relative Cost" for an engineered cap is listed as "Medium." This is inconsistent with what you have stated throughout the document. Please clarify.

**Response:** Table B-1 will be modified to indicate that excavation costs range from "Low" to "High" contingent on the materials being excavated, handling requirements, and the excavation method. Table B-1 will also be revised to indicate that RCRA-compliant containment costs can also range from "Low" to "High", contingent on the type of RCRA barrier selected. For example, a Hanford Barrier has a relatively high cost while a standard RCRA Subtitle C barrier has a relatively low cost.

67. **Comment:** Appendix E, Page E-4, 7<sup>th</sup> bullet: How is access to the contained burial grounds going to be controlled if security fencing and signs are not required? WAC 173-340-440 requires institutional controls if containment is selected as the cleanup action for a site and the controls must remain in place until residual hazardous substance concentrations no longer exceed site cleanup levels established under MTCA.

**Response:** Institutional controls are anticipated in the form of deed restrictions. Access would be controlled by the barrier (waste will be a minimum of 4.6 m below the top of the barrier and 4.5 m from the edge of the barrier). Fencing and signs could be added as a low-cost extra precaution, but are not deemed necessary.

68. **Comment:** Appendix E, Page E-4, Section E3.2, 1<sup>st</sup> paragraph: O&M costs for the barriers will be needed for 100 years and 1000 years. Please include both.

**Response:** See response to Specific Comment 50 and 52.

69. **Comment:** Appendix E, Pages E-6 through E-9, Tables E-1 and E-2: It appears that these two tables were switched in that Table E-1 presents the costs for the Containment alternative and Table E-2 presents the costs for the RTD alternative. The RTD alternative costs presented in Table 8-1 on page 8-4 match the Containment alternative costs presented in Table E-2. Please make the necessary changes. Also see General Comment No. 12.

**Response:** The table titles were inadvertently switched, this error will be corrected. Regarding General Comment No. 12, see the response to Specific Comment No. 45.

Administrative Comments

1. **Comment:** Page ES-2, last paragraph, 2<sup>nd</sup> sentence: The 9 criteria of CERCLA should be added to the list of what was used to evaluate the protectiveness of the alternatives.

**Response:** The text will be revised to add the 9 CERCLA criteria to the sentence noted.
2. **Comment:** Page 1-2, 2<sup>nd</sup> paragraph: The third sentence should say "EPA and Ecology" will... Delete the last sentence of this paragraph.

**Response:** The text will be revised to include "EPA and Ecology" in the second sentence. The last sentence of the paragraph will be deleted as suggested.
3. **Comment:** Page 1-2, 3<sup>rd</sup> paragraph: First and second sentences should be combined and read "After the interim action ROD is signed, Ecology will **coordinate the modification** of the Hanford Facility RCRA Permit (Ecology 1994) to incorporate the burial ground CERCLA remedial action into the RCRA Permit for RPP sites.

**Response:** The text will be revised as noted. In addition, the 3<sup>rd</sup> paragraph will be joined to the end of the second paragraph.
4. **Comment:** Page 1-3, 1<sup>st</sup> paragraph: Delete the words "and RCRA permit modification."

**Response:** The text will be revised as noted.
5. **Comment:** Page 2-4, last sentence in Section 2.1.7.1: Add the following to the end of the sentence: "and disposed in the 200 West Area as stated in a separate ROD."

**Response:** The text will be revised as noted. In addition, the ROD reference (58 FR 48509; September 1993) will be added.
6. **Comment:** Page 3-9, 1<sup>st</sup> bullet under Section 3.6: Add "for radionuclides" to the end of the sentence.

**Response:** The text will be revised as noted.
7. **Comment:** Page 4-4, last paragraph: Change "should satisfy" to "will satisfy."

**Response:** The text will be revised as noted.
8. **Comment:** Appendix C, Page C1-2, Section C1.2, 2<sup>nd</sup> paragraph: Kd is a distribution or adsorption coefficient, not a diffusion coefficient.

**Response:** The text will be revised as noted. The Kd is the distribution coefficient.

9. **Comment:** Appendix C, Page C1-3, 5<sup>th</sup> paragraph: The first sentence should read "...in direct contact with the contents *of the* burial ground or from..."

**Response:** The text will be revised as noted.

10. **Comment:** Appendix C, Page C1-4, 3<sup>rd</sup> paragraph: The third sentence should read "Under the Recreational Land Use alternative, nine of the 27 burial grounds *for which data were available* present total risks of..."

**Response:** The text will be revised as noted.

11. **Comment:** Eliminate the RMTD acronym

**Response:** The RMTD acronym will be deleted from the text.

12. **Comment:** Make units consistent throughout text, figures, and tables.

**Response:** Measurements units will be made consistent throughout the document.