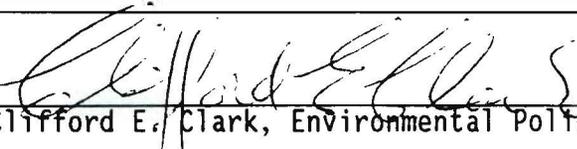


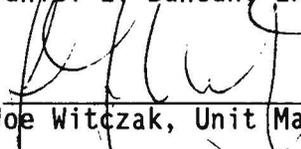
Final

Meeting Minutes Transmittal/Approval
Unit Managers Meeting: Low Level Burial Grounds

Meeting Held August 9, 1991
1100 Jadwin Ave., Room 508
Richland, Washington

Appvl.  Date: 9/11/91
Clifford E. Clark, Environmental Policy and Permitting, RL

Appvl. _____ Date: _____
Daniel L. Duncan, EPA Region 10, RCRA Program Manager

Appvl.  Date: 9/11/91
Joe Witczak, Unit Manager, Washington State Department of Ecology

Appvl.  Date: 9/11/91
Richard Pierce, Unit Manager, Contractor Representative, WHC

PURPOSE:

Meeting Minutes are attached. These minutes are from the August 1991 Unit Managers Meeting held 8-9-91. Minutes are comprised of the following:

- Attachment 1 - Summary of Discussion and Commitments
- Attachment 2 - Attendance List
- Attachment 3 - Agenda
- Attachment 4 - Action Items List with Status
- Attachment 5 - Notice of Deficiency Response Table



Low Level Burial Grounds
Unit Managers Meeting
1100 Jadwin Ave., Room 508
Richland, Washington
August 9, 1991

Summary of Discussion and Commitments

An agenda was provided for the meeting (See Attachment 3).

- I. Cliff Clark (RL) asked the attendees to introduce themselves.
- II. The first topic discussed was the responses to the Notice of Deficiency Table which were submitted July 26, 1991 (Attachment 5). Ecology (Joe Witczak) provided some preliminary questions and remarks to the NOD responses, and a formal Ecology response will follow later.
NOD 14: Ecology (Joe Witczak) inquired about real-time response regarding using radiography for detecting the presence of free liquids which does not work when there is lead shielding. Mr. Witczak wondered whether very many shipments have lead shielding and what percentage can't be verified for liquids. WHC (D. Armstrong) stated that not very many shipments are lead shielded and that the percentage of shipments for which liquid verification cannot be done is "very small."

NOD 15: Ecology (Joe Witczak) stated that this NOD shows approval, but Ecology has not yet concurred with the response, and Ecology will have to verify that information contained in Appendix 4A will satisfy this NOD.

Ecology (Joe Witczak) made reference to a letter to Tim Nord of Ecology (June 19, 1991 from E.A. Bracken of RL) requesting that a meeting be set up to discuss transferring waste from Single-Shell Tanks to Low-Level Burial Grounds and referencing equipment such as blowers. WHC (Rick Pierce) stated that this letter to Mr. Nord stated that WHC/RL would like to remove de minimis quantities of mixed waste from tank farms and that another letter had been written to Mr. Nord stating that, in effect, WHC/RL will proceed as planned if Ecology does not respond. Mr. Pierce of WHC also stated that WHC/RL is very hesitant to proceed without Ecology approval, but there is also pressure to go ahead with the above-stated mixed waste transfer because of ALARA concerns. RL (Cliff Clark) stated that safety concerns are an issue in this matter and that there is a possibility that a contest could arise between following the Atomic Energy Act or the WAC regulations regarding protection of human health and the environment if no resolution is made. Mr. Witczak asked that he be called after his return to Olympia in order to set up this meeting. Mr. Witczak stated that his initial reaction to the letter was to deny this disposal for the reasons stated in the following discussion of NOD 16.

NOD 16: Ecology (Joe Witczak) stated that Ecology's statement in NOD 16 was based on a reading of the Federal Register which had come out in either May or June of 1985 regarding minimum technology requirements.

Mr. Witczak stated that, according to the Federal Register, even though a portion of a trench which contains no waste is considered an existing trench and therefore is not required to have a double liner, the Federal Register would still compel that the requirements be met which were in place prior to HSWA. Mr. Witczak said that the Federal Register states that what was in place at that time was a single-liner system. RL (Cliff Clark) noted that a single-liner system would not alleviate the immediate problems existing at the Low-Level Burial Grounds. Also, the engineering work involved in producing the single liner as well as going through the budgeting process with Congress would extend the date of installing the liner a few years. Witczak stated that Ecology will follow the Federal Register and suggested that perhaps RL could try to make a case for a waiver.

NOD 19: Ecology (Joe Witczak) inquired whether the NOD response referred to destructive soil samples from the actual liner or samples from the test pad. WHC (Tom Yount) stated that destructive tests on the synthetic liner will be conducted on the procurement material before installation and there will not necessarily be destructive tests of the installed landfill material except, for the welds and joints. Mr. Yount will check the CQA Plan to determine if destructive tests will be performed on the soil liner.

NOD 102: Ecology (Joe Witczak) questioned why this response was limited to extremely hazardous waste. WHC (Rick Pierce) did not have the information during the meeting, but noted that the intent was probably to show extremely hazardous waste as a higher concern on NOD 102.

NOD 103: Some general discussion took place regarding corrosion of metal exposed to certain liquids in a relatively arid climate. No resolution was reached.

NOD 106: Ecology (Joe Witczak) noted that the NOD response refers to a 3% slope but does not mention Ecology's specification of 1/10th of a foot. RL (Cliff Clark) stated that WHC/RL will look at what Golder & Associates designs and this will be the basis for the Permit Application, and if Ecology has an idea that something in the design needs to be changed, then WHC/RL would need to know the technical basis for the change. Ecology (Joe Witczak) noted that these comments had been compiled before review of the definitive design, and there is not yet a definitive design of the final cover.

NOD 107: Discussion took place regarding a layer of coarse material up to 12 inches in diameter. Ecology (Joe Witczak) asked whether there is a design specification for the soil distribution in this layer. WHC (Rick Pierce) replied that there is not a design specification for soil distribution in this layer, and the 12-inch diameter of coarse material is a design limitation for the lifts.

NOD 117: Ecology (Joe Witczak) inquired as to the meaning of "heads of field elements," which RL (Cliff Clark) stated is a term from an RL manual and refers to John Wagoner (DOE-RL Manager).

NOD 139: Ecology (Joe Witczak) pointed out that WAC 173-303-161 defines lab packs as small containers with liquids in them, and also noted that this NOD response mentions containers with up to 15 gallons of liquid being considered lab packs. Mr. Witczak suggested a change in the text to take care of this. WHC (B. Broomfield) agreed that "lab packs" was not the correct terminology.

NOD 144: Ecology (Joe Witczak) does not want it to appear that the postclosure period will definitely be 30 years; it could be less or more depending on the individual situation. Mr. Witczak suggested that 30 years may be used as a design basis, and that the Parties can say that they are assuming a 30-year postclosure period without locking it "in stone." RL (Cliff Clark) stated that, at least for purposes of the initial Permit, the anticipated postclosure time period should be estimated.

Ecology will include comments from review of the Construction Quality Assurance Plan and the Definitive Design in its next response to the NOD comments. RL (Cliff Clark) requested that Ecology's letter of transmittal include 120 days for RL to respond. Ecology (Joe Witczak) agreed.

NOD 230: Ecology (Joe Witczak) would like to see a statement in the text stating when closure cost estimates must be provided which is in accordance with the facility-wide permit.

NOD 252: Ecology (Joe Witczak) noted that there had been agreement that Ecology would be notified of resolution meetings. Mr. Witczak noted that nothing had been said about pre-construction meetings or problems/work efficiency meetings and wondered whether this was inadvertant or if Ecology RL planned to exclude Ecology from these meetings. RL (Cliff Clark) responded that RL is assuming that at some time soon Moses Jaraysi (Ecology) will be able to get on site and be able to schedule his own participation; also, there are some meetings which RL holds with its contractors which RL would not consider it appropriate for Ecology to attend. WHC (Rick Pierce) stated that the definition of a "resolution meeting" is important because there will not be actual resolution without Ecology present. Ecology (Joe Witczak) expressed interest in being notified of work deficiency meetings and problem meetings. RL (Cliff Clark) did not agree to notify Ecology of all such meetings.

- III. Ecology (Joe Witczak) noted that a number of comments had been deferred on the submarine compartments and asked when those responses might come in. RL (Cliff Clark) said that at the next UMM there will be a schedule. WHC (Sue Price) asked whether Ecology would be able to respond to the comments on the submarine compartments in 60 days. Ecology (Joe Witczak) stated that Ecology would be able to do so. The end of 60 days would be September 26, 1991.

WHC (Rick Pierce) requested that when Ecology transmits comments on definitive design that WHC/RL receive an informational copy from Ecology's consultant (Parametrix). The request was for the purpose of expediting the up-coming year's construction schedule. Ecology (Joe

Witczak) stated that an effort would be made to get a quick turnaround on the comments, and WHC/RL will just see a smooth copy. RL (Cliff Clark) noted that RL will be handing over documents from contractors to Ecology which RL hasn't previously reviewed and suggested that Ecology could consider doing likewise for the purpose of expediting the project.

- IV. WHC (Tim Greager) said that the construction specifications referring to the geomembrane liner stated that SLT will be the contractor and no substitutions will be made. RL has informed WHC, however, that sole sourcing will not be done. Ecology (Joe Witczak) stated that this is one case in which it is highly recommended that whatever brand and model number is tested be used. This way, the 9090 testing can be part of "what goes out on the street." Mr. Greager stated that if fingerprinting specifications are used, there is a potential that only one contractor will be able to match the specifications; however, it is possible that another manufacturer could at least have an opportunity to meet the specifications. RL (Cliff Clark) stated that federal procurement rules are specific that specifications can't be overly precise, but it can be worded to use a certain specification or equivalent.

WHC (Tim Greager) stated the the 9090 Test Report Phase I has been completed, and all of the material looks "pretty good." There are, however, questionable results on the geotextile, and WHC is continuing to look at the impacts of this. WHC would like to have Golder & Associates make a special presentation to Ecology in particular to discuss the 9090 test results. This presentation with Golder & Associates and Ecology is planned to take place immediately following the next Unit Managers Meeting on September 10, 1991. Ecology (Joe Witczak) stated that agreement will need to be reached on the degree of tolerance which will be allowed on the fingerprinting data when formulating the procurement specifications.

- o RL (Cliff Clark) noted that a meeting has been scheduled between WHC/RL and EPA (Cathy Massimino) on August 28 at 2:15 p.m. to discuss the PCB TSCA Permit. Mr Clark also noted that in a notice of proposed rule making, EPA has indicated that EPA is considering removing PCBs from submarines from the regulative realm.
- o Roger Bowman (WHC) is now acting for the Westinghouse RCRA Permits Section Manager.
- o The next meeting is scheduled for September 10, 1991 at 10 a.m. at the EPA Region 10 office, 712 Swift Blvd., Richland, Washington.

Attachment 2

Low Level Burial Grounds
(W-025 Mixed Waste Trench)
Unit Managers Meeting
August 9, 1991

Attendance List

<u>NAME</u>	<u>ORGANIZATION</u>	<u>PHONE #</u>
D. Armstrong	WHC	(509) 373-9240
R. Bowman	WHC	(509) 376-4876
B. Broomfield	WHC	(509) 376-4966
C. Clark	RL	(509) 376-9333
K. Davis	CNES	(509) 376-0412
D. Duncan	EPA	(206) 553-6693
M. French	DOE-NR	(206) 476-3655
R. Gilbert	RL	(509) 376-9210
T. Greager	WHC	(509) 376-0312
J. King	SWEC	(509) 376-4726
B. Koch	PSNS	(206) 476-1932
R. Pierce	WHC	(509) 376-5681
S. Price	WHC	(509) 376-1653
J. Witczak	Ecology	(206) 438-7557
T. Yount	WHC	(509) 376-0034

Attachment 3

Low Level Burial Grounds
(W-025 Mixed Waste Trench)
Unit Managers Meeting
August 9, 1991

Agenda

LOW-LEVEL BURIAL GROUNDS

- I Opening Remarks (C. Clark)
- II Discuss Responses to the Draft Notice of Deficiencies (J. Witczak)
- III Status of Ecology Comments on Design Package (J. Witczak)
- IV Is a Specific Brand of Liner Material required or May an Equivalent be Used Even Though a Brand Name Was Named in the Specifications (T. Greager)

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Attachment 4

Low Level Burial Grounds
(W-025 Mixed Waste Trench)
Unit Managers Meeting
August 9, 1991

Commitments/Agreements Status (Status date: (8/9//91)

ACTION ITEM

COMMITMENTS/AGREEMENTS STATUS LIST

5-30-91:1 Provide a letter on interim status construction authorization and regulatory criteria for design. Action: Joe Witczak (Ecology) and Dan Duncan (EPA)

OPEN

Attachment 5

Notice of Deficiency Response Table with Responses

921241233

Attachment 4

Low Level Burial Grounds
(W-025 Mixed Waste Trench)
Unit Managers Meeting
August 9, 1991

Commitments/Agreements Status (Status date: (8/9//91)

ACTION ITEM

COMMITMENTS/AGREEMENTS STATUS LIST

5-30-91:1 Provide a letter on interim status construction authorization and regulatory criteria for design. Action: Joe Witczak (Ecology) and Dan Duncan (EPA)

OPEN

92124142225

LOW-LEVEL BURIAL GROUNDS
NOTICE-OF-DEFICIENCY RESPONSE TABLE

July 26, 1991
Page 1 of 111

No.	Comment/Response	Ecology Concurrence
1.	<p><u>Chapter 2.0 (2-1)</u>. In several sections of Chapter 2.0 (page 2-14, Table 2-1, and page 2-21) it is documented that mixed waste is currently being disposed of in unlined trenches at the (Low-Level Burial Grounds (LLBG). On page 2-21, it is stated that this disposal is allowed under the existing portion exemption. There is no reference, within the document, that the Applicant has applied for or received from Washington State Department of Ecology (Ecology) an existing portion exemption in accordance with Washington Administrative Code (WAC) 173-303-665(2)(b).</p> <p><u>Ecology Recommendation</u>. The Applicant should submit with this permit application all information in support of it's request for an exemption for mixed wastes currently being disposed of in unlined trenches.</p> <p>DOE-RL/WHC Response: It is our understanding from the reading of the Environmental Protection Agency (EPA) regulations [40 CFR 264.301(a)] and Ecology regulations [WAC 173-303-806(4)(h)(ii)(A)] that the existing portion is exempt from liner leachate requirements by regulation; therefore, no application for exemption in accordance with WAC 173-303-665(2)(b) is required. Mixed waste is disposed in the existing portion of the trenches based on criteria described in Section 4.6.2.1 and after notifying Ecology.</p>	4-26-91
2.	<p><u>Page 2-14 (2-2)</u>. It is noted in the first paragraph that the permit application will not be revised to include all changes to the volume forecasts.</p> <p><u>Ecology Recommendation</u>. In accordance with WAC 173-303-830(3)(a)(i), any modifications in the projected volume of waste should be noted in a revised permit application and submitted to Ecology.</p> <p>DOE-RL/WHC Response: As stated in the text, the annual waste forecast was used for the preparation of Table 2-1. The forecast is for a period of 30 years and is necessarily only a rough estimate in the later years. Any waste receipts greater than the amounts forecasted in the Part A of the permit application would of course result in a revision to the permit. The paragraph will be rewritten to clarify why Table 2-1 will not be revised.</p>	4-26-91

Attachment # 5

LOW-LEVEL BURIAL GROUNDS
NOTICE-OF-DEFICIENCY RESPONSE TABLE

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No.	Comment/Response	Ecology Concurrence
3.	<p><u>Page 2-14, Section 2.1.2.2.1 (2-3).</u> In the third paragraph, mention is made of drag-off boxes being transported to a trench by a flatbed railroad and remotely skidded off into the trench.</p> <p><u>Ecology Recommendation.</u> It is not clear if the boxes are arranged after they are remotely skidded into the trench. Detailed procedures should be provided.</p> <p>DOE-RL/WHC Response: Text will be added discussing that the waste is covered with soil as soon as it is placed and a description of procedures will be provided.</p>	4-26-91
4.	<p><u>Page 2-23, lines 10 and 11 (2-4).</u> Section 2.5.1 states "The LLBG are located in a semiarid climate with an average annual rainfall of about 6.3 inches." There is no cite given for this conclusion.</p> <p><u>Ecology Recommendation.</u> Include the reference cite for this conclusion.</p> <p>DOE-RL/WHC Response: Reference to Pacific Northwest Laboratory (PNL) PNL-4622, Climatological Summary for the Hanford Area, Washington State, Stone et. al., June 1983 will be added to the text.</p>	4-26-91
5.	<p><u>Page 2-57 (2-5).</u> Section 2.7.2.3 states that due to the remote location of the LLBG that discharges occurring on property not owned by the U.S. Government are unlikely and, therefore, a description of the actions to restore the impacted area is not required. There is no cite given for this conclusion.</p> <p><u>Ecology Recommendation.</u> Include the reference cite for this conclusion.</p> <p>DOE-RL/WHC Response No. 1: Reference to the site map, which shows the LLBG location well within the site boundaries, will be added.</p> <p><u>Ecology Response No. 1 Comment:</u> Section 2.7, Spills and Discharges, Page 2-57</p> <p>Edit Section 2.7.2.3 to read "actions taken to restore <u>an off-site</u> impacted area and to replenish <u>off-site</u> resources is not required".</p>	

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LOW-LEVEL BURIAL GROUNDS
NOTICE-OF-DEFICIENCY RESPONSE TABLE

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No.	Comment/Response	Ecology Concurrence
6.	<p>DOE-RL/WHC Response No. 2: The last sentence of 2.7.3.3 will be revised to read "Therefore a description of the actions taken to restore an offsite impacted area and to replenish offsite resources is not required."</p> <p>Page 3-1, lines 11 through 13 (3-1). This section states, inter alia, that, "The generators are responsible for identifying and providing waste designations in accordance with WAC 173-303 (Ecology 1989)." A <u>complete</u> cite is required when referencing any statutes or regulations.</p> <p><u>Ecology Recommendation.</u> Include the <u>complete</u> cite (i.e., WAC 173-303-070).</p> <p>DOE-RL/WHC Response: A complete cite to WAC 173-303-070(1)(b) will be included in the text.</p>	4-26-91
7.	<p>Page 3-2, lines 10 through 12 (3-2). Section 3-1 discusses mixed wastes and states that "such waste also is categorized as toxic ... under WAC 173-303 (Ecology 1989)." A complete cite is required.</p> <p><u>Ecology Recommendation.</u> Include the <u>complete</u> cite (i.e., WAC 173-303-070).</p> <p>DOE-RL/WHC Response No. 1: A complete cite to WAC 173-303-070 will be included in the text.</p> <p><u>Deficiency:</u> Section 3.1, Chem, Bio and Physical Analysis, Page 3-2</p> <p>Although the correct reference has been provided in the response, the Extraction Procedure Toxicity test is no longer accepted.</p> <p><u>Requirement:</u> All references to future toxicity testing must reference the Toxicity Characteristic Leaching Procedure (TCLP). WAC 173-303-090(8) (October 16, 1990)</p> <p>DOE-RL/WHC Response No. 2: The text will be revised to remove Extraction Procedure requirements and insert Toxicity Characteristic Leaching Procedure in its place.</p>	

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LOW-LEVEL BURIAL GROUNDS
NOTICE-OF-DEFICIENCY RESPONSE TABLE

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No.	Comment/Response	Ecology Concurrence
8.	<p data-bbox="236 354 1630 418"><u>Page 3-3, line 20 (3-3)</u>. Section 3.1.1.3 states that "small quantities" of mercury are disposed at the Hanford Site.</p> <p data-bbox="236 451 1630 516"><u>Ecology Recommendation</u>. The term "small quantities" should be refined (e.g., less than 5 pounds per year).</p> <p data-bbox="236 548 1630 610">DOE-RL/WHC Response: The term "small quantities" will be refined to read 'less than 10 pounds per year.'</p>	4-26-91
9.	<p data-bbox="236 641 1730 738"><u>Page 3-4, lines 35 through 37 (3-4)</u>. Section 3.1.3 states that operation of the LLBG does not involve storage of waste in tank systems and, therefore, the requirements of "this section" are not applicable to the LLBG. It is unclear what "section" is referenced.</p> <p data-bbox="236 771 1730 836"><u>Ecology Recommendation</u>. Explain which "section" and its requirements that are not applicable to the LLBG.</p> <p data-bbox="236 868 1730 930">DOE-RL/WHC Response: The text will be changed to "... the requirements of WAC-173-303-640 are not applicable to...".</p>	4-26-91
10.	<p data-bbox="236 961 1730 1058"><u>Page 3-4, lines 42 and 43 (3-5)</u>. Section 3.1.4 states that operation of the LLBG does not involve the placement of waste in piles and, therefore, the requirements of "this section" are not applicable to the LLBG. It is unclear what "section" is referenced.</p> <p data-bbox="236 1091 1730 1156"><u>Ecology Recommendation</u>. Explain which "section" and its requirements that are not applicable to the LLBG.</p> <p data-bbox="236 1188 1730 1250">DOE-RL/WHC Response: The text will be changed to "... the requirements of WAC 173-303-660 are not applicable to...".</p>	4-26-91

LOW-LEVEL BURIAL GROUNDS
NOTICE-OF-DEFICIENCY RESPONSE TABLE

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No.	Comment/Response	Ecology Concurrence
11.	<p><u>Page 3-5, lines 8 through 10 (3-6).</u> Section 3.1.6 states that operation of the LLBG does not involve the incineration of waste and waste used in performance tests and, therefore, the requirements of "this section" are not applicable to the LLBG."</p> <p><u>Ecology Recommendation.</u> Explain which "section" and its requirements that are not applicable to the LLBG.</p> <p>DOE-RL/WHC Response: The text will be changed to "...the requirements of WAC 173-303-807 are not applicable to..."</p>	4-26-91
12.	<p><u>Page 3-5, lines 15-16 (3-7).</u> Section 3.1.7 states that operation of the LLBG does not involve the land treatment of waste and, therefore, the requirements of "this section" are not applicable to the LLBG. It is unclear what "section" is referenced.</p> <p><u>Ecology Recommendation.</u> Explain which "section" and its requirements that are not applicable to the LLBG.</p> <p>DOE-RL/WHC Response: The text will be changed to read "... the requirements of WAC 173-303-655 are not applicable to..."</p>	4-26-91
13.	<p><u>Page 3-5, lines 39 through 41 (3-8).</u> Section 3.2 states that "...the waste must be completely and accurately characterized in accordance with Ecology regulations before approval for storage or disposal is granted." No cite for the referenced regulations is given.</p> <p><u>Ecology Recommendation.</u> Include the <u>complete</u> cite for the referenced regulations.</p> <p>DOE-RL/WHC Response: "...Ecology regulations..." will be changed to "...WAC 173-303-070..."</p>	4-26-91

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LOW-LEVEL BURIAL GROUNDS
NOTICE-OF-DEFICIENCY RESPONSE TABLE

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Ecology
Concurrence

- | No. | Comment/Response | |
|-----|---|---------|
| 14. | <p><u>Page 4-3, Section 4.1.2.1 (4-1)</u>. It is noted that testing for free liquids is not performed because testing would increase the potential for radiation exposure of personnel.</p> <p><u>Ecology Recommendation</u>. The reason for not testing for liquids seems reasonable. However, there is no means of verifying whether or not free liquids actually exist in a particular waste. Alternative methods to test for free liquids should be explored and discussed here.</p> <p>DOE-RL/WHC Response No. 1: Text will be revised.</p> <p><u>Comment</u>: Section 4.1.2.1, Test for Free Liquids, Page 4-3</p> <p>The alternate methods of testing for free liquids should be presented in the next NOD Response Table. This discussion must also justify the equivalency of any alternate method to the Paint Filter Method.</p> <p>DOE-RL/WHC Response No. 2: The proposed alternative method for determining the presence of free liquids is real time radiography. This is the approved method for determining the presence of free liquids in transuranic waste to be shipped to the WIPP site, and has been proven very effective in locating small quantities of free liquids where lead shielding isn't used. This will be done in accordance with a sampling plan to be developed in support of the Hanford Facility Dangerous Waste Permit Application.</p> | |
| 15. | <p><u>Page 4-4, Section 4.6.1 (4-2)</u>. Appendix 4B indicates the waste type, age, and status of the trenches in the 200 West and 200 East Areas burial grounds. Based on information presented in Appendix 4B tables, some trenches are presently accepting mixed waste.</p> <p><u>Ecology Recommendation</u>. The Applicant should identify the specific areas of the existing unlined trenches in the LLBG that have received these mixed wastes, identify the mixed waste characteristics, and present a plan for dealing with these mixed wastes.</p> <p>DOE-RL/WHC Response No. 1: Trenches receiving mixed waste are existing portion trenches which are exempt from liner and leachate collection requirements [WAC 173-303-806(4)(h)(ii)(A)]. A listing of the mixed waste placed since November 23, 1987, will be added to the text. The plan for dealing with these wastes is the same as for other remote-handled waste. The waste will be covered with 8 feet of soil and will receive a RCRA compliant cover upon closure as described in Chapter 11.0.</p> | 4-26-91 |

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LOW-LEVEL BURIAL GROUNDS
NOTICE-OF-DEFICIENCY RESPONSE TABLE

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No.	Comment/Response	Ecology Concurrence
	<p><u>Comment:</u> Section 4.6.1, List of Wastes, Page 4-4</p> <p>Concurrence with this response will be based upon the additional information to be submitted. This information should be provided as soon as possible to facilitate our evaluation. In addition, the trench locations where liquids have disposed must also be identified.</p> <p>DOE-RL/WHC Response No. 2: Trenches receiving mixed waste and trenches containing liquid waste will be identified to Ecology, and in the list of waste. This information already is listed in Appendix 4A.</p>	
16.	<p><u>Page 4-5, Section 4.6.2.1 (4-3).</u> A request for an exemption for mixed wastes (specifically categorized as remote-handled waste) placed in unlined trenches subsequent to November 23, 1987, is reported here. The Applicant states that this element of the radioactive mixed waste management strategy was summarized in Applicant's January 26, 1988, letter to Ecology.</p> <p><u>Ecology Recommendation.</u> The Applicant should identify the specific areas of the existing unlined trenches in the LLBG that have received these mixed wastes, identify the mixed waste characteristics, and present a plan for dealing with these mixed wastes.</p> <p>DOE-RL/WHC Response No. 1: Trenches receiving mixed waste are existing portion trenches which are exempt from liner and leachate collection requirements [WAC 173-303-806(4)(h)(ii)(A)]. A listing of the mixed waste placed since November 23, 1987, will be added to the text. The plan for dealing with these wastes is the same as for other remote-handled waste. The waste will be covered with 8 feet of soil and will receive a RCRA compliant cover upon closure as described in Chapter 11.0.</p> <p><u>Deficiency:</u> Section 4.6.2.1, Exemption Based on Existing, Pg 4-5</p> <p>Although trenches which were operational and received mixed waste prior to November 23, 1987 are exempt from the double-liner requirements of HSWA, the portion of these trenches which did not receive wastes must still meet the single liner with leachate collection system required prior to HSWA.</p>	

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LOW-LEVEL BURIAL GROUNDS
NOTICE-OF-DEFICIENCY RESPONSE TABLE

July 26, 1991
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No.	Comment/Response	Ecology Concurrence
	<p><u>Requirement:</u> The additional information to be provided should also specify what portions of each trench did not contain wastes on November 23, 1987. In addition, the term "notification of" on line 21 must be replaced with "approval from."</p> <p>DOE-RL/WHC Response No. 2: There is no question that the mixed waste is subject to the Hazardous and Solid Waste Amendments (HSWA); however, HSWA did not change the definition of the existing portion of a landfill. Mixed waste has been accepted, with prior notification of Ecology by DOE, in the open trenches beyond that which was there on November 23, 1987; therefore, the definition of the existing portion of the landfill has had implicit concurrence by Ecology.</p>	
17.	<p><u>Page 4-5, lines 26 through 33 (4-4).</u> The Applicant states that a liner system exemption request for trench 94 in burial ground 218-W-12B will be submitted in a separate submittal.</p> <p><u>Ecology Recommendation.</u> It is recommended that the Applicant submit the application for exemption in accordance with WAC 173-303-665(2)(b) with sufficient information demonstrating equivalent protection for the hazardous wastes to be included in the reactor compartments.</p> <p>DOE-RL/WHC Response: An application for exemption in accordance with WAC 173-303-665(2)(b) was prepared and submitted to Ecology on July 25, 1990.</p>	4-26-91
18.	<p><u>Page 4-12, Section 4.6.3.3.1 (4-5).</u> Placing the asphalt in nondrag-off landfills using heavy machinery will be difficult and if not done with proper care, could damage the underlying liner.</p> <p><u>Ecology Recommendation.</u> It is recommended that the use of light vehicles be investigated for use over the liner to lay asphalt as a way to avoid heavy loading on the liner during construction. Detailed procedures for ensuring liner and leachate collection system integrity must be developed during final design but should be provided at the conceptual level in the permit application.</p> <p>DOE-RL/WHC Response No. 1: The construction of an asphalt pad is not included in the definitive design that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.</p>	

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Comment: Section 4.6.3.3.1, Liner System Description, Page 4-12

Until the definitive design is complete, Ecology will not issue a dangerous waste permit for the dragoff mixed waste trench. If this trench is not scheduled for design and construction in the near future (within the next 12 months), all references to this trench should be eliminated from the Part A and the Part B applications. A permit modification can be used if and when the dragoff trench becomes a reality.

DOE-RL/WHC Response No. 2: Design and Construction of the dragoff mixed waste trench will not be completed in the next 12 months. The project was replaced with the non-dragoff mixed waste trench. The reference to the dragoff trench will be removed from the Part A and Part B permit application.

- 19. Page 4-13, lines 5 and 6 (4-6). There is high potential for significant shear when boxes loaded with wastes are pulled into place in the drag-off trenches. The Applicant has proposed to evaluate the effects on the liner by use of a test pad.

Ecology Recommendation. As noted by the Applicant, there is a high degree of uncertainty associated with quantifying the shear stresses associated with movement of the drag-off trenches on the liner. Applicant should provide a detailed review of the alternative procedures proposed for testing of the liner damage.

DOE-RL/WHC Response No. 1: The mixed waste trench to be constructed in burial ground 218-W-5 is designed for nondrag-off packages. This section will be revised to address only burial ground 218-W-5.

Deficiency: Section 4.6.3.3.2, Stresses from Equipment, Page 4-13

The response is unclear. If burial ground 218-W-5 is a nondrag-off burial ground, why would it be the only burial ground addressed in a permit section discussing the effects of dragging boxes? Furthermore, the text appears to indicate that the sole purpose of the test pad is to evaluate operational stresses on the liner. The test pad must also be constructed to determine the acceptability of the soil liner construction and design specifications. Section 4.6.5.5.1 discusses some field tests for the liner, but does not indicate whether these tests are for both the dragoff and non-dragoff trenches, nor if these will be performed on a test pad or the installed liner.

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Requirement: Please clarify the response and provide more detail for the dragoff test pad if the dragoff trench is to be included in the application (see comment 18).. .

DOE-RL/WHC Response No. 2: Burial Ground 218-W-5 is a non-dragoff mixed waste trench. The portion of section 4.6.3.3.2 that pertains to the dragoff trench will be removed from the permit. The field test mentioned in section 4.6.5.5.1 applies to the non-dragoff landfill. A test fill (also known as a test pad) will be performed for the admix liner material to document the adequacy of the materials, design, equipment, and construction procedures proposed for the admix liner [see the recently submitted Construction Quality Assurance Plan (WHC-SD-WO25-PLN-001), Sections 4.3.2 and 4.4.1]. Furthermore, samples of the liner material will be collected and tested upon delivery and preparation to document that the material properties are within the range stated in the specifications (WHC-S-045, Section 02275). As noted in WHC-SD-WO25-FDR-001, section 5.3.3., Page 19 of 197, a two-foot operations layer will be placed over the entire landfill, including the slopes, during construction to protect the liners from equipment damage during operations and to act as an insulating layer.

20. Page 4-14, lines 26 through 29 (4-7). The anchor trenches are intended to hold the liners in place while the liner is extended up the side slopes to the ground surface.

Ecology Recommendation. Details of the anchor trench construction and overlying weight specifications should be provided in the detailed design. The Applicant should provide conceptual information in the permit application sufficient to demonstrate that the anchor trenches will be of adequate design to hold the liners in place during construction and operation periods.

DOE-RL/WHC Response No. 1: The information requested will be provided in the definitive design that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.

Comment: Section 4.6.3.4, Liner System Coverage, Page 4-14

This comment will be addressed in a subsequent NOD to be issued for the definitive design document.

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	DOE-RL/WHC Response No. 2: The anchor trench design is shown on Drawing H-2-131579. Pullout resistance for this system is analyzed in Appendix C.11 of the Design Report and demonstrated to be substantially greater than required.	

21.	<u>Page 4-14, lines 31 through 33 (4-8).</u> The Applicant states that the portion of the liner system on the upper side slopes will be exposed to the weather for several years.	
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Ecology Recommendation. The Applicant has not demonstrated with test data that the integrity of the liner will remain after an extended period of exposure to the elements. Although some liner materials are less effected by exposure than others, Ecology knows of no liner materials which would be unaffected by prolonged exposure over several years. Alternative approaches to limit the period of exposure of a particular liner section, such as covering the liner and phased cell construction, should be evaluated.

DOE-RL/WHC Response No. 1: The liner will be covered with soils to protect it from the environment as described in the definitive design that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.

Deficiency: Section 4.6.3.5, Liner Exposure Prevention, Page 4-14

Comment 20 also applies here.

DOE-RL/WHC Response No. 2: The stresses caused by thermal contraction can be seen in the Definitive Design Report WHC-SD-W025-FDR-001, Appendix C.10, Pages 275-279 of 397 and on Page 19 of 397, Sections 5.3.3, 5.4.1. A two foot operations layer will be placed over the entire landfill, including the slopes, during construction to act as an insulating layer and to prevent exposure of the geosynthetics to ultraviolet (UV) radiation, the most serious cause of deterioration. Carbon black will be added to the FML and will prevent deterioration during reasonably expected storage times even if the geomembrane is exposed to UV light. Any deterioration would be identified by conformance testing as described in Section 4.4.1.2 of the CQA Plan.

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| 22. | <p>Page 4-26, lines 3 through 5 (4-9). Indicates an absence of hydraulic conductivity test data.</p> <p><u>Ecology Recommendation.</u> Hydraulic conductivity test data would be useful as part of the permit review process. The Applicant should provide the test results.</p> <p>DOE-RL/WHC Response No. 1: Hydraulic conductivity test data are not required for the definitive design. There are no plans to conduct additional testing as part of this project.</p> <p><u>Deficiency:</u> Section 4.6.4.3.4, Hydraulic Conductivity, Page 4-26</p> <p>Line 4 and 5 indicate that some hydraulic conductivity test results from the unsaturated zone were not available at the time of preparing the permit application. These results should be available now.</p> <p><u>Requirement:</u> A summary of these test results should be provided in the application.</p> <p>DOE-RL/WHC Response No. 2: The requested hydraulic conductivity test results have been incorporated into the revised Chapter 4.0.</p> | |
| 23. | <p>Page 4-31, Section 4.6.4.4.5 (4-10). As part of the preliminary design, there are no provisions for monitoring the potential landfill gas.</p> <p><u>Ecology Recommendation.</u> Although significant amounts of landfill gas are not expected to be generated in the LLBG, it is possible that radioactive gases, such as tritium, could be produced in the LLBG cells. The Applicant should provide an assessment of the potential for gas production and an evaluation of alternative gas monitoring alternatives.</p> <p>DOE-RL/WHC Response: Section 4.6.4.4.5 is discussing the potential for gas pressure in the subgrade beneath the liner of the landfill and not generation of gas by the waste placed in the lined trench and above the liner. The discussion as written is correct for the subject of this section as defined by the Ecology permit application outline. Generation of gas by the waste is discussed in Section 11.1.4.3.</p> | 4-26-91 |

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24.	<p><u>Pages 4-34 and 4-35, Section 4.6.5.2 (4-11).</u> According to the testing protocol, separate samples will be subjected to primary leachate, secondary leachate, and radiation levels to provide the total expected design-life dose in a period of about 30 days.</p> <p><u>Ecology Recommendation.</u> The test protocol as proposed may not be adequate. In order to simulate the cumulative effect of all three forms of contaminants, some of the liner samples should be exposed concurrently to combinations of the strongest leachate form and radiation. Extended period testing should also be considered in parallel with permitting and design activities to increase information available on the basis for liner selection.</p> <p><u>DOE-RL/WHC Response:</u> A "Liner/Leachate Compatibility Test Plan" has been submitted to Ecology for review. The proposed leachate and radiation testing protocols are described in more detail in the test plan. The permit application will be revised to agree with the test plan.</p>	4-26-91
25.	<p><u>Page 4-36, lines 14 and 15 (4-12).</u> The Applicant refers to "substantial modification" of the conceptual design.</p> <p><u>Ecology Recommendation.</u> Some additional clarification with regard to the term "substantial modification" is needed. A change in the conceptual design requires a modification of the permit application, per WAC 173-303-610(3)(b).</p> <p><u>DOE-RL/WHC Response:</u> The definitive design will be submitted for review and will be the basis for modifying the permit application.</p>	4-26-91
26.	<p><u>Page 4-37, Section 4.6.5.3.4 (4-13).</u> The thermal expansion of the liner due to temperature variations will be accommodated by installing the flexible membrane liner with a small amount of slack in the side slopes of the trenches.</p> <p><u>Ecology Recommendation.</u> Given the extreme temperature variations at the Hanford Site, providing slack might not be sufficient to prevent damage due to thermal stresses and other effects of prolonged exposure. The exposed portion of the liner on the side slope portions of the trenches should be covered with ultra-violet protection material until the side slopes are covered with waste. See comment number 22.</p>	

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DOE-RL/WHC Response No. 1: Thermal expansion is described in more detail in the definitive design that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.

Deficiency: Section 4.6.5.3.4, Thermal Stresses, Page 4-37

Comment 20 also applies here.

DOE-RL/WHC Response No. 2: The stresses caused by thermal contraction are described in the Definitive Design Report WHC-SD-W025-FDR-001, Page 19 of 397, Section 5.4.1. and in Appendix C.10, Pages 275-279 of 397. This analysis shows that thermal stresses and strains in the FML were well within acceptable limits even when extreme temperature conditions and no slack were assumed. Also, once the operations layer is in place, thermal fluctuations will be relatively minor compared to the extreme conditions assumed for the analysis.

27. Page 4-41, Section 4.6.5.5.2 (4-14). Soil liner compatibility test procedures.

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Ecology Recommendation. Similar to the synthetic liner testing protocol, some means of testing the cumulative effects of the contaminant types should be included.

DOE-RL/WHC Response: This information will be provided in the Liner/Leachate Compatibility Test Plan. The permit application will be revised to agree with the test plan.

28. Page 4-44, Section 4.6.6.1.1 (4-15). The locations of the sumps in the primary system are not specified.

Ecology Recommendation. Specify the location of sumps in the primary system.

DOE-RL/WHC Response No. 1: The locations of the sumps will be provided in the definitive design documents that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.

Comment: Section 4.6.6.1.1, Primary System Page 4-44

Comment 20 also applies here.

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	DOE-RL/WHC Response No. 2: See the Definitive Design Report WHC-SD-W025-FDR-001, Page 29 of 397, Section 6.4.1.1, "Primary System." The sump locations are shown on the design drawings and on Figure 4-7 of the revised Chapter 4.	
29.	<p><u>Page 4-46, Section 4.6.6.1.2 (4-16).</u> The locations of the sumps in the secondary system are not shown.</p> <p><u>Ecology Recommendation.</u> Specify the locations of the sumps in the secondary system.</p> <p>DOE-RL/WHC Response No. 1: The locations of the sumps will be provided in the definitive design documents that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.</p> <p><u>Comment:</u> Section 4.6.6.1.2, secondary System, Page 4-46</p> <p>Comment 20 also applies here.</p> <p>DOE-RL/WHC Responses No. 2: See the Definitive Design Report WHC-SD-W025-FDR-001, Page 30 of 397, Section 6.4.1.2, "Secondary System Pumps." The sump locations are shown on the design drawings and on Figure 4-7 of the revised Chapter 4.</p>	
30.	<p><u>Page 4-47, Section 4.6.6.5 (4-17).</u> The Applicant cites references to other sources for information on components within the waste stream.</p> <p><u>Ecology Recommendation.</u> Test results for compatibility of components within the waste stream handling system (pumps, holding tanks, and drain pipes) with radioactive and dangerous wastes should be provided here or appended by reference.</p> <p>DOE-RL/WHC Response No. 1: Items that are replaceable, such as pumps and tanks, will not be subjected to Method 9090 testing. The high-density polyethylene pipe used for drainage and transfer of leachate from the sump area into the aboveground holding tank will be tested. The design attempts to minimize the components that would not be accessible for maintenance.</p>	

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Comment: Section 4.6.6.5, System Compatibility, Page 4-47

Comment 20 also applies here.

DOE-RL/WHC Responses No. 2: When the 9090 test report is completed, it will be submitted to Ecology and will provide the information applicable to this comment.

31. Pages 4-36 through 4-48. Sections 4.6.5.3.2 and 4.6.6.6.1 (4-18). Both sections discuss the stresses on the liner and geonet from the overlying load.

Ecology Recommendation. The weight of the overlying material on the geonet after the landfill is closed has a tendency to impinge the geonet and impair the function of the geonet resulting in clogging of the drainage layer. Laboratory tests should be performed on a geonet layer sandwiched between flexible membrane liners and geotextile and supplying the weight of the waste and final cover to demonstrate that the geonet will perform in the field. Such tests should include bearing weights of asphalt or other base courses provided as storage flooring overlying the liner system. These test results should be provided for Ecology review. Factors of safety for compression and clogging (particles, mineral deposits, and biological growth) also should be provided for Ecology review.

DOE-RL/WHC Response No. 1: This concern is addressed in the definitive design specifications which will be submitted to Ecology for review. In the specifications, the transmissivity value is specified under normal load of about one-half the ultimate waste cover. Manufacture's test data and results of planned conformance tests will be submitted to Ecology if requested.

Comment: Sections 4.6.5.3.2 and 4.6.6.6.1, Weight of Overlying Material and Stability of Drainage Layers, Pages 4-36 and 4-47

Transmissivity tests should indicate adequate performance (i.e., transmissivity greater than 5×10^{-4} m²/sec) at 1.5 times the maximum expected load which the geonet will experience. Furthermore, the manufacturer's test data and results must be submitted to Ecology. Comment 20 also applies here.

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DOE-RL/WHC Response No. 2: Manufacturer's transmissivity data for the proposed geonet is shown on the attached Figure PN-3000. With respect to performance, we believe that the section tested by Fluid Systems, Inc. is similar to the critical section in the Project W-025 Landfill (operations layer over geocomposite). It can be seen that at loads up to 10,000 psf, the transmissivity of this system exceeds 5×10^{-4} m²/sec in all cases. Conservatively assuming a unit weight of 110 pcf for materials above the liner, a load of 10,000 psf corresponds to 90 feet of waste and soil cover. This is 2 to 3 times the expected thickness, so the geocomposite has an acceptable margin of capacity.

With respect to test data, formal manufacturer's submittals and conformance testing results are required, not only for the geocomposite but for most other materials, as established in the CQA Plan and the Specifications. This information will be made available to Ecology as requested.

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32. Page 5-1, lines 18-21 (5-1). This section states that because a waiver from the groundwater monitoring requirements under WAC 173-303-645 is not requested by this plan, "therefore, the requirements of this section of the Washington Administrative Code are not applicable to the LLBG." This is not correct. This section of the Code (173-303-645) states, inter alia, "(a) Except as provided in (b) of this subsection, the regulations in this section apply to owners and operators of facilities that treat, store, or dispose of dangerous waste in surface impoundments, waste piles, land treatment units, or landfills. The owner or operator must satisfy the requirements of this section for all wastes (or constituents thereof) contained in any such waste management unit at the facility that is a "regulated unit" [as defined in WAC 173-303-040(75)]." Thus, subsection -645 applies although application of specific provisions of this subsection (i.e., those relating to exemption from groundwater monitoring) are not requested.

4-26-91

Ecology Recommendation. Rewrite this section to state that WAC 173-303-645 applies and that exemption from this subsection of the code is not requested.

DOE-RL/WHC Response: The sentence "Therefore, the requirements of this section ... are not applicable to the LLBG." will be deleted.

33. Page 5-2, lines 25 through 35 (5-2). Section 5.2.1 discusses what the Interim Status Groundwater Monitoring Approach was supposed to do to meet the 1986 compliance order. To what degree these requirements were carried out is not detailed.

4-26-91

Ecology Recommendation. Outline to what degree requirements, goals, and objectives were met.

DOE-RL/WHC Response: The text will be expanded to indicate that the initial network of 35 monitoring wells was installed as planned, and that the goals of the network in providing hydrogeologic property information and background water quality data were met.

34. Page 5-3, lines 4 and 5 (5-3). The basis for establishing the compliance boundaries is not explained. Is the compliance boundary the same as the low-level waste management area (LLWMA) boundary shown in Figures 5-1 and 5-2?

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Ecology Recommendation. Describe the basis for establishing compliance boundaries and delineate the compliance boundary in figures.

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	DOE-RL/WHC Response: The compliance boundary is defined by a line that connects the monitoring wells spaced around the perimeter of the waste management area. If no well is located at a corner of a waste management area the compliance line is continued along both sides of the waste management area until they meet. The lines on Figures 5-1 and 5-2 that delineate the 'low-level waste management area' are the compliance boundaries. Both text and figures will be altered to specifically define these boundaries.	
35.	<u>Page 5-6, line 51 (5-4).</u> Bierschenk initials turned around in reference section.	4-26-91
	DOE-RL/WHC Response: The order of Bierschenk's initials will be corrected in the references.	
36.	<u>Page 5-7, line 8 (5-5).</u> Deju (1975) citation omitted in reference section.	2-26-91
	DOE-RL/WHC Response: The Deju (1975) citation is not correct. The citation in the text will be corrected to Ledgerwood and Deju (1975).	
37.	<u>Page 5-7, lines 30-42 (5-6).</u> Section 5.2.2.2 discusses the interim status monitoring well network and states that four of the 35 wells, completed in 1987, are screened over the lowermost 20 feet of the uppermost aquifer. The remaining 31 wells are completed in the upper 20 feet of the uppermost aquifer. No explanation is given why four wells were completed in the deep section of the aquifer.	4-26-91
	<u>Ecology Recommendation.</u> Provide an explanation on the number of wells chosen for monitoring the deeper section of the aquifer. This discussion should focus on explaining why a small number of wells were completed in the deeper section of the aquifer relative to the larger number of wells for the upper part of the aquifer.	
	DOE-RL/WHC Response: There is considered to be virtually no likelihood of dense non-aqueous phase liquids reaching the groundwater from the wastes in the LLBG. However, four wells were selected as deep wells for verification. This concept is supported by the types and quantities of waste described in Chapter 3.0; the methods of disposal, and the mechanisms available for mobilization and transport to the groundwater. Furthermore, the results of the first year of monitoring have been found to be consistent with this concept. The text will be revised to explain the number of wells chosen to monitor the deeper section of the aquifer.	

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38.	<p><u>Page 5-9, lines 25 and 26 (5-7).</u> A detailed explanation on casing and screen inspection was not provided. Was decontamination performed prior to placement? If so, what solutions/solvents were used?</p> <p><u>Ecology Recommendation.</u> Provide a detailed explanation on casing and screen inspection.</p> <p>DOE-RL/WHC Response: The casing and screen were factory-cleaned and delivered to the well site in clean plastic bags where they were visually inspected prior to installation. No additional cleaning was found to be required at the well site. A detailed description of the cleaning, inspection, and handling process will be added to the text.</p>	4-26-91
39.	<p><u>Page 5-9, line 30 (5-8).</u> What size and type of silica sand?</p> <p>DOE-RL/WHC Response: The size and type of silica sand will be specified in the text.</p>	4-26-91
40.	<p><u>Page 5-9, line 38 (5-9).</u> What proportion of grout is Volclay vs. concrete?</p> <p>DOE-RL/WHC Response: Volclay does not contain concrete. A detailed description of Volclay will be added to the text.</p>	4-26-91
41.	<p><u>Pages 5-10 and 5-13 (5-10).</u> Well 299-W7-2 has been left out of well listing.</p> <p><u>Ecology Response.</u> Include Well 299-W7-2 to the well listing.</p> <p>DOE-RL/WHC Response: Well 299-W7-2 will be added to the well listing.</p>	4-26-91
42.	<p><u>Page 5-13, lines 12-17 (5-11).</u> Text says that the data do not "clearly indicate" whether upgradient contamination is a problem. Is there 'some' indication that upgradient contamination is a problem?</p> <p><u>Ecology Recommendation.</u> Elaborate on the potential for upgradient contamination and how it should be addressed in the monitoring program.</p> <p>DOE-RL/WHC Response: Upgradient contamination is a potential problem at the site. A description of this upgradient contamination is provided in Section 5.4. An approach for treating the statistical complications resulting from the presence of upgradient</p>	4-26-91

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	contamination is outlined in Section 5.5.4.7. References to these sections will be added to Section 5.2.2.4.	
43.	<u>Page 5-13, lines 26 through 35 (5-12).</u> Section 5.2.2.5 lists analysis performed on sediments. Were the grab samples used for analysis? If so, were they hard drive slurry or drive barrel samples? <u>Ecology Recommendation.</u> Elaborate and clarify the sampling methods employed and the type of samples tests were performed on. Subsequent sections' discussion on heterogeneity of material types, hydraulic conductivity, etc., could raise question on quality of lithologic evaluation. DOE-RL/WHC Response: A more detailed description of the sediment sampling techniques and the testing performed on each type of soil sample will be added to the text. Sediment was collected as split barrel continuous core, hard tool slurry, and drive barrel samples.	4-26-91
44.	<u>Page 5-13, line 47 (5-13).</u> How was contaminated purge water disposed of? DOE-RL/WHC Response: A more detailed discussion of purge water disposal will be presented in the new Section 5.2.3.1.8, and a reference to that section will be added to the text.	4-26-91
45.	<u>Page 5-14, lines 37 through 44 (5-14).</u> What decontamination techniques were used to decontaminate water-level measuring equipment between wells? DOE-RL/WHC Response: The water-level measuring equipment is decontaminated between wells by rinsing with distilled water. A description of the decontamination techniques will be added to the text.	4-26-91
46.	<u>Page 5-15, lines 2 through 4 (5-15).</u> For low-yielding wells, at least two volumes should be evacuated to purge annular space water in contact with casing volume water. DOE-RL/WHC Response: The LLBG monitoring networks contain no low-yielding wells at present, and at least three well volumes have been removed from all interim status wells before each sampling event. The discussion of reduced purging of low-yielding wells will be removed from the text.	4-26-91

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47.	<u>Page 5-15, lines 7 and 8, Section 5.2.3.1.3 (5-16).</u> Specify pump flow rate during VOA collection. DOE-RL/WHC Response: The flow rate during collection of VOA samples is generally 1 gallon per minute. A discussion of this flow rate will be added to the text.	4-26-91
48.	<u>Page 5-15, line 34 (5-17).</u> Semivolatiles were not specified in above sampling order (Section 5.2.3.1.3, lines 16 and 17). When was this fraction sampled? <u>Ecology Recommendation.</u> Specify semivolatiles in the sampling order. Identify when this fraction was sampled. DOE-RL/WHC Response: The sampling order, including semivolatiles, will be more clearly described in the text.	4-26-91
49.	<u>Page 5-15, lines 43 through 45 (5-18).</u> Semivolatiles require a volume of only 75 percent container. DOE-RL/WHC Response: All sample bottles, other than those for VOA's, are filled to the top, although a small amount of air space (less than 5 percent) may remain in the bottle. The VOA vials are filled slightly more than full so that no air space remains in the bottle. The text will be modified to clarify the extent of filling and specify sample bottle types.	4-26-91
50.	<u>Page 5-15, lines 40 through 43 (5-19).</u> Specify sample bottle types - size, clear glass, amber glass, polyethylene, etc. DOE-RL/WHC Response: The text will be revised to specify sample bottle types.	4-26-91
51.	<u>Page 5-15, line 48 (5-20).</u> What methods were used to monitor the 4°C temperature? <u>Ecology Recommendation.</u> Specify methods used to monitor the 4°C temperature. DOE-RL/WHC Response: A description of the methods will be included in the permit application.	4-26-91

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52.	<p><u>Page 5-16, lines 29 through 37 (5-21).</u> What preparation procedures were used for field and trip blanks? What kind of water is used - distilled, deionized, or carbon-free? Where are trip blanks prepared?</p> <p>DOE-RL/WHC Response: A more complete description of the preparation procedures for blank samples will be added to the text.</p>	4-26-91
53.	<p><u>Page 5-16 (5-22).</u> Section 5.2.3.1.7 does not indicate whether samples were collected as a check on matrix homogeneity (duplicates, replicates).</p> <p><u>Ecology Recommendation.</u> Applicant should elaborate on this and specify frequency. In addition, state whether or not any unsates on ancillary equipment (water-level measurement tapes, probes) were taken to evaluate the effectiveness of the decontamination process.</p> <p>DOE-RL/WHC Response: Duplicate sampling frequency and a discussion of equipment blanks will be added to the text.</p>	4-26-91
54.	<p><u>Page 5-25, lines 10 and 11 (5-23).</u> What was done with the water from Well 299-E28-26?</p> <p>DOE-RL/WHC Response: Well 299-E28-26 was not pump tested. Purge water from this well was treated the same as other purge water, as described in Section 5.2.3.1.8. The text will be modified to clarify water handling from this well.</p>	4-26-91
55.	<p><u>Pages 5-25 through 5-27, Section 5.2.3.2.3 (5-24).</u> What was done with unacceptable purge water during quarterly monitoring?</p> <p>DOE-RL/WHC Response: A description of disposal procedures for all purge water will be outlined in the new Section 5.2.3.1.8. A reference to this section will be added to the text.</p>	4-26-91
56.	<p><u>Page 5-39, line 34 (5-25).</u> Refer to Section 5.3.3 which does not discuss transmissivity.</p> <p><u>Ecology recommendation.</u> Delete reference or clarify.</p> <p>DOE-RL/WHC Response: The reference to Section 5.3.3 will be changed to Section 5.3.5.1.5.</p>	4-26-91

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57.	<p><u>Page 5-41, Table 5-3 (5-26).</u> This table identifies the major ion chemistry of the unconfined aquifer on the Hanford Site. No source for this data is noted.</p> <p><u>Ecology Recommendation.</u> Include the citation for this data at the bottom of Table 5-3.</p> <p>DOE-RL/WHC Response: The source of the data will be added to Table 5-3.</p>	4-26-91
58.	<p><u>Pages 5-42 through 5-59, Section 5.3.5 (5-27).</u> There is a considerable amount of ambiguity with respect to hydraulic conductivities. It is understood that a considerable degree of heterogeneity in site materials results in great variations in hydraulic conductivity. However, evaluation and analysis should focus more attention on this critical parameter because it does play such a critical role in the efficiency modeling, potential plume dispersion, and ultimately the location of monitoring wells.</p> <p>DOE-RL/WHC Response: Although discussion of hydraulic conductivities will be clarified in the text, this parameter does not affect dispersion, the efficiency modeling, or the location of monitoring wells. Efficiency modeling depends upon the plume shape when plumes reach the boundary of the buffer zone. As described in Section 5.5.2.1.4, dispersion in porous media is the sum of molecular diffusion and mechanical dispersion. Mechanical dispersion, which equals velocity times a dispersivity coefficient, dominates molecular diffusion except at very low flow rates. Assuming a diffusion coefficient of 1×10^{-6} square feet per day, and a low transverse dispersivity of 1 foot, molecular diffusion may be neglected at flow rates greater than 1×10^{-4} feet per day, which is several orders of magnitude smaller than the estimated flow rates beneath the LLBG. For nonreactive transport dominated by mechanical dispersion, the shape of a plume of a given size is independent of groundwater velocity and, therefore, also independent of hydraulic conductivity. This velocity independence is evident upon careful inspection of the equation in Section 5.5.2.1.4. This will be described in greater detail in the text.</p>	4-26-91

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59.	<p>Page 5-48, lines 33 through 38 (5-28). Section 5.3.5.1.5 suggests a comparison of hydraulic conductivity in feet per day for basalt to transmissivity in square feet per day of Hanford and Ringold Formations.</p> <p><u>Ecology Recommendation.</u> Convert transmissivity to average hydraulic conductivity so units will allow direct comparison.</p> <p>DOE-RL/WHC Response: Transmissivity values will be converted to hydraulic conductivity values.</p>	4-26-91
60.	<p>Page 5-59, lines 12 through 16 (5-29). Section 5.3.5.2.5 discusses groundwater flow velocities beneath the low-level waste management areas and indicates that Darcian flow is assumed to be valid. No explanation is given why this assumption should not be considered valid.</p> <p><u>Ecology Recommendation.</u> Provide an explanation why Darcian flow should be considered valid for groundwater flow beneath these management areas.</p> <p>DOE-RL/WHC Response: Darcy's law is considered valid for all flow through granular media except in fine-grained materials of very low permeability (Freeze and Cherry, 1979, pp. 72-73). Sediments in the Hanford and Ringold Formations are relatively coarse grained with moderate to high permeability. The text will be modified to eliminate the suggestion that Darcy's law may not be valid.</p>	4-26-91
61.	<p>Page 5-60, line 44, Section 5.3.6 (5-30). What is (I)?</p> <p>DOE-RL/WHC Response: 'I' refers to the upper member of the Elephant Mountain Basalt. The text will be changed to be consistent with the usage of 'upper' throughout.</p>	4-26-91

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62.	<p><u>Page 5-62, lines 3 through 5 (5-31)</u>. Section 5.4 states that, "Ecology regulations require a description and delineation of any groundwater contaminant plume that, based on interim status monitoring data, is suspected of originating from one of the LLBG-regulated units." The specific Ecology regulations must be cited.</p> <p><u>Ecology Recommendation</u>. Cite the specific Ecology regulations referenced.</p> <p>DOE-RL/WHC Response: The specific Ecology regulation will be added to the text.</p>	4-26-91
63.	<p><u>Page 5-62, line 5 (5-32)</u>. The, "on" should be "of".</p> <p>DOE-RL/WHC Response: This sentence will be replaced as part of revising Chapter 5.</p>	4-26-91
64.	<p><u>Pages 5-77, lines 22 and 23 (5-33)</u>. Text implies drinking water standard for nitrate is 45 parts per million as NO₃, but should specifically state.</p> <p>DOE-RL/WHC Response: The text will be changed to specifically state that the water standard for nitrate is expressed in terms of nitrate.</p>	4-26-91
65.	<p><u>Pages 5-77 through 5-148, Section 5.5 (5-34)</u>. General monitoring program design should consider contingency for monitoring aquifer below uppermost aquifer if uppermost aquifer becomes contaminated.</p> <p>DOE-RL/WHC Response: The text will be changed to indicate that monitoring the aquifer below the uppermost aquifer may be necessary should the bottom of the uppermost aquifer become contaminated from waste in the LLBG.</p>	4-26-91

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66.	<p><u>Page 5-85, Section 5.5.2.1.3 (5-35)</u>. The monitoring efficiency model appears to be an ideal approach to the design of monitoring systems. However, even if the model is valid, it should be in addition to conventional hydrogeologic analysis, particularly, the preparation of detailed planer and cross-sectional flow nets for each of the sites.</p> <p>There may not be sufficient data for the preparation of detailed flow nets, specifically for LLWMA-2, -4, and -5. If this is the case, and representative flow net construction is not possible, this may indicate that data are insufficient for a valid interpretation of the hydrogeology and the proper design of a monitoring system, including application of the efficiency model.</p> <p><u>Ecology Recommendation.</u> Provide detailed planer and cross-sectional flow nets for each site or provide a detailed explanation why construction of these nets is not possible.</p> <p>DOE-RL/WHC Response: Equipotential maps of the groundwater surface have been prepared for three consecutive years for all low-level waste management areas to supplement the efficiency model results and will be added to the text. These maps have contour intervals of 1 foot or less and are based upon data from the immediate vicinity of the low-level waste management areas and from the surrounding area. The consistency of the equipotentials with time and the level of detail provided by the small contour intervals are considered to provide sufficient information on the hydrogeology to support monitoring network design. Planer flow nets have been prepared at 1 foot contour intervals or less for all low-level waste management areas for the most recent data set. Companion cross-sectional flow nets have also been prepared at 1-foot contour intervals or less for the low-level waste management areas in the 200 West Area, where the thickness of the uppermost aquifer is about 200 feet and deep monitoring wells have been installed. All flow nets will be added to the text and will be used with the MEMO Model results in monitoring network design.</p>	4-26-91

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67.	<p><u>Page 5-90, lines 1 through 52 (5-36).</u> The original Domenico and Robbins (1985) article on the two-dimensional analytical transport model could not be obtained for review within the time available. Until the original article and other documentation can be reviewed, specific comments on the applicability of this particular model must be deferred.</p> <p>DOE-RL/WHC Response: Additional comments on the applicability of the Domenico and Robbins plume generation model have not been received from Ecology, and it is assumed that this model was found to be acceptable.</p>	4-26-91
68.	<p><u>Page 5-91, lines 1 through 9 (5-37).</u> The report states the model is valid for lower density contaminants which would not exhibit vertical mixing. A potential problem could exist with heavier contaminants that would show vertical mixing and that would then invalidate the two-dimensional assumption of the Domenico and Robbins model. Deeper monitoring wells and some type of three-dimensional model may be warranted.</p> <p>DOE-RL/WHC Response: The text will be modified to include a discussion of potential sources of dense non-aqueous phase liquids and metal salts at the low-level waste management areas that, if present, could invalidate the application of the two-dimensional formulation of the Domenico and Robbins model. In brief, based on the quantities and disposal methods of metal salts and dense non-aqueous phase liquids, no significant potential for density driven transport is considered to exist at the low-level waste management areas.</p>	4-26-91
69.	<p><u>Page 5-92, lines 29 through 32 (5-38).</u> The assumption of a 20-foot long source length through a 200-foot deep vadose zone is not adequately substantiated. This factor could greatly effect the model results as it would effect the generation of the plume family curves used.</p> <p><u>Ecology Recommendation.</u> Backup data for the assumption of 20-foot long source length through a 200-foot deep vadose zone would be helpful. Golder Associates (i.e., Charles Wilson) stated that the figure came from the literature. A source reference was not cited, but should be.</p> <p>DOE-RL/WHC Response: The text will be modified to include an expanded discussion (Section 5.5.2.1.5.3) of line source width. The magnitude of this width was determined based upon site specific conditions and was not taken from the literature. A review of Hanford Site data on tank and crib leaks and the associated spreading of the plume through the vadose</p>	4-26-91

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	<p>zone will be presented. Modeling results of the T-106 point source leak and of an aerielly distributed leak scenario will be summarized. In addition, a detailed analysis of model sensitivity to source width will be included. Because monitoring efficiencies decrease at a decreasing rate as source width declines, and changes little below about 40 feet, the selection of source width is not critical to model results.</p>	
70.	<p>Page 5-93, lines 1 through 36 (5-39). Discussion states:</p> <p>a) Smaller dispersivities are more conservative.</p> <p>b) Longitudinal dispersivity (Dx) for Ringold like material is 49 feet over distance of 260 feet (scale of interest).</p> <p>c) Scale of interest at 200 Areas is 300 to 1,000 feet.</p> <p>d) Selected 'conservative' longitudinal dispersivity is 70 feet.</p>	4-26-91
	<p>Dx=70 feet may be conservative for a scale of interest of 1,000 feet. However, it is not very conservative for a scale of interest of 300 feet which is closer to what the Ringold like material was evaluated at.</p> <p>For monitoring well placement, proper selection of a representative transverse dispersivity is even more critical. Hydraulic conductivity influences the dispersivity ratio and the data indicate low and high extremes in hydraulic conductivity for the low-level waste management areas. A single transverse dispersivity for all cases does not seem appropriate, particularly in the case of the Hanford formation where hydraulic conductivities are on the order of 10 feet per minute. In such a case, a transverse dispersivity of 3 to 5 feet might be more appropriate.</p>	
	<p><u>Ecology Recommendation.</u> Re-evaluate dispersivities. If necessary use more than one dispersivity value for modeling runs to reflect variations in site conditions. Due to the extreme sensitivity the model results would have on the selection of both lateral and transverse dispersivity, some type of tracer test should be run to further validate the model assumptions for typical sites around the project.</p>	

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DOE-RL/WHC Response: Dispersivity values presented in the literature and estimated from existing plumes at the Hanford Site were re-evaluated, and detailed sensitivity studies were performed on both longitudinal and transverse dispersivities using the MEMO Model. The results of these studies will be added to the text. The monitoring efficiency was found to be sensitive to transverse dispersivity but relatively insensitive to longitudinal dispersivity. The data were evaluated at a scale of about 1,000 feet, which is considered appropriate because of the need to model plumes extending across the 500 feet wide buffer zone and well back into the low-level waste management area. The dispersivity data show wide ranges, from which conservative values were selected for use in the model. Emphasis was given to transverse dispersivities because of the demonstrated sensitivity to that parameter.

While the process of dispersion is velocity dependent, the dispersivity coefficients are material properties that depend only upon the heterogeneity of the material, and not upon the absolute magnitude of the hydraulic conductivity; see, for example, "Three-Dimensional Stochastic Analysis of Macrodispersion in Aquifers" by L. W. Gelhar and C. L. Axness (Water Resources Research, Vol. 19 No. 1, 1983), and "A Natural Gradient Experiment on Solute Transport in a Sand Aquifer, Spatial Variability of Hydraulic Conductivity and Its Role in the Dispersion Process" by E. A. Sudicky (Water Resources Research, Vol. 22 No. 13, 1986). While the geology of the 200 East and West Areas are somewhat different, there is no reason to believe that the heterogeneity of the areas differs significantly. As a result, because the scale of interest is the same for all of the low-level waste management areas, the same values for dispersivity coefficients were used for all sites.

Several existing plumes on the Hanford Site have been analyzed to estimate dispersivities, and the results will be summarized in the text. Performing a field tracer test to further validate the model assumptions is suggested in the comments but is not believed to be warranted for the purpose of supporting network design. A single test could not be demonstrated to be representative of all sites; several tests would need to be run to overcome this difficulty. Further, tracer testing is not a routine practice in the same sense as permeability testing, but is of a somewhat experimental nature. It is proposed instead to base the monitoring network design upon conservatively selected dispersivities from the literature and from analysis of existing plumes at the Hanford Site.

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71.	<p>Page 5-94, lines 1 through 8 (5-40). The need for a buffer zone in the model is well explained but selection of a 500 foot width appears somewhat arbitrary. . .</p> <p>Discussions with Golder Associates (Charles Wilson) indicate that there were no guidelines for buffer zone width designation. Guidelines they did see pertained mostly to urbanized areas. The remote location of the sites appears to have strongly influenced the selection of 500 feet as the zone width. Are there any objective criteria which can be used? What would a small buffer zone be? What would a large buffer zone be?</p> <p><u>Ecology Recommendation.</u> Elaborate on selection of a specific buffer zone width. Some backup references concerning this are in order, even if they pertain mostly to urban areas. This would at least give some feel for the numbers used at other sites. If objective criteria cannot be established, describe the benefit of using 500 foot width over larger or smaller widths (i.e., sensitivity analysis presented on page 5-98, lines 16 through 24, cost differences, etc.).</p> <p>DOE-RL/WHC Response: The discussion of buffer zone width will be expanded in the text. Regulatory guidelines relating to the buffer zone concept have been discussed, and references to those guidelines have been included. In addition, several objective criteria are suggested for determining buffer zone widths, although not all may apply to any one site. A sensitivity analysis of monitoring efficiency to buffer zone width was conducted, and the results will be described in the text. The results indicate that the efficiency is not highly sensitive to buffer zone width.</p>	4-26-91
72.	<p>Page 5-97, lines 21 through 25 (5-41). Northern wells are spaced farther apart because of angle of incidence. Because hydraulic conductivity is also highest in the north, transverse dispersivity will consequently be less, yielding a narrower plume.</p> <p><u>Ecology Recommendation.</u> Reconsider wider spacing of monitoring wells on the northern margin of LLWMA-1.</p> <p>DOE-RL/WHC Response: Transverse dispersivity is a material property that is independent of the magnitude of hydraulic conductivity and groundwater flow velocity (see response to comment number 69). However, the process of dispersion, which governs lateral spreading in the Domenico and Robbins model (ignoring molecular diffusion) is dependent upon the magnitude of hydraulic conductivity and groundwater flow velocity. This process is adequately</p>	4-26-91

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	represented in the MEMO Model. The width of the plume and the spacing of the northern wells of LLWMA-1 are, therefore, entirely appropriate.	
73.	<p>Page 5-98, lines 26 through 36 (5-42). Larger transverse dispersivity is less conservative given fixed well locations as in design presented. Sensitivity to changes in transverse dispersivity is reported low for high-efficiency levels and high for low-efficiency levels. How low is low?</p> <p><u>Ecology Recommendation.</u> Perform sensitivity analysis using a transverse dispersivity of 3 to 5 feet which would be representative of high hydraulic conductivities and result in lower efficiencies, indicating a given well spacing is less conservative.</p> <p>DOE-RL/WHC Response: A sensitivity analysis of monitoring efficiency to transverse dispersivity will be conducted over the range of 1.75 to 17.5 feet, and a discussion of the results will be added to the text.</p>	4-26-91
74.	<p>Page 5-100, lines 18 through 20 (5-43). The text states that the lower hydraulic gradient in the west-central part of the area suggests that the groundwater is crossing a band of lower conductivity material. Typically (everything else being equal), a lower hydraulic gradient is indicative of a higher hydraulic conductivity. Therefore, the text is confusing or erroneous. Which data supports the use of the efficiency model, the hydraulic gradient or the hydraulic conductivities?</p> <p><u>Ecology Recommendation.</u> Clarify or correct and relate to model application.</p> <p>DOE-RL/WHC Response: This section of the text will be clarified. The original text erroneously referred to a lower, rather than a higher, hydraulic gradient in the central part of the low-level waste management area.</p> <p>The MEMO Model depends only on the direction, and not the magnitude, of the hydraulic gradient, and does not depend upon the magnitude of hydraulic conductivity (see response to comment number 69).</p>	4-26-91

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75.	<p>Page 5-104, lines 20 through 24 (5-44). A hydraulic conductivity of 0.6 feet per day (4×10^{-4} feet per minute) is not consistent with the sandy gravel depicted in Figure 5-19. This order of magnitude for hydraulic conductivity is characteristic of a very fine sand or silt.</p> <p><u>Ecology Recommendation.</u> Re-evaluate hydraulic conductivity for LLWMA-3, basic data or interpretation of aquifer tests may be in error or original lithologic descriptions may be in error.</p> <p>DOE-RL/WHC Response: The values of hydraulic conductivity reported in the text were obtained from Last et al. (1989), in which hydraulic conductivity was estimated by dividing the transmissivity by the total saturated thickness of the aquifer. This was incorrect, since in most cases the wells were not screened over the total saturated thickness of the aquifer. Hydraulic conductivities have been recalculated by dividing the transmissivity obtained from the well tests by the total screen length of 10 feet. These new values will be reported in Sections 5.3.5.1.5 and 5.3.5.2.5. In some cases, the new values of hydraulic conductivity are more than two orders of magnitude larger than originally reported.</p>	4-26-91
76.	<p>Pages 5-107 and 5-108. Figure 5-39 (5-45). Figure labeled incorrectly. Should be Area-3.</p> <p>DOE-RL/WHC Response: The figure heading will be corrected.</p>	4-26-91
77.	<p>Page 5-112, Section 5.5.2.1.9 (5-46). With the data and discussion presented, it is not possible to evaluate the adequacy of the base of aquifer monitoring program (deep wells).</p> <p><u>Ecology Recommendation.</u> Provide cross-sectional flow nets parallel to groundwater flow for each site and relationship of deep wells.</p> <p>DOE-RL/WHC Response: Cross-sectional flow nets have been prepared at 1 foot contour intervals or less for the low-level waste management areas in the 200 West Area, where the thickness of the uppermost aquifer is about 200 feet and deep monitoring wells have been installed. These flow nets will be added to the text and are used with the MEMO Model results in monitoring network design. The thickness of the uppermost aquifer in the 200 East Area is sufficiently small that many monitoring wells penetrate the entire aquifer, and vertical flow nets for that area have not been prepared.</p>	4-26-91

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78.	<p><u>Page 5-112, lines 40-43 (5-47)</u>. Section 5.5.2.1.9 discusses the need to monitor the deeper portion of the uppermost aquifer due to possible migration of dense contaminants to the bottom of the aquifer. It is stated that, "in view of these considerations, deep wells will be installed at each low-level waste management area to provide samples for upgradient and downgradient water quality analysis, but will not be configured to establish networks equivalent to those described for the shallow wells." This explanation regarding the network density for wells monitoring the deeper portion of the aquifer relative to wells monitoring the shallow portion of the aquifer is inadequate.</p> <p><u>Ecology Recommendation</u>. Provide a detailed explanation regarding the rationale for the network of wells monitoring the shallow portion of the aquifer and wells monitoring the deeper portion of the aquifer.</p> <p><u>DOE-RL/WHC Response</u>: Based on the quantities and disposal methods of metal salts and dense non-aqueous phase liquids, no significant potential for density driven transport exists at the low-level waste management areas. As a result, the number of deep wells is smaller than the number of shallow wells (see response to comment number 68). The text will be revised to explain the number of wells chosen to monitor the shallow and deeper sections of the aquifer.</p>	4-26-91
79.	<p><u>Page 5-115, line 47 (5-48)</u>. Well Construction Standard citation not included in references.</p> <p><u>DOE-RL/WHC Response</u>: The WAC 173-160 Well Construction Standard will be added to the reference list.</p>	4-26-91
80.	<p><u>Page 5-129, line 26 (5-49)</u>. Implements should be steamed cleaned after 6 and before 7.</p> <p><u>DOE-RL/WHC Response</u>: The type of groundwater sampling equipment addressed in this paragraph is usually not steam cleaned. The text will be changed to clarify that this discussion applies only to laboratory decontamination of groundwater sampling equipment.</p>	4-26-91
81.	<p><u>Page 5-130, lines 44 through 51 (5-50)</u>. Section 5.5.3.2.1 states that, "For low-level waste management areas in which regulated units presently contain buried waste, background water quality conditions will be determined from monitoring wells located immediately hydraulically upgradient and within 100 feet of the boundary of the respective low-level waste management area." No explanation is given why 100 feet was chosen as the maximum distance an upgradient well will be situated at the monitored burial ground.</p>	4-26-91

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	<p><u>Ecology Recommendation.</u> Provide a detailed explanation regarding the spacing of upgradient monitoring wells from the burial grounds.</p> <p>DOE-RL/WHC Response: The text will be modified to clarify the rationale for locating upgradient wells. Generally, it will be necessary to locate upgradient wells relatively near the low-level waste management areas because of the close proximity of other potential sources of contamination. Such locations are also desirable in areas where groundwater flow directions are projected to change because of mound decay, and some upgradient wells may become downgradient wells. However, the text was not intended to imply that 100 feet is a limit that will be applied to all future upgradient wells. The text will be revised accordingly.</p>	
82.	<p><u>Page 5-134, line 35 (5-51).</u> Section 5.5.3.2.3 should include a discussion of quality control sample types and frequency.</p> <p>DOE-RL/WHC Response: A discussion of quality control sample types and frequency will be added to the text.</p>	4-26-91
83.	<p><u>Page 5-135 (5-52).</u> Section 5.5.4.1.1 should discuss procedures used for decontamination of measurement devices between wells.</p> <p>DOE-RL/WHC Response: A discussion of decontamination of water-level measurement devices between wells will be added to the text.</p>	4-26-91
84.	<p><u>Page 5-136, lines 14 through 45 (5-53).</u> Pump type selection is critical and should be detailed.</p> <p><u>Ecology Recommendation.</u> Describe pump type, manufacturer, and reason for selection.</p> <p>DOE-RL/WHC Response: A discussion of the reasons for selecting the Hydrostar pump will be added to the text. The pump type and manufacturer have also been added to the text.</p>	4-26-91

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85.	<p data-bbox="236 358 1625 418"><u>Page 5-136, lines 21 through 24 (5-54).</u> What is sampling procedure if stabilization of parameters does not occur after evacuation of two well volumes?</p> <p data-bbox="236 451 1625 516">DOE-RL/WHC Response: A description of the procedure to follow, should parameters not stabilize after evacuation of two well volumes, will be added to the text.</p>	4-26-91
86.	<p data-bbox="236 553 1698 613"><u>Page 5-136, lines 33 through 34 (5-55).</u> At least two volumes should be removed to evacuate annular space water in contact with casing volume.</p> <p data-bbox="236 646 1698 711">DOE-RL/WHC Response: A description of the methods will be included in the Hanford Dangerous Waste Permit. The LLBG will cross reference the site-wide permit.</p>	4-26-91
87.	<p data-bbox="236 743 1591 803"><u>Page 5-138, lines 1 through 18 (5-56).</u> Pump type selection is critical and should be detailed.</p> <p data-bbox="236 836 1591 868"><u>Ecology Recommendation.</u> Describe pump type, manufacturer, and reason for selection.</p> <p data-bbox="236 901 1591 992">DOE-RL/WHC Response: The criteria for selection of the pump type will be explained in Section 5.5.4.1.3. The pump type and manufacturer will also be added to the text. A reference to that section will be added to the text.</p>	4-26-91
88.	<p data-bbox="236 1024 1613 1057"><u>Page 5-138, line 46 (5-57).</u> What methods will be used to monitor the 4°C temperature?</p> <p data-bbox="236 1089 1613 1154">DOE-RL/WHC Response: A description of the methods will be included in the permit application.</p>	4-26-91
89.	<p data-bbox="236 1187 1725 1247"><u>Page 5-140, lines 32 and 33 (5-58).</u> How will trip blanks be prepared? What media will be used for field and trip blanks - distilled, deionized, or carbon-free?</p> <p data-bbox="236 1279 1725 1404">DOE-RL/WHC Response: A description of procedures for field-related quality control blank and duplicate samples will be provided in Section 5.5.3.2.3. This description will be modified to indicate the type of media to be used. A reference to that section will be added to the text.</p>	4-26-91

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90.	<p>Page 5-140, line 31 (5-59). Analysis of another sample from the original sample volume is a replicate, not a duplicate.</p> <p>DOE-RL/WHC Response: A description of the methods will be included in the Hanford Dangerous Waste Permit. The LLBG will cross reference the site-wide permit.</p>	4-26-91
91.	<p>Page 5-148, lines 8 through 15 (5-60). This section outlines the DOE-RL actions in the event of determining a statistically significant increase in one or more parameters. However, the discussion omits immediate resampling as required under WAC 173-303-645(9)(h)(ii).</p> <p><u>Ecology Recommendation.</u> Include immediate resampling as the DOE-RL action or explain why resampling will not be performed.</p> <p>DOE-RL/WHC Response: Immediate resampling will be added to the text as a required action if a statistically significant increase is detected.</p>	4-26-91
92.	<p>Page 5-148, line 36 (5-61). Typo, "started" should be "stated".</p> <p>DOE-RL/WHC Response: Typo will be corrected.</p>	4-26-91
93.	<p>Page 5-151, lines 38 and 39 (5-62). Section 5.7 states that, "Characterization will provide concentrations of each constituent listed in WAC 173-303-9905 (Ecology 1989)..." Characterization should be conducted in compliance with 40 CFR 264, Appendix IX (EPA 1988).</p> <p><u>Ecology Recommendation.</u> Replace WAC 173-303-9905 with 40 CFR 264, Appendix IX (EPA 1988) in the above quoted sentence.</p> <p>DOE-RL/WHC Response: The citation will be changed in the text as suggested.</p>	4-26-91
94.	<p>Page APP 7A-1 through 7A-4 (7-1). Appendix 7A is a <u>sample</u> procedure for "clean up/recover radioactive material spills emergency procedures--low-level burial grounds. Submission of a <u>sample</u> procedure is inappropriate for this application.</p> <p><u>Ecology Recommendation.</u> The Applicant is required to submit an <u>actual</u> sampling procedure for clean up/recover radioactive spills emergency procedure for the low-level burial grounds permit application.</p>	

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	<p>DOE-RL/WHC Response No. 1: A description of operations will be provided as required by WAC 173-303-806(4)(a)(viii). All 'sample' procedures and references to such will be removed from the permit application. This approach is consistent with that being used to finalize the 616 NRDSWF permit application.</p> <p><u>Comment:</u> Appendix 7A, Sample Procedure, Page 7A-1</p> <p>In addition to the description of operations which will be provided, a statement must be made indicating the locations of the actual procedures.</p> <p>DOE-RL/WHC Response No. 2: Controlled copies of the procedures are kept in Building 272WA and in vehicles so that they are available at the work location. A statement will be included noting that these procedures will be available for on-site inspection by the regulators.</p>	
95.	<p><u>Page 8-9, Table 8-1, line 15 (8-1).</u> This table indicates that Basic Crane and Rigging Training is <u>not</u> a required course for crane operators. Is this correct? If so, please provide an explanation why crane operators are not required to complete the course.</p> <p>DOE-RL/WHC Response: The Basic Crane and Rigging Training is required for crane operators. Table 8-1 will be corrected to show that the training is required.</p>	4-26-91
96.	<p><u>Page 9-12, lines 39 through 41 (9-1).</u> Section 9.2.2.2 states, inter alia, that because of low precipitation, flat topography, and the lack of nearby surface water bodies, the risk of human exposure to LLBG waste through the surface water pathway is very <u>low</u>. Emphasis added. Characterizing any risk to human health as <u>low</u> without further quantification is not appropriate for a document of this type.</p> <p><u>Ecology Recommendation.</u> Quantify the risk to human health of exposure to LLBG waste through the surface water pathway.</p> <p>DOE-RL/WHC Response: The EPA guidelines for preparing the Exposure Information Report state that the "EPA does not expect applicants to develop major, extensive new pieces of information..." Quantification of the risk to human health of exposure to LLBG waste would require developing new information that is beyond the scope of the EPA guidelines; therefore, the text will remain unmodified.</p>	4-26-91

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97.	<p><u>Page 9-14, lines 37 and 38 (9-2).</u> The same comment applies to the characterization of the risk to human health via the air pathway as for the surface water pathway..</p> <p><u>Ecology Recommendation.</u> Quantify the risk to human health of exposure to LLBG waste through the air pathway.</p> <p>DOE-RL/WHC Response: The EPA guidelines for preparing the Exposure Information Report state that the "EPA does not expect applicants to develop major, extensive new pieces of information..." Quantification of the risk to human health of exposure to LLBG waste would require developing new information that is beyond the scope of the EPA guidelines; therefore, the text will remain unmodified.</p>	4-26-91
98.	<p><u>Page 9-14, lines 1 and 2 (9-3).</u> The same comment applies to the characterization of the risk to human health via soils as for the air and surface water pathways.</p> <p><u>Ecology Recommendation.</u> Quantify the risk to human health of exposure to LLBG waste through soils.</p> <p>DOE-RL/WHC Response: The EPA guidelines for preparing the Exposure Information Report state that the "EPA does not expect applicants to develop major, extensive new pieces of information..." Quantification of the risk to human health of exposure to LLBG waste would require developing new information that is beyond the scope of the EPA guidelines; therefore, the text will remain unmodified.</p>	4-26-91
99.	<p><u>Page 9-17, lines 26 through 28 (9-4).</u> The same comment applies to the characterization of the risk to human health via transportation-related releases as for air, surface water, and soil pathways.</p> <p><u>Ecology Recommendation.</u> Quantify the risk to human health of exposure to LLBG waste via transportation-related releases.</p> <p>DOE-RL/WHC Response: The EPA guidelines for preparing the Exposure Information Report state that the "EPA does not expect applicants to develop major, extensive new pieces of information..." Quantification of the risk to human health of exposure to LLBG waste would require developing new information that is beyond the scope of the EPA guidelines; therefore, the text will remain unmodified.</p>	4-26-91

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100.	<p><u>Page 11-2, Section 11.1 (11-1).</u> The fourth paragraph indicates burial ground 218-E-12B is to be a RCRA compliant facility.</p> <p><u>Ecology Recommendation.</u> Until an exemption is approved with regard to lining of particular trenches within the LLBG, the LLBG is not considered a RCRA compliant facility.</p> <p><u>DOE-RL/WHC Response:</u> The purpose of the application is to receive a Part B permit for the Low-Level Burial Grounds as a RCRA disposal facility. When this permit and any necessary exemptions are granted, the Low-Level Burial Grounds will indeed be a RCRA compliant facility. The statement is made in this context.</p> <p>In light of this, the text in lines 27 and 28 of page 11-2 will be modified with the following or similar text:</p> <p>"Landfills for future disposal of low-level mixed waste are required to comply with RCRA standards and are proposed in burial grounds 218-W-5 (lined landfill) and 218-E-12B (trench 94 extension)".</p>	4-26-91
101.	<p><u>Pages 11-15 and 11-16, Figure 11-7 (11-2).</u> The identification of trench numbers 20, 24, and 29 is not shown on the legend.</p> <p><u>Ecology Recommendation.</u> The figure should be revised as appropriate.</p> <p><u>DOE-RL/WHC Response:</u> These trenches are identified in the legend, but the identification appears to be misleading because only the outline of the trench bottom is black instead of the entire bottom. This will be changed to make the identification of this type trench in the figure clearer.</p>	4-26-91
102.	<p><u>Page 11-22, Section 11.1.2 (11-3).</u> This paragraph states that following retrieval of the transuranic and radioactive organic liquid waste, native soils lying beneath the existing unlined trenches that may have been contaminated by waste or waste residues will be left in place. It is proposed that the trenches will be closed in compliance with the closure requirements of WAC 173-303. After retrieval of the transuranic and radioactive organic liquid waste and closure under WAC 173-303, it is possible that the trenches will be reused for the burial of stabilized low-level waste.</p>	

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Ecology Recommendation. Following retrieval of wastes that are regulated by Ecology, the trenches may have to be certified closed before reuse for the disposal of low-level waste or any other waste. The closure performance standards required that all contaminated soils be cleaned to background levels [WAC 173-303-610(2)(b)(i)]. The conditions under which the trenches may be reused should be more clearly defined.

DOE-RL/WHC Response No. 1: It seems that Ecology's interpretation of the closure of a trench and the closure of a landfill is two separate issues. Individual trenches remain part of the LLBG regardless of whether the waste in those trenches has been moved, retrieved, or replaced. Closure requirements for the LLBG are defined in WAC 173-303-665(6)(b), "a landfill must comply with all postclosure requirements contained in WAC 173-303-610(7), (8), (9), and (10)". There are no requirements in these sections which discuss cleanup levels for soils. Therefore, there are no closure performance standards for a landfill which require that contaminated soils be cleaned to background levels or to designated limits. The WAC 173-303-610(2)(b)(i) and (ii), do not apply to the closure of a landfill.

To assist in clarifying the WAC requirements which must be met for closure of the LLBG, the text will be modified to cite closure under WAC 173-303-665.

Deficiency: Section 11.1.1.2, Removal or Decontamination, Page 11-22

After the waste is retrieved from a trench, any further use of that trench would be considered replacement and would therefore be subject to double liner requirements. Furthermore, it would not be prudent to leave uncontainerized, contaminated soil in place when it can easily be identified and removed. The identification of soil contamination, if any, would also provide valuable insight into the potential extent of contamination beneath other trenches as well as other disposal sites at the Hanford Reservation.

Requirement: After waste retrieval, soil sampling must be conducted. The results of this sampling will determine any further actions to be taken and future use of the trench. The permit application must contain a generalized sampling plan for this situation. A detailed sampling plan need not be developed until the soil beneath the retrievable waste is visually inspected.

DOE-RL/WHC Response No. 2: The text will be modified to present a general soil sampling plan for extremely hazardous waste (EHW) in trenches where such waste has been retrieved. Details

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of the sampling program, such as depth, locations, and methods, will depend on a number of factors, including trench geometry, age of the waste, and type of waste. Detailed sampling plans for a particular trench or portion thereof will be prepared after the waste has been retrieved and the constituents verified. On the basis of sampling and testing results, further requirements (if any) for reusing the trench will be identified.

103. Page 11-25, Section 11.1.4.1 (11-4). It is noted that in the third and fourth storage configurations (containing retrievable transuranic waste) have not been covered since 1987 and will continue to be that way for the next 10 years. It appears that the containers are left exposed to ambient atmospheric conditions for long periods making them more susceptible to degradation and eventual leakage.

Ecology Recommendation. The Applicant should provide some discussion of measures that have been taken to protect the containers from the weather. If measures have not been taken to date, the possibility of a temporary cover that will serve to protect the waste containers for the next 10 years should be explored and discussed.

DOE-RL/WHC Response No. 1: In a desert climate, such as is present on the Hanford Site, the relative humidity is low and metal surfaces do not corrode rapidly in the open atmosphere. The text will be revised to include a discussion of this 'as is' option as well as soil covering or temporary cover options. The text will provide supporting rationale for the preferred option.

Deficiency: Section 11.1.4.1, Retrievably Stored TRU Waste, Page 11-25

The response is erroneous. The Central Waste Complex has experienced the corrosion of drums stored on exposed pads for periods far less than 10 years. Furthermore, it is not acceptable to only state that the text will be revised.

Requirement: Either retract the first sentence of the response or expand the response to discuss the reality of storing containerized dangerous waste in a semiarid climate. In addition, provide the revised text as part of this response.

DOE-RL/WHC Response No. 2: The reviewer's understanding of the 183H Basin waste problem is incorrect. The drums corroded from the inside out due to improper packaging methods. Many of the presently uncovered waste containers will be retrieved, repackaged, and transferred to

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	<p>a permitted storage facility in the Central Waste Complex within a year's time period. The concept of providing weather protection for the remaining uncovered mixed-waste containers in the trenches is being discussed. Alternatives under consideration include some type of roof cover and a plastic tarp covered with soil as was used previously. Because this waste is to be retrieved in the future, the method of protection should not unduly hinder the retrieval operation. Current plans call for transferring the uncovered containers of transuranic waste from the trenches to a permitted storage building when space becomes available. It is anticipated that this transfer will be initiated within two years. In addition, an engineering evaluation will be performed during FY 1992 to determine if a cover should be placed over the uncovered waste in the interim. The last sentence of the fourth paragraph will be deleted and replaced with the following statements: "Uncovered waste will be transferred to a permitted storage building at the Central Waste Complex or the 224T Transuranic Waste Storage and Assay Facility when space becomes available. The feasibility of providing a cover over this waste in the interim will be determined in 1992."</p>	
104.	<p><u>Page 11-27, lines 39 through 43 (11-4).</u> Section 11.1.4.5 states that decontaminated equipment and structures will be disposed of in accordance with requirements of the U.S. Department of Energy and WAC 173-303 (Ecology 1989). The cite to the Washington Administrative Code is incomplete.</p> <p><u>Ecology Recommendation.</u> Include the complete cite to WAC 173-303 for disposal of decontaminated structures and equipment.</p> <p>DOE-RL/WHC Response: The text will be modified to cite WAC 173-303-665.</p>	4-26-91
105.	<p><u>Page 11-28, Section 11.1.4.5 (11-5).</u> The last paragraph indicates that contaminated native soils, if any, lying beneath the retrievable trenches will not be removed as part of closure operations.</p> <p><u>Ecology Recommendation.</u> The Applicant should provide some discussion of measures that have been taken to protect the containers from the weather. If measures have not been taken to date, the possibility of a temporary cover that will serve to protect the waste containers for the next 10 years should be explored and discussed.</p> <p>DOE-RL/WHC Response No. 1: It seems that Ecology's interpretation of the closure of a trench and the closure of a landfill is two separate issues. Individual trenches remain part of the</p>	

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	<p>LLBG regardless of whether the waste in those trenches has been moved, retrieved, or replaced. Closure requirements for the LLBG are defined in WAC 173-303-665(6)(b), "a landfill must comply with all postclosure requirements contained in WAC 173-303-610(7), (8), (9), and (10)". There are no requirements in these sections which discuss cleanup levels for soils. Therefore, there are no closure performance standards for a landfill which require that contaminated soils be cleaned to background levels or to designated limits. The WAC 173-303-610(2)(b)(i) and (ii), do not apply to the closure of a landfill.</p> <p>To assist in clarifying the WAC requirements which must be met for closure of the LLBG, the text will be modified to cite closure under WAC 173-303-665.</p> <p><u>Comment:</u> Section 11.1.4.5, Decon and Disposal Procedures, Page 11-28</p> <p>Ecology's concern in this comment is not so much whether soil sampling should occur as discussed in comment 102, but a reiteration of the concern raised in comment 103. In other words, what steps have and will be taken to prevent the soil contamination in the first place? The response to this comment need only note that this section will reflect any text changes resulting from the resolution of comments 102 and 103.</p> <p>DOE-RL/WHC Response No-2: As noted in the response to comment 103, the uncovered transuranic waste is to be transferred to a permitted storage building when space becomes available. In addition, an engineering evaluation will be performed in 1992 to determine the feasibility of putting a temporary cover over the waste during the interim.</p>	
106.	<p><u>Page 11-29, Section 11.1.5.2.1 (11-6).</u> The cover will be sloped at a grade of 1.5 percent. This proposed slope is below the 3 percent slope recommended in the EPA technical guidance document entitled, "Final Covers on Hazardous Waste Landfills" (EPA/530-SW-89-047).</p> <p><u>Ecology Recommendation.</u> The Applicant should demonstrate that the proposed slope is sufficient to drain the surface water flows and accommodate projected subsidence.</p>	

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DOE-RL/WHC Response No. 1:	The necessary calculations have already been performed to evaluate the covers ability to adequately handle precipitation and other surface water flows. Ecology is directed to Appendices 11-A, B, C, and D. Further demonstration of design adequacy is presented in the response to comment 109.	
	Subsidence is not considered to be an issue of concern at the LLBG. Ecology is directed to Section 11.2.1.3 for a discussion on subsidence.	
	<u>Deficiency:</u> Section 11.1.5.2.1, General Description, Page 11-29	
	Although the calculations support the use of a 1.5% slope, a 3.0% slope would provide for unanticipated settlement/subsidence as well as meet the recommended guidance.	
	<u>Requirement:</u> All final cover slopes must be no shallower than 3.0%. This grade must not vary more than 1/10 of a foot in 16 feet.	
DOE-RL/WHC Response No. 2:	Final covers will be sloped at a minimum grade of 3%.	
107.	<u>Page 11-48, Section 11.1.5.2.2 (11-7).</u> The third paragraph of this section indicates that the grade layer will be placed in 18- to 24-inch-thick lifts in most areas of the LLBG to a compaction of 95 percent or as high as is reasonably achievable.	
	<u>Ecology Recommendation.</u> The proposed lift of 18- to 24-inch-thick lifts appear to be too thick to achieve the compaction limits of 95 percent density. Loose lifts of up to 12 inches should be used in order to achieve a more uniform compaction throughout the depth of the grade layer.	
DOE-RL/WHC Response No. 1:	Observations indicate that some of the potential grade layer material is quite coarse, containing a large fraction of cobbles. Experience indicates that this type of material can be placed in relatively thick lifts and compacted satisfactorily. However, it may be premature to specify a lift thickness at this time, even if only as an example. The text will be modified to delete reference to specific lift thickness and will note that the optimum lift thickness will be determined by constructing a test pad.	

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	<p><u>Deficiency:</u> Section 11.1.5.2.2.1, Native Soil Grade Layer, Page 11-48</p> <p>It is typical construction practice to place soil in 6 - 8 inch lifts when compaction or permeability are critical factors. Evaluating lift depths of up to 2 feet would only encumber the test pad evaluation.</p> <p><u>Requirement:</u> All soil and soil mixtures must be placed per the accepted practice of 6 - 8 inch lifts.</p> <p>DOE-RL/WHC Response No. 2: The soil available for the grade layer may have coarse material up to 12 inches in dimension. Placing such material in thin lifts would be counterproductive, as the roller would ride on the larger material and not effectively compact the finer grained matrix. Were this a normal fine-grained fill, lift thicknesses of 6 to 8 inches would be appropriate. While permeability is not a design consideration for the grade layer, we agree that compaction is important. Evaluation of compaction as part of the test pad construction may be slightly cumbersome, but is required and will be performed.</p>	
108.	<p><u>Page 11-48, Section 11.1.5.2.2 (11-8).</u> It is proposed that the compaction of the grade layer will be accomplished with a 20-ton dead weight or drum vibratory roller.</p> <p><u>Ecology Recommendation.</u> The bearing capacities of the underlying cover material and waste containers should be determined to ensure that they can withstand the loads imposed by the 20-ton or greater weight drums vibratory roller and prevent any damage to the waste containers or the liner and leachate collection systems. The use of lifts of lesser thickness may allow adequate completion to be accomplished with lower weight roller and limit the potential for such damage.</p> <p>DOE-RL/WHC Response: This is a valid concern for structures with geosynthetics and should be addressed prior to closure when the waste characteristics and geometry are known. Text on page 11-48 will be modified to address this concern.</p>	4-26-91
109.	<p><u>Page 11-52, Section 11.1.5.2.2.6 (11-9).</u> No mention is made of the slope of the drainage layer.</p> <p><u>Ecology Recommendation.</u> The EPA RCRA cover technical guidance document recommends a drainage layer with a minimum slope of 3 percent after settlement and subsidence.</p>	

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	<p>DOE-RL/WHC Response No. 1: The drainage layer will be sloped at 1.5 percent, the same as the other layers. However, the issue primarily relates to the performance of the drainage layer with the use of a 1.5 percent slope. The EPA technical guidance at the time of the LLBG cover design (EPA, 1982) recommended final slopes of 3 to 5 percent. However, slopes outside of this range have been approved for other hazardous waste facilities if adequate performance could be demonstrated. It appears that the EPA implicitly recognizes this in their latest guidance document for closure covers (EPA, 1989), which states:</p> <p>"In arid regions...it may be possible to construct a top layer that will absorb most, if not all, of the precipitation that infiltrates into that layer, eliminating the need for a drainage layer."</p> <p>Consequently, if the drainage layer is not required, then its slope is no longer a significant issue.</p> <p>To investigate this design approach, a series of supplemental HELP (Hydrological Evaluation of Landfill Performance) analyses were performed. The same parameters as in Appendix 11A of the application were used, except that the slope angle and drainage path length were varied.</p> <p>HELP version 2.04 was used instead of version 2.02, which was used for the original analysis. Daily precipitation data from 1979 through 1988 from the Hanford Meteorological Station were used in all cases. The results are summarized in the attached Table 1.</p> <p>Case 1 is the analysis presently contained in Appendix 11A, which was performed using version 2.02. Case 2 uses the same parameters with version 2.04. It may be seen that version 2.04 predicts slightly less evapotranspiration and slightly more flow through the drainage layer than does version 2.02. The difference is not considered significant. Cases 3 through 5 show the effect of increasing the cover slope from 0 to 5 percent. Case 6 shows the effect of a reduced drainage path length.</p> <p>It may be seen that the amount of lateral drainage increases with steeper cover slopes and reduced path length, as might be intuitively expected. However, the amount of percolation through the cover into the waste remains the same in all cases. This supports the EPA approach in that the contribution of the drainage layer to cover performance appears to be negligible at an arid site. This analysis indicates that a flat cover and a 5 percent sloped cover would perform equally well at the Hanford Site.</p>	

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	<p><u>Comment:</u> Section 11.1.5.2.2.6, Drainage Layer, Page 11-52</p> <p>Comment 106 also applies here.</p> <p>DOE-RL/WHC Response No. 2: The drainage layer will be sloped at 3%, the same as the other layers. See response to Comment 106.</p>	
110.	<p><u>Page 11-64, Section 11.1.5.5.5 (11-10).</u> The results of wind erosion analysis indicates a net loss of 3.5 tons of cover soil per year. This amount of soil is greater than the EPA recommended value of 2 tons per year.</p> <p><u>Ecology Recommendation.</u> Discussion of alternative measures to reduce the total erosion due to wind and surface water should be provided here and specifically addressed in the detailed design.</p> <p>DOE-RL/WHC Response: The need to revise the cover wind erosion section (Appendix 11F), due to subsequent work done in this area on cover designs for the Hanford Site, is recognized. The revised text will address such information as specific McGee Ranch soil physical property analysis that was not available at the time of submitting the permit application and information on the crusting properties of soil. If this additional information does not indicate a reduction of the erosion levels to EPA guidance levels, then a more in depth discussion will be added to the text that will explain why the erosion levels are not a point of concern and/or discussion of alternative measures proposed to achieve this level.</p>	4-26-91
111.	<p><u>Page 11-64, Section 11.1.5.5.5 (11-11).</u> The total erosion (sum of net cover water and wind erosion) is 4.3 tons of cover soil per acre per year. This exceeds the EPA recommended limit of 2 tons per acre per year.</p> <p><u>Ecology Recommendation.</u> Discussion of alternative measures to reduce the total erosion due to wind and surface water should be provided here and specifically addressed in the detailed design.</p> <p>DOE-RL/WHC Response: The main contribution to total erosion is wind erosion. As stated in response 110, this section will be revised. The concern that Ecology raises here will be dealt with in the revised text described in the response to Comment 110.</p>	4-26-91

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112.	<p>Page 11-66, Section 11.1.5.6 (11-12). Two of the techniques proposed for correction of existing subsidence problems in inactive trenches prior to placement of final cover are mass impact (pounding of the ground using a weight of up to 30 tons dropped from a height of 65 feet) and dynamic consolidation (hammering or vibrating a beam or pile into the ground).</p> <p><u>Ecology Recommendation.</u> Both methods have the potential for producing or increasing damage to previously disposed of wastes or waste containers and thereby increasing the potential for leakage or leaching. The bearing capacities of underlying waste containers, cover, and other materials should be determined to ensure that they can withstand the stresses due to mass impact and dynamic consolidation and prevent any supplemental damage that might increase the potential for emissions. Alternative approaches for providing the necessary ground improvement to support the final cover loads and minimize cover settlement should be considered, or more adequate assessment of the potential for increased leakage or leaching provided.</p> <p>DOE-RL/WHC Response: This NOD suggests that dynamic consolidation will damage waste or waste containers, and thereby increase the potential for leakage or leaching. Furthermore, the NOD suggests that the purpose of dynamic consolidation is for support of static loads imparted by the surface (at grade) cover and for minimization of cover settlement.</p> <p>The initial premise of unintentional damaging of waste and waste containers, relative to solid waste burial grounds may not be correct. Solid waste typically consists of contaminated miscellaneous metallic, cellulose based, or mineralogic materials transported and discharged to burial trenches in bulk transport packaging. Little, if any, intent was given to disposal of waste materials in high integrity containers or equivalent packages. Additionally, most waste transport packages used have a nominal expected integrity when buried. Hence, one may assume that most packages and containers, will have presently degraded, or will degrade within a few decades.</p> <p>Structural collapse of waste materials and containers has occurred at most burial grounds as manifested by moderate to large subsidence features. This provides evidence as to the present failure of waste and waste containers under ambient conditions. It is indeed the intent of dynamic consolidation to cause "damage" to waste and waste containers. Dynamic consolidation causes compaction of waste under controlled conditions. Past field demonstration activities have shown that greater than 90 percent of potential waste volume reduction can be imparted by dynamic consolidating in situ with negligible health and safety</p>	4-26-91

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	<p>concerns. Without dynamic consolidation, or equivalent in situ treatment, structural failure of surface engineered barriers overlying buried solid waste trenches is probable and could prove to be compromising to the life of the cover system.</p> <p>The text will be modified to clarify the purpose of the waste consolidation efforts.</p>	
113.	<p><u>Page 12-14, lines 44 through 46 (12-1)</u>. Section 12.4.1.8.2 states, "(c) The future use of the above described land is restricted under terms of 40 CFR 264.117(c) and WAC 173-303-61-(7)(d). The reference to the Washington Administrative Code is a misprint. The correct cite is WAC 173-303-610(7)(d).</p> <p>DOE-RL/WHC Response: The citation will be corrected.</p>	4-26-91
114.	<p><u>Pages APP 4A-17 through 4A-44 (Volume 5)</u>. Under the "Toxic Name" column on each of these pages are listed the various constituents placed in the trenches. In the T50 trench lead, oil, beryllium, zirconium, and "carcinogens" are listed. In the T10 trench, as noted on page APP 4A-44, lead, lead shielding, lead pipes, oil, "carcinogens", mercury, and charcoal are listed. The use of the term "carcinogens" is too vague.</p> <p><u>Ecology Recommendation.</u> Replace "carcinogens" with the specific form of carcinogen (e.g., asbestos insulation).</p> <p>DOE-RL/WHC Response No. 1: A better description of "carcinogens" is not available because it was not recorded on the old records. The best information available has been provided in the permit application and in the "LLBG Database" (WHC-MR-0008).</p> <p><u>Comment:</u> Appendix 4A, List of Mixed Waste</p> <p>The fact that "carcinogens" cannot be more specifically defined should be stated in the Chapter 4 text where this appendix is referenced.</p> <p>DOE-RL/WHC Response No. 2: The following statement will be added to 4.6.1: "Some older type waste was not well characterized at the time it was emplaced (e.g., waste listed as 'carcinogens'). This waste is identified to the extent possible with the available information."</p>	

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	<p><u>Requirement:</u> Please clarify the text.</p> <p>DOE-RL/WHC Response: The text will be replaced with "Heads of Field Elements" to agree with DOE Order 5820.2A.</p>	
118.	<p><u>Deficiency:</u> Section 2.1.1, Hanford Site, Page 2-4</p> <p>The definition of mixed wastes on lines 6-8 is inadequate because it does not include radioactive waste containing dangerous constituents not regulated by RCRA.</p> <p><u>Requirement:</u> Although DOE Order 5820.2A may not take into account state laws and regulations, the text must be edited to indicate that mixed waste at the Hanford Reservation includes waste containing both radioactive and hazardous components as defined by the Atomic Energy Act and the Hazardous Waste Management Act. RCW 70.105.109</p> <p>DOE-RL/WHC Response: The text will be changed to define mixed waste as: "Waste containing both radioactive components as defined by the <i>Atomic Energy Act</i>, and hazardous components as defined by RCRA, including state implementation of RCRA."</p>	
119.	<p><u>Comment:</u> Section 2.1.1, Hanford Site, Page 2-4</p> <p>The regulation of radionuclides will be addressed in the facility wide permit. Delete the sentence beginning on line 12.</p> <p>DOE-RL/WHC Response: Radionuclides are not regulated under RCW 70.105.109 because the Federal Government has not delegated this authority to the State; therefore this statement is correct.</p>	
120.	<p><u>Deficiency:</u> Section 2.1.2.1, Past Practices, Page 2-6</p> <p>It is not clear in the last paragraph of this page and the first paragraph of page 2-11 if <u>liquid waste</u> (whether mixed waste or not) with a dose rate greater than 200 millirem per hour is still being placed in the trenches. Liquid dangerous/mixed waste can no longer be land disposed per WAC 173-303-140.</p>	

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	<p><u>Requirement:</u> The discussion must indicate what type of liquid wastes, if any, have been or continue to be disposed of or stored in the trenches since November 23, 1987.</p> <p>DOE-RL/WHC Response: The following sentence will be added on page 2-6, line 51: "Liquid mixed waste is no longer accepted for storage."</p>	
121.	<p><u>Deficiency:</u> Section 2.1.2.1, Past Practices, Page 2-11</p> <p>The fire retardant that was used on the plywood may contain dangerous constituents which could eventually leach out of the burial ground. The text does not indicate if this possibility has been considered.</p> <p><u>Requirement:</u> The text should specify what type of fire retardant was and currently is used on the plywood within the burial grounds. A discussion should also be presented on the leaching potential of this material.</p> <p>DOE-RL/WHC Response: The fire retardant type is being investigated and will be fully explained in the text.</p>	
122.	<p><u>Deficiency:</u> Section 2.1.2.1, Past Practices, Page 2-11</p> <p>Although trenches which received mixed waste and discontinued operation prior to November 23, 1987 are not subject to permitting under WAC 173-303, they are subject to the Hazardous and Solid Waste Amendments (HSWA) to RCRA.</p> <p><u>Requirement:</u> The application must incorporate the above text. In addition, the term "were backfilled" on line 31 should be replaced with "discontinued operation."</p> <p>DOE-RL/WHC Response: There is no question the mixed waste is subject to the Hazardous and Solid Waste Amendments (HSWA); however, HSWA did not change the definition of the existing portion of a landfill. Mixed waste has been accepted, with Ecology's notification, in the open trenches beyond that which was there on November 23, 1987; therefore, the definition of the existing portion of the landfill has had implicit concurrence by Ecology. The text in section 2.1.2.1 on page 2-11, beginning on line 31, will be changed as follows: "Trenches that received mixed waste and were backfilled before the effective date of regulation of mixed waste are not subject to regulation as permitted treatment, storage, and/or disposal</p>	

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| | <p>units under WAC 173-303 (Ecology 1991), although the requirements of the (HWA) to RCRA will apply."</p> | |
| 123. | <p><u>Deficiency:</u> Section 2.1.2.1, Past Practices, Page 2-11</p> <p>Trenches which were constructed prior to November 23, 1987 but did not receive mixed waste until after November 23, 1987 are not considered existing units and therefore are not exempt from the liner requirements. Therefore, some "unfilled" trenches may be subject to the liner requirements.</p> <p><u>Requirement:</u> Edit the last sentence of this section to read "The existing units include trenches which received mixed waste and were constructed prior to November 23, 1987."</p> <p>DOE-RL/WHC Response: The last sentence in section 2.1.2.1 will be changed as follows: "The existing units include trenches which received mixed waste and were constructed before November 23, 1987."</p> | |
| 124. | <p><u>Deficiency:</u> Section 2.1.2.3, Closure, Page 2-22</p> <p>The distinctions drawn between the types of trenches are important to determine the applicable regulations. Although Appendix 4B aids in the identification of how each trench is classified, there is no visual aid to illustrate the locational relationship of each type of trench.</p> <p><u>Requirement:</u> New figures should be provided or Figures 2-7 through 2-14 should be elaborated to distinguish the types of trenches within each burial ground (see comment 116).</p> <p>DOE-RL/WHC Response: New figures will be provided that indicate which trenches contain mixed waste.</p> | |
| 125. | <p><u>Comment:</u> Figure 2-7, Burial Ground, Page 2-25/2-26</p> <p>Typo. The proper identification number for this burial ground is "218-W-3A", not "218-2-3A". Please correct.</p> <p>DOE-RL/WHC Response: The number will be corrected.</p> | |

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126. Deficiency: Section 2.5.1, Measures to Prevent Degradation, Page 2-53

It is not clear if the discussion in this section on liquids in the trenches refers only to mixed waste placed prior to November 23, 1987. See comment 120.

Requirement: The text should be clarified to indicate what, if any, liquid waste has been disposed in the trenches after November 23, 1987.

DOE-RL/WHC Response: The following statement will be added to second paragraph: "No liquid waste has been placed in the trenches since November 23, 1987."

127. Comment: Section 3.1, Chem, Biol and Phys Analysis, Page 3-2

Waste analysis procedures for the Hanford Site are under development through the facility wide permit negotiations. The specific requirements for waste verification prior to disposal at the LLBG will be addressed upon resolution of this issue.

DOE-RL/WHC Response: The following paragraph will be added to section 3.0, beginning on line 20: "Unit particular waste analysis plans are being developed through the Hanford Facility Permit negotiations. As part of this effort, specific sampling and analysis strategies will be prepared for any waste received for disposal or storage."

128. Deficiency: Section 3.1.2, Containerized Waste, Page 3-4

The text states that the mixed waste disposed at the LLBG is packaged "to ensure isolation from the environment for 20 years". It is unacceptable to only design for 20 year isolation.

Requirement: It is Ecology's understanding that USDOE policy requires mixed waste disposal practices to isolate mixed waste for much greater periods of time, in some cases up to 10,000 years. Provide additional discussion in the application defending the 20 year time period in relation to both USDOE policy and dangerous waste closure performance standards.

DOE-RL/WHC Response: Most waste drums have a design life of 10 years; the drums used on site have a higher design standard of 20 years. This requirement is consistent with the intent to retrieve waste from the LLBG within this time period (Section 3.1, page 3-2, line 19). The DOE requirements for long term isolation will not depend upon waste container

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design life. Other barriers are to be employed to prevent intrusion and exposure, such as the construction of thick, impervious covers over the trenches. The precise specifications for these barriers have not yet been finalized; however, the requirements of DOE Order 5820.2A, and the soon to be completed performance assessment, will be used to establish these criteria. The date for completion of the Performance assessment is not yet determined.

To clarify these issues the text in section 3.1.2 will be revised as follows:

"Under current operating conditions, mixed wastes stored at the LLBG is packaged to maintain containment and retrieval capability of the waste for up to 20 years. The mixed waste stored in open trenches will be moved into permitted storage buildings at the Central Waste Complex when space becomes available. Buried mixed waste in retrievable storage will be retrieved for subsequent processing at the proposed Waste Receiving and Processing Facility. Chapter 4.0, Section 4.1.1 provides details of the waste container system.

129. Deficiency: Section 3.1.5, Landfilled Wastes, Page 3-5

The definition of free liquid given on lines 1 and 2 is not consistent with the dangerous waste regulations.

Requirement: The definition of free liquids should reference the Paint Filter Liquids Test as described in SW-846. WAC 173-303-140(4)(b)

DOE-RL/WHC Response: Consistent with 40 CFR 260.10 and WAC 173-303-140, the definition of free liquid will be revised as follows: "liquids which readily separate from the solid portion of a waste under ambient temperature and pressure. For containerized or bulk waste, the absence or presence of free liquids is demonstrated by the Paint Filter Liquids Test."

130. Comment: Section 3.2, Waste Analysis Plan, Page 3-6

Comment 127 also applies here.

DOE-RL/WHC Response: The issues will be addressed by adding to Section 3.0 the new paragraph shown in the response to comment 127.

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| 131. | <p><u>Comment:</u> Section 3.2.3, Waste Shipment, Inspection, Page 3-7</p> <p>Comment 127 also applies here.</p> <p>DOE-RL/WHC Response: The issues will be addressed by adding to Section 3.0 the new paragraph shown in the response to comment 127.</p> |
| 132. | <p><u>Comment:</u> Section 3.2.4, Generator Oversight, Page 3-8</p> <p>How long has the generator assessment program been used? How many noncompliant waste packages have been identified through this program? The application should describe who the "waste certification review committee" is, how often they meet, what criteria they use, etc.</p> <p>DOE-RL/WHC Response: The assessment program has been replaced by a full audit and surveillance program for non-naval reactor (NR) generators. The audit program has been in effect for three years. The exact number of noncompliant waste packages identified through the program is estimated to be less than 800.</p> <p>As a result of these changes to the audit program, the waste certification review committee has been replaced by the audit team. The audit team will consist of at least two engineers from Solid Waste and one engineer from Quality Assurance. A description of the revised program will be incorporated into Chapter 3.</p> <p>Public Law 98-525 Section 1634 gives NR special considerations regarding disposal of their components. NR has exercised their authority in regard to this law and DOE-RL has been directed to use an information exchange program in lieu of an audit. The information exchanges will be performed by the same personnel as audits and will complete the same audit checklist. Generators who are not satisfactory, as measured by the checklist, will not be authorized to ship to Hanford. A description of the program will be incorporated into Chapter 3. The end result is that all generators will be treated the same in fact, if not in format.</p> |
| 133. | <p><u>Comment:</u> Section 3.2.4, Generator Oversight, Page 3-8</p> |

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| 134. | <p><u>Deficiency:</u> Figure 3-1, Sample Assessment Checklist, Page 3-9</p> <p>It is unclear what is meant in item 4 of this checklist which asks "Are radioactive waste analyzed for dangerous constituents and their constituents?"</p> <p><u>Requirement:</u> Correct or clarify item 4 on this checklist.</p> <p>DOE-RL/WHC Response: The checklist will be replaced with an updated version.</p> | |
| 135. | <p><u>Comment:</u> Table 3-1, Mandatory Waste Characterization, Page 3-14</p> <p>Item 7 must be corrected to indicate the TCLP test.</p> <p>DOE-RL/WHC Response: Item 7 on page 3-14, lines 45 and 46 will be changed to "Toxicity Characteristic" which is consistent with the terminology used in WAC 173-303-090.</p> | |
| 136. | <p><u>Deficiency:</u> Section 3.2.7, Sampling Methods, Page 3-16</p> <p>Composite sampling should only be conducted when it is reasonable to assume the constituent concentrations are evenly distributed. Otherwise, samples should always be taken from the location where the highest chemical concentrations are expected. Furthermore, if a phase separation exists, each portion must be sampled and analyzed.</p> <p><u>Requirement:</u> The text in the last paragraph of this section must be modified per the above discussion.</p> <p>DOE-RL/WHC Response: The text in the last paragraph in section 3.2.7 on page 3-16 will be changed as follows: "Composite sampling is conducted when it is reasonably assumed the constituent concentrations are evenly distributed and is performed by obtaining random samples in random locations. Otherwise, samples will be taken from the location where the highest chemical concentrations are expected. Furthermore, if multiple phases or media exist, each different phase or media will be individually sampled and analyzed.</p> | |

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| 137. | <p><u>Comment:</u> Table 3-2, Analytical Methodology, Page 3-17</p> <p>The reference to EP Toxicity testing should be changed to TCLP testing. In addition, the procedure for determining the Ph of a solid outlined in Ecology's <u>Chemical Testing Methods</u>, WDOE 83-13, should be referenced for corrosivity testing. WAC 173-303-090(8) (October 16, 1990)</p> <p>DOE-RL/WHC Response: The text on line 11, page 3-17 will be changed from "extraction procedure toxicity, reference 1310," to "toxicity characteristic leaching procedure, reference 1311." The following reference will be put after 9041, line 10, page 3-17: "9045," which is the ASTM testing method used for determining the Ph of soils and semi-solid materials.</p> | |
| 138. | <p><u>Comment:</u> Section 3.2.9, Additional Requirements, Page 3-20</p> <p>Are offsite generators subject to the generator assessment program discussed in Section 3.2.4? If not, how is offsite waste verified? Offsite waste should be more vigorously assessed than onsite waste. Common practice dictates 10% of offsite generated waste should be verified prior to acceptance.</p> <p>DOE-RL/WHC Response: Except for special cases (naval reactor (NR) generators subject to Public Law 98-525, Section 1634), off-site generators are subject to the same auditing and surveillance program as the on-site generators. The schedule for conducting audits is a minimum of one per year. Surveillances are conducted on a more frequent basis. The same information is gathered from NR generators, but a different format is used. (See comment 132)</p> | |
| 139. | <p><u>Deficiency:</u> Section 4.1.1, Containers with Free Liquids, Page 4-1</p> <p>The text on line 28 indicates that the containers with free liquids are lab packs. Lab packs are specifically defined in WAC 173-303-161. Section 4.1.1.1 describes containers containing liquids which may not meet the regulatory definition of lab packs.</p> <p><u>Requirement:</u> Wac 173-303-161 and the federal regulations referenced therein should be reviewed to determine if all containers with liquids are indeed lab packs. If some</p> | |

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	<p>containers are not lab packs, the text should be edited to identify the other type of free liquid containers which are located in the trenches.</p> <p>DOE-RL/WHC Response: The containers with free liquid consist of an inner container of no more than 15 gallons of liquid surrounded with an amount of absorbent which can absorb at least twice the amount of liquid present; this is packaged in 55-gallon steel drums. As discussed in section 4.1.1, these containers do meet the WAC-303-161 definition of a lab pack. To avoid further confusion, the above description of the containers will be added to the text in section 4.1.1 and will follow the first sentence which starts on line 28. Also the term lab pack will be deleted from the text. The revised text will be as follows: "Containers with free liquid are discussed in the following sections. The containers with free liquid consist of an inner container of no more than 15 gallons of liquid surrounded with an amount of absorbent which can absorb at least twice the amount of liquid present; this is packaged in 55-gallon steel drums.</p> <p>These sections describe past practices in the LLBG that were discontinued before November 23, 1987. Currently, mixed waste is received and stored at the new Central Waste Complex, which will be covered under a separate Part B permit application."</p>	
140.	<p><u>Deficiency:</u> Section 4.1.1.2, Container Management Practices, Page 4-2</p> <p>It is not appropriate to treat buried containers of waste as storage units because none of the container storage regulations can be applied.</p> <p><u>Requirement:</u> The retrievable storage units must be considered landfills.</p> <p>DOE-RL/WHC Response: It is agreed the reference to storage units is inaccurate. However, it is necessary to differentiate the management of waste considered to be retrievable from that considered to be disposed. Therefore, retrievable waste in trenches will be referenced as such in the text. The phrase "retrievable storage units" will be replaced with "retrievable waste in the LLBG trenches." The buried containers were placed in storage prior to coming under Ecology regulation and the storage unit being classified as a landfill. The waste is to be retrieved when the Central Waste Complex is capable of receiving it.</p>	

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| 141. | <p><u>Deficiency:</u> Section 4.1.2.4, Container Storage Area Drainage, Page 4-3</p> <p>Precipitation that comes into contact with exposed waste containers could leach chemical and/or radiological contamination. There is no description of how the drainage liquid (run-off) is chemically or radiologically assessed and managed.</p> <p><u>Requirement:</u> The application should discuss the potential for precipitation to leach contaminants from exposed waste containers and how the run-off is assessed to verify the absence of such contamination.</p> <p>DOE-RL/WHC Response: The following text will be added to Section 4.1.2.4: "The Waste is packaged in polyethylene (either double bagged, or bagged and placed in 90 mil polyethylene liners inside 55 gallon DOT 17C or 17H drums containing absorbent material that would absorb any potential leachable waste). The packaging combined with the dry desert climate preclude the leaching of hazardous constituents from the waste. Weekly inspections are performed on waste stored in open trenches to check for evidence of any leakage from drums. Routine radiation surveys are conducted in the burial grounds to check for soil contamination. These checks are more sensitive than hazardous waste tests for verifying that waste drums are not leaking."</p> | |
| 142. | <p><u>Comment:</u> Section 4.6.2.2, Exemption Based on Design, Page 4-5</p> <p>Comment 115 also applies here.</p> <p>DOE-RL/WHC Response: The sentence on Page 4-5 line 31 will be revised to say, "Each compartment weighs approximately 1,000 tons and contains waste lead designated as WT01 and D008." The paragraph beginning on Page 4-6 line 7 will be replaced with the following: "Of the hazardous constituents listed previously, only waste lead is present in quantities requiring regulation under WAC 173-303. This lead is designated as WT01 and D008."</p> | |
| 143. | <p><u>Deficiency:</u> Section 4.6.2.2, Exemption Based on Design, Page 4-5</p> <p>Based upon discussions with U.S. Navy personnel, it is our understanding that the reactor compartments will be encased in steel hulls with a minimum thickness of 3/4 inch, not 3/8 inch. Furthermore, it is now expected that as much as 230 gallons of liquid may remain in the compartments. Therefore, all free liquids have not been drained.</p> | |

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Requirement: Please verify the text. Also, provide a reference for stating "the compartments should probably last longer than 500 years".

DOE-RL/WHC Response: Ecology comments 143, 256, 261, and 262 require further technical evaluation.

144. Deficiency: Section 4.6.3, Liner System, General Items, Page 4-6

The duration of postclosure has not been defined. Therefore, the term "30-year postclosure period" may not be accurate.

Requirement: Delete the term "30-year".

DOE-RL/WHC Response: The "30-year postclosure period" is defined in WAC 173-303-610(7)(a). No text change is required.

145. Deficiency: Figure 4-1, RCRA Compliant Liner System, Page 4-7/8

This figure and several other references indicate a layer of "asphalt". Taken literally, this means that a layer of viscous petroleum residues will be applied over the sand layer. It is unclear if this or asphaltic concrete will be used.

Requirement: Please verify the composition of this layer. Edit the text to specify the composition and purpose of this layer.

DOE-RL/WHC Responses: The only asphalt that will be used on the non-dragoff trench will be asphaltic concrete similar to that used elsewhere in the 200 Areas. The asphaltic concrete will provide pavement for the truck unloading area. Please see the Construction Quality Assurance Plan (CQAP), WHC-SD-W025-PLN-001, Page 23, Section 4.3.6, and the design drawings in WHC-SD-W025-FDR-001 on Page 105 of 397.

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146.	<p><u>Deficiency:</u> Section 4.6.3.1.2, Primary Liner System, Page 4-11</p> <p>All landfill slopes must be no steeper than 4 horizontal: 1 vertical. This applies to both the lined trench slope and the final cover slope.</p> <p><u>Requirement:</u> Edit line 47 to read "4H:1V".</p> <p><u>DOE-RL/WHC Response:</u> The basis for Ecology's requirement of 4H:1V slopes is not clear. Slope stability is discussed in Section 5.1 of FDR-001. Details of these analyses are presented in Appendices C.8, C.9, and C.12 of the Design Report, and indicate acceptably high factors of safety under all design conditions. With respect to constructability, 3H:1V side slopes are routinely constructed without difficulties at several major hazardous waste disposal facilities (one facility even has side slopes as steep as 2H:1V). Operations layer material is also typically spread on these 3H:1V slopes. The Design Report includes a filling plan (Section 6.6) which suggests that the landfill be filled in horizontal lifts. This approach will avoid any unbalanced forces acting downward along the slopes and will thus serve to maximize stability (also see response to comment 150).</p> <p>The final cover has not yet been designed, so slope of the cover has not been determined.</p>	
147.	<p><u>Comment:</u> Section 4.6.4.4.4, Stability of Slopes, Page 4-30</p> <p>It is not just conjectural that sand will not stay on this slope, it is a certainty. There have been a number of reported slope failures at grades of 3H:1V. As far as mitigating this problem, option 1 is undesirable since it maximizes exposure of the geosynthetics, the solution in option 2 is obscure and needs expansion, and option 3 may not work due to crushing under the load of the backfill. Comments 20 and 146 also apply here.</p> <p><u>DOE-RL/WHC Responses:</u> See the Definitive Design Report WHC-SD-W025-FDR-001, Page 14 of 397, Section 5.1.1. and Appendix C.9, Page 264 of 397. The response to Number 146 also applies here.</p>	

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151.	<p><u>Comment:</u> Section 4.6.5.5, Soil Liners, Page 4-39</p> <p>Installation of soil/bentonite liners is underway at the LERF site. A number of refinements are being made to the process. Activities involving the development and installation of the admixed liner should be coordinated with the LERF project to ensure consistency in technical and regulatory matters (See Ecology letter to Wisness from Nord dated January 30, 1991 titled: Standardized Soil-Bentonite Project).</p> <p>DOE-RL/WHC Response: The LERF team has provided lessons learned on problems encountered during their project. Soil/Bentonite plans can be seen in the Definitive Design Report WHC-SD-W025-FDR-001, Section 4.2.1, 4.3.1, and 5.3. The Design Report, Specifications, and CQA Plan provide a great deal of latitude for the Contractor (or Construction Manager) to determine the most suitable types of equipment and procedures for preparing and placing the admix liner. The Specifications require a submittal to the Westinghouse Hanford Company Project Engineer and the CQA Engineer describing these activities. With this approach, the pertinent experience from the LERF Project will be incorporated as appropriate when the Project W-025 Landfill is constructed (see response to comment 19 in regards to an individual test fill).</p>	
152.	<p><u>Comment:</u> Section 4.6.5.5.1, Material Testing Data, Page 4-40</p> <p>Fines content testing (ASTM D 1140) should also be specified.</p> <p>DOE-RL/WHC Response: The CQA Plan requires sieve and hydrometer testing on Eolian sand and admix at the rate of 1 test per 1,000 cubic yards of material. The specified method is ASTM D422, which is much more comprehensive than ASTM D1140 (see WHC-S-045, Section 02224, Paragraph 2-3).</p>	
153.	<p><u>Deficiency:</u> Section 4.6.5.5.1, Material Testing Data, Page 4-41</p> <p>It is not sufficient to only use a nuclear densimeter when measuring density. A minimum number of sand cone tests, ASTM D1556-82, should be performed to provide calibration and backup for the nuclear densimeter.</p>	

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	<p><u>Requirement:</u> The frequency of performing sand cone tests must be specified.</p> <p>DOE-RL/WHC Response: The CQA Plan (Section 4.3.2) requires that nuclear gage density measurements be verified with either sand cone (ASTM D1556) or rubber balloon (D2167) tests. At least 1 of these tests is required for each 2 lifts of admix placed, or 1 per day, whichever is greater.</p>	
154.	<p><u>Deficiency:</u> Section 4.6.5.5.2, Soil Liner Compatibility, Page 4-41</p> <p>A permeability of 1×10^{-7} centimeters per second is a maximum value, not a minimum value as indicated on line 42.</p> <p><u>Requirement:</u> Edit the word "minimum" to read "maximum".</p> <p>DOE-RL/WHC Response: The Design Report WHC-SD-W025-FDR-001, Page 18 of 397, Section 5.3.2 has the correct terminology. The word has been changed to a "maximum value" in the revised Chapter 4.0 permit application.</p>	
155.	<p><u>Comment:</u> Section 4.6.5.5.5, Engineering Report, Page 4-43.</p> <p>If this report is complete, it must be more specifically referenced and provided to Ecology. If it is not, provide an estimate for when it will be completed and modify the text to note that a copy will be provided to Ecology for review and approval.</p> <p>DOE-RL/WHC Response: The Engineering Report has been provided to Ecology for review (see the Design Report WHC-SD-W025-FDR-001, DOE-RL-88-20, Supplement 2, Volume 1 of 2., Chapter 4).</p>	
156.	<p><u>Deficiency:</u> Section 4.6.6.1.1, Primary System, Page 4-44</p> <p>The text here states that the primary drainage layer will be composed of gravel. This contradicts Figure 4-1 which specifies sand.</p> <p><u>Requirement:</u> Clarify this contradiction and edit the application as necessary.</p> <p>DOE-RL/WHC Response: The Primary Drainage Layers will be gravel (see the Design Report WHC-SD-W025-FDR-001, DOE-RL-88-20, Supplement 2, Volume 1 of 2, Chapter 4, Page 20 of 397,</p>	

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159.	<p><u>Deficiency:</u> Section 4.6.6.1.1, Primary System, Page 4-45</p> <p>It is insufficient to say the primary sumps will be monitored "regularly".</p> <p><u>Requirement:</u> The monitoring frequency should be specified as weekly.</p> <p><u>DOE-RL/WHC Responses:</u> See the Design Report WHC-SD-W025-FDR-001, Page 37 of 397, Section 7.2. Periodic (daily) readings of the leachate levels in the primary and secondary sumps will be obtained and recorded.</p>	
160.	<p><u>Deficiency:</u> Section 4.6.6.1.2, Secondary System, Page 4-46</p> <p>There is no reference to a Response Action Plan (RAP) which is required by EPA's minimum technology requirements for landfills. The RAP addresses the handling of liquids which enter the leachate detection, collection and removal system (LCDRS) and the actions to be taken in response to liquids in the LCDRS.</p> <p><u>Requirement:</u> A RAP must be written and included in this application. Refer to the Grout Processing Facility RAP for guidance.</p> <p><u>DOE-RL/WHC Response:</u> A Response Action Plan will be included in the permit application prior to operation of the landfill.</p>	
161.	<p><u>Deficiency:</u> Section 4.6.6.5, System Compatibility, Page 4-47</p> <p>There is no mention here or throughout the text on fingerprinting FML's.</p> <p><u>Requirement:</u> Fingerprinting must be conducted for all synthetic liners. A discussion of the fingerprinting program must be presented in the text. Furthermore, the reference to "Farnsworth et al. 1988" should be corrected to read "Farnsworth et al. 1989".</p> <p><u>DOE-RL/WHC Response:</u> Fingerprinting will be conducted (see the Design Report WHC-SD-W025-FDR-001, Page 27 of 397, Section 6.3.1. and the 9090 Test Report to be submitted to Ecology). The reference to Farnsworth et al. is no longer cited in the revised Chapter 4.0.</p>	

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162. Deficiency: Section 4.6.7.3, Construction Quality Control, Page 4-49

Although Appendix 4F provides some construction quality control information for the liner system, the EPA requires a comprehensive construction quality assurance (CQA) plan for the entire facility in the Hazardous and Solid Waste Amendments to RCRA.

Requirement: A CQA plan must be provided as part of the application for the LLBG which addresses the EPA's, as well as Ecology's, concerns.

DOE-RL/WHC Response: The CQA Plan has been submitted to Ecology.

163. Comment: Section 4.6.8.1.1, Design and Performance, Page 4-50

What factor of safety does a 0.3 foot freeboard provide?

DOE-RL/WHC Response: See the Design Report WHC-SD-W025-FDR-001, Page 122 of 397, for surface water hydrology calculations. Drainage ditch design is presented in Appendix C.1 of the Design Report. Because the total cross sectional area of the ditch is 3 times the area of flow for the peak 25-year storm, the factor of safety is 3.

164. Deficiency: Section 4.6.8.5, Maintenance, Page 4-52

Given the sandy and windy conditions of the Hanford site, as well as the problems associated with tumbleweeds, it would seem maintenance may be a greater problem than projected.

Requirement: Discuss the effect of wind, sand and tumbleweeds on drainage ditch maintenance.

DOE-RL/WHC Response: See the Design Report WHC-SD-W025-FDR-001, Page 37 of 397, Section 7.2. Surface drainage ditches surrounding the landfill should be cleaned out and graded in the fall of each year prior to start of the rainy season (see Section 4.6.8.5. of the revised Chapter 4.0).

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165. Comment: Chapter 5, Groundwater

Although Ecology concurs with the previous NOD responses made on this chapter, a number of new comments on this chapter are presented and may address similar concerns. It is our understanding that this chapter has been extensively revised since this application's submittal. Therefore, although the specific Chapter 5 comments which follow may no longer be applicable, the following general requirements should be addressed in the revised text. Chapter 5 should address the following: 1) all stages of monitoring well installation and well sampling should be coordinated with Ecology; 2) all lab result reports must be provided to Ecology; 3) all well completion reports must be provided to Ecology; 4) the revised chapter should utilize post 1987 data as well as prior data; and 5) provide supporting descriptions for the well location model.

DOE-RL/WHC Response: 1) DOE/RL will continue to inform Ecology in advance of monitoring well installation and sampling plans. Advance information on each year's drilling program for installing new monitoring wells is provided in quarterly groundwater monitoring reports or in letter reports to Ecology. Advance information on well sampling is provided in the Part B permit application for both Interim Status and the proposed Final Status programs. This procedure provides Ecology with the opportunity to comment upon and discuss well installation and sampling plans at any time.

2) Ecology will continue to be provided with validated laboratory data from the LLBG monitoring wells in quarterly groundwater monitoring reports. Because of their volume, raw and unvalidated data are not automatically distributed; however, laboratory result reports will be provided to Ecology along with the validated laboratory data upon request.

3) Well Completion Reports for the LLBG monitoring wells will be provided to Ecology.

4) Post-1987 data will be incorporated into the revised Chapter 5.

5) The description of the Monitoring Efficiency Model used to locate monitoring wells will be expanded and clarified in response to Ecology comments. Further, references will be provided to technical reports describing the model that have been prepared since the first draft of Chapter 5 was submitted to Ecology.

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166.	<p><u>Deficiency:</u> Section 5.2.1, Interim Status Groundwater, Page 5-2</p> <p>According to the text, the monitoring system should accomplish the following: 1) define the specific waste management areas for the LLBG, 2) establish an initial ground water monitoring well network, and 3) characterize the hydrogeologic properties of the upper most aquifer beneath the LLBG. Item 3 was not fully accomplished nor completely presented in the application.</p> <p><u>Requirement:</u> Based upon the most current data, item 3 must be completed according to the premise in the application.</p> <p>DOE-RL/WHC Response: The third objective of the interim status program was clarified in response to Ecology Comment 33, to indicate that the first 35 wells were intended to provide preliminary hydrogeologic properties of the uppermost aquifer system beneath the LLBG using data collected from the monitoring well network and from previously collected or published data. These data are being supplemented by additional data collected while installing new monitoring wells, and by monitoring data collected from the entire existing network. Chapter 5 will be revised to discuss these new data and will either present them or describe how they may be obtained. Characterization of the hydrogeologic properties of the uppermost aquifer is sufficient to support this Part B permit application.</p>	
167.	<p><u>Deficiency:</u> Section 5.2.3.2.1, Groundwater Elevations, Page 5-18</p> <p>Although the text states "Hydrographs for the interim status wells are given in Last et al. (1989)", no comments related to the hydrographs or any interpretations of the conclusion are given.</p> <p><u>Requirement:</u> The information from the cited reference should be provided along with the conclusions drawn from this information.</p> <p>DOE-RL/WHC Response: The water level changes shown in the hydrographs are summarized in the paragraph containing the Last et al. citation, and the preceding paragraph of the text. The hydrographs are too short (covering a period of only about 8 months) to draw meaningful conclusions regarding long-term trends. The revised Chapter 5 will address the longer period of record now available, and present interpretations of that record.</p>	

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| 172. | <p><u>Comment:</u> Section 5.3.4, Regional Hydrogeology, Page 5-39</p> <p>The "actual amount of recharge" needs to be revised based upon the new data that is now available.</p> <p>DOE-RL/WHC Response: The text will be revised based upon the more recent studies of Gee and others, to indicate that the actual net recharge is not known, but is thought to vary locally from near zero to about 4 inches per year, depending upon the local soil and vegetative characteristics.</p> | |
| 173. | <p><u>Comment:</u> Section 5.3.4, Regional Hydrogeology, Page 5-39</p> <p>The paragraph beginning on line 23 is unclear. Please clarify how the difference between high and low transmissivities effect the monitoring network.</p> <p>DOE-RL/WHC Response: A higher and larger mound developed in the 200-West Area because a greater hydraulic gradient and aquifer thickness were required to move the same volume of water through a less transmissive medium. The effects of varying hydraulic properties on the monitoring network are discussed in Section 5.5.2 rather than in this section. The transmissivity may be a factor in determining an appropriate buffer zone width, and will affect the modeling results if the hypothetical plume moves so slowly that it does not reach a monitoring well. At the Hanford Site, the plumes would be expected to move with sufficient velocity that the network design developed with the help of the Monitoring Efficiency Model is not affected by the transmissivity. The discussions of this and other characteristics and assumptions of the model will be expanded and clarified in Section 5.5.2.</p> | |
| 174. | <p><u>Comment:</u> Section 5.3.4, Regional Hydrogeology, Page 5-39</p> <p>The quoted ranges of hydraulic conductivity and the information provided in Tables 5-3 and 5-4 are not relevant because they are provided as estimated ranges. Additional discussion should be presented to indicate the impact of this variability on the design of the monitoring system.</p> <p>DOE-RL/WHC Response: The general ranges of hydraulic conductivity are relevant to the discussion on page 5-39 in Section 5.3.4 because that section addresses regional hydrogeology. The general water quality data presented in Tables 5-3 and 5-4 are also</p> | |

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	relevant to the discussion of regional hydrogeology in Section 5.3.4. More detailed discussions of hydraulic properties at the LLBG begin in Section 5.3.5 where the results of aquifer tests performed in the LLBG monitoring wells and other nearby wells are presented. An expanded discussion of the effects of the variability in hydraulic conductivity on the design of the monitoring system will be provided in Section 5.5.2.	
175. <u>Comment</u> :	Section 5.3.5, Uppermost Aquifer, Page 5-42 The thickness of the sediments must be specified. This information can be found in Last (1989). DOE-RL/WHC Response: The total thicknesses of the sediments beneath each of the LLBG will be added to the text in Sections 5.3.5.1.1 (for those in the 200-East Area) and 5.3.5.2.1 (for those in the 200-West Area).	
176. <u>Deficiency</u> :	Section 5.3.5.1.4, Vadose Zone, Page 5-46 There is no data provided from recent drilling. <u>Requirement</u> : The information from the most recent drilling program must be provided. DOE-RL/WHC Response: The text will be revised to provide additional data on the vadose zone obtained from recent drilling.	
177. <u>Deficiency</u> :	Section 5.3.5.1.5, Aquifer Properties, Page 5-48 The porosity was not tested, but estimated. This is not acceptable because these values should have been obtained after analyzing samples from recent drilling. <u>Requirement</u> : The analysis of soil samples should include determining porosity from undisturbed samples obtained during recent drilling. DOE-RL/WHC Response: The text will be revised to provide available information on porosity determined from samples taken in the aquifer during recent drilling.	

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178. Comment: Section 5.3.5.1.5, Aquifer Properties, Page 5-49

The text states that "The impact of the mound reduction on the local hydraulic gradient and velocity may be significant." Please elaborate on this comment.

DOE-RL/WHC Response: The text in Section 5.3.5.1.5 will be revised to further explain the potential effects of mound reduction on local hydraulic gradients and flow velocities. In general, hydraulic gradients would be expected to decrease in the vicinity of the mounds, groundwater flow directions may change, and groundwater flow velocities may decrease.

179. Comment: Section 5.3.5.2.4, Vadose Zone, Page 5-57

The text indicates the presence of an 8-15 foot thick section of unconsolidated loess. Was this section analyzed for its effect on pollutant migration? The applicable data supporting this effect, or the absence of an effect, must be provided.

DOE-RL/WHC Response: The various stratigraphic horizons within the vadose zone in the 200 West Area, including the loess, sandy gravels, sands, and cemented calcium carbonate units, were considered in estimating the size of the source in the Monitoring Efficiency Model. Because the model assumes constant, steady state releases, retardation within the vadose zone was not considered. The horizons with smaller pore sizes such as the loess would tend to spread a release over a wider area because of lower hydraulic conductivities and stronger lateral capillary effects. However, with wider lateral spreading the contaminant flux per unit surface area of the aquifer decreases, reducing the contaminant concentration in the aquifer. Sensitivity studies that will be presented in the revised text have shown that the two effects of lateral spreading and reduced concentration offset each other, resulting in a low net sensitivity to lateral spreading for the final network design. The network design was not found to be sensitive to the presence of the loess, and a detailed evaluation of its properties was not considered necessary.

180. Deficiency: Section 5.3.5.2.4, Vadose Zone, Page 5-58

The text indicates that the sediment thickness varies from 80-150 feet and the moisture content varies from 2-18.7%. This is not an adequate description of the unsaturated zone.

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	<p><u>Requirement:</u> The results of soil sampling and analysis from new wells should be used for the description of the unsaturated zone. The changes of moisture content should be then mapped more precisely.</p> <p>DOE-RL/WHC Response: The text will be revised to provide an expanded discussion of the properties of the vadose zone. This will include additional details on changes of moisture content and new data that have become available from recent drilling.</p>	
181.	<p><u>Comment:</u> Section 5.3.6, Underlying Aquifer, Page 5-60</p> <p>The aquifer description should include how the new wells respond to monitoring. In addition, new data obtained during drilling and monitoring should be included.</p> <p>DOE-RL/WHC Response: Several new wells not associated with this permit application have been drilled into the underlying Rattlesnake Ridge aquifer since the 1989 text was prepared. Although none of the wells in the Rattlesnake Ridge aquifer are part of the monitoring network for the LLBG, the text will be revised to incorporate more recent data that may be relevant.</p>	
182.	<p><u>Deficiency:</u> Section 5.4, Contaminant Plume Description, Page 5-62</p> <p>The text states "Presently, water quality information is available for only the first quarter sampling event (October 1988)." New data is now available.</p> <p><u>Requirement:</u> The new data should be presented.</p> <p>DOE-RL/WHC Response: Additional water quality data are now available and statistical analysis of the interim status indicator parameters has been completed. The text will be revised in Section 5.2.3 to present the new water quality data that has become available from the LLBG monitoring wells, and will be revised in Section 5.4 to present any new information regarding any contamination that may have entered the groundwater from one of the regulated units.</p>	

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183.	<p><u>Deficiency:</u> Section 5.4.1.3, Vadose Zone, Page 5-63</p> <p>The vadose zone description does not include any site specific information, nor soil testing results from the 36 new LLBG boreholes.</p> <p><u>Requirement:</u> The new information should be provided.</p> <p>DOE-RL/WHC Response: The text will be revised to incorporate available site-specific information relating to plume travel times in the vadose zone, including results from the new LLBG boreholes.</p>	
184.	<p><u>Deficiency:</u> Section 5.4.1.3.2, Measured Contaminant Plumes, Page 5-65</p> <p>There is no supporting evidence for the example given in the text. Therefore, the conclusions are premature.</p> <p><u>Requirement:</u> The data which supports this example must be provided.</p> <p>DOE-RL/WHC Response: The text will be revised to provide additional supporting information (plan and cross-section views of the extent of contamination) and to cite a recent modeling study of the 241-T-106 tank leak prepared by Pacific Northwest Laboratory that provides an analysis of the leak.</p>	
185.	<p><u>Deficiency:</u> Section 5.4.2, Travel Time, Page 5-70</p> <p>The estimated travel times given here are not substantiated because aquifer parameters and flow paths are not presently known.</p> <p><u>Requirement:</u> New travel times should be specified based on more accurate calculations.</p> <p>DOE-RL/WHC Response: Travel times based upon actual plume migration rates at the Hanford Site on the scale of interest are more accurate than the results of calculations based upon averaged aquifer parameters and flow paths inferred from those plumes. Further, travel times based upon theoretical considerations can only be substantiated if actual plume data are available at a burial ground site on the same scale of interest. Thus it is preferable, where possible, to base travel time estimates upon actual plume migration rates rather than</p>	

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upon aquifer parameter and flow path data. The regional travel times given in the text are based upon actual large-scale plume migration rates for the Hanford Site in the uppermost aquifer. Their accuracy should be equal to or greater than that for travel times computed for similar flowpath lengths at other (not at Hanford) landfill sites, and is considered acceptable. Because these estimates are based upon actual plume migration rates, any new aquifer parameter or flowpath data that estimate significantly different rates would be of questionable validity.

186. Comment: Section 5.4.4, Summary of travel, Page 5-70

See above comment.

DOE-RL/WHC Response: See response to Comment 185.

187. Deficiency: Figures 5-28, 5-29 and 5-30, Pages 5-71 through 5-76

These figures provide no interpretation of plume behavior in different lithological formations.

Requirement: The modeling should include the behavior of the plume in different lithologies using field obtained parameters.

DOE-RL/WHC Response: The text will be revised to provide an interpretation of plume behavior in different lithological formations. The discussion and application of the model in Section 5.5.2 will be revised to incorporate dispersivity values obtained from Hanford Site plumes, and to evaluate the effects of changing lithologies and hydrologic parameters on the model results.

188. Comment: Section 5.4.6, Conclusions, Page 5-77

The conclusions are unclear and need to be substantiated with new data.

DOE-RL/WHC Response: The text will be revised to clarify and update the conclusions, based upon the new data that have become available.

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| 189. | <p><u>Comment:</u> Section 5.5.1, Indicator Parameters, Page 5-80</p> <p>Were any volatile organic compounds or supplemental parameters present in the soil or water during the more recent drilling? Provide the justification for choosing these "indicator" parameters.</p> <p>DOE-RL/WHC Response: The text will be revised to present groundwater monitoring data obtained since the 1989 draft was prepared. The indicator parameters will be reevaluated based on these new data and on a reanalysis of the quantity and chemical form of each parameter in the waste. The justification for developing the indicator parameter list will be presented.</p> | |
| 190. | <p><u>Deficiency:</u> Section 5.5.2, Groundwater Monitoring Program, Page 5-82</p> <p>This section does not address the interim status monitoring program.</p> <p><u>Requirement:</u> The groundwater monitoring program should be based on the results of interim monitoring and incorporate all improvements necessary for the final detection system.</p> <p>DOE-RL/WHC Response: The text will be revised to explain how the results of the interim status monitoring program are used to design the final detection system. Emphasis will be placed upon the use of the expanded groundwater level data to refine the directions of groundwater flow, and the use of the aquifer test data to assess the influence of permeability variations on monitoring network design.</p> | |
| 191. | <p><u>Deficiency:</u> Section 5.5.2.1.1, Background, Page 5-84</p> <p>There is a need for monitoring the middle portion of the aquifer. The lithology between some "deep" and "shallow" portions might be such that it will retain pollutants.</p> <p><u>Requirement:</u> A portion of the monitoring wells must be screened to monitor the middle section of the aquifer if the aquifer thickness exceeds 40 feet.</p> <p>DOE-RL/WHC Response: Retention of pollutants in the middle section of the aquifer would require (1) the presence of lithologic layers that could retain and laterally divert contaminants that would otherwise reach the bottom of the aquifer, and (2) the presence of</p> | |

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	<p>contaminants in the middle section of the aquifer. The stratigraphy of the saturated zone is discussed in Sections 5.3.5.1.3 (for the 200-East Area) and 5.3.5.2.3 (for the 200-West Area), and illustrated in Figures 5-16 and 5-19. In both cases the sediments in the middle of the aquifer are sands, gravelly sands, and sandy gravels with no laterally extensive fine-grained silts or clays. There is therefore no evidence that a lithologic layer that could retain and laterally divert contaminants is present. The presence of contaminants in the middle section of the aquifer beneath the LLBG is also unlikely, for the reasons stated in the accepted DOE-RL/WHC response to Comments 68 and 78. In view of the lack of identified lithologic layers that could cause retention and lateral diversion of contaminants, and the small likelihood that contaminants could reach the middle section of the aquifer, monitoring wells completed in the middle section of the aquifer are not considered to be needed.</p>	

192. Comment: Section 5.5.2.1.1, Background, Page 5-84

The ranges of hydraulic conductivity should be based on the soils sampling from new wells. The aquifer properties should be described in greater detail after obtaining the new samples and lab analysis results. This will allow the calculation of transmissivity for each change of lithology within the Hanford or Ringold formation.

DOE-RL/WHC Response: Identification of hydraulic conductivity on the basis of sedimentary facies rather than geologic formations is being studied at the Hanford Site (see, for example, Poeter and Gaylord, Groundwater, Vol. 28 No. 6, 1990). These studies will be reviewed and the correlations adapted, where pertinent, to the LLBG. Both new and old soil sampling data at the LLBG will be used in this correlation.

193. Deficiency: Section 5.5.2.1.2, Monitoring Design Approach, Page 5-84

The assumptions about hydraulic conductivities can be misleading. As a consequence, some constituents can be missed in the monitoring wells.

Requirement: The text here must provide support for the assumptions.

DOE-RL/WHC Response: The text will be revised to more fully explain the monitoring design approach, which is based upon more factors than the hydraulic conductivity and depth considerations discussed here.

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197. Deficiency: Section 5.5.2.1.9.2, Deep Well Locations, Page 5-114

Two deep wells were constructed for the interim monitoring network, but no results from these wells are presented to support these conclusions. Deep wells might be extremely important in total network efficiency. If there are differences in the predicted distribution of aquifers, the results from sampling deep wells will also confirm or negate changes in transmissivities.

Requirement: The results from the deep wells must be presented.

DOE-RL/WHC Response: There are actually four deep LLBG monitoring wells, two at upgradient and two at downgradient locations. The text will be revised to present the monitoring results from the deep wells, and to evaluate the implications of those results on the adequacy of the total monitoring well network.

198. Comment: Section 5.5.2.1.11, Well Installation Staging, Page 5-125

The text indicates that the monitoring system will consist of 69 shallow wells and 6 deep wells. Of these, 42 new shallow wells and 2 new deep wells will be installed. This means that 27 shallow wells and 4 deep wells were installed for the interim monitoring system. However, page 5-1 indicates that thirty-five wells were in the interim monitoring system. Please correct this discrepancy.

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200.	<p><u>Comment:</u> Section 5.5.2.3, Representative Samples, Page 5-129</p> <p>Sampling may be subject to revision depending upon results from the past two years of monitoring, 1991 monitoring, and one additional year for monitoring all the wells in the network.</p> <p>DOE-RL/WHC Response: The sampling procedure will be reviewed for adequacy based upon the results obtained from previous monitoring. The text will be modified to provide for continuing review and evaluation of the representativeness of the samples based upon past monitoring results.</p>	
201.	<p><u>Comment:</u> Section 6.2.2.6.2, Leak Detection System, Page 6-4</p> <p>The text here indicates that the leak detection system design was scheduled for completion in February 1990. If complete, it must be included in the revised text. If not complete, provide the new date for completion. This also applies to the LCRS referred to in Section 6.2.2.6.4.</p> <p>DOE-RL/WHC Response: The information requested was provided to Ecology in September 1990 as the Supplement to the Permit Application for the LLBG, "Low Level Burial Waste Dangerous Waste Permit Application Design Documents, DOE/RL 88-20, Supplement 2."</p>	
202.	<p><u>Comment:</u> Section 6.3.1.3, Emergency Equipment, Page 6-5</p> <p>List any emergency equipment located at each trench or burial ground, i.e., spill control material, fire suppressants, first aid. If there is none, this should be justified.</p> <p>DOE-RL/WHC Response: The following text will be added to Section 6.3.1.3: "Emergency equipment is not located at burial ground trenches. Portable fire extinguishers are carried on all LLBG operations vehicles. The 200 area fire station with trained fire fighting and emergency medical personnel and equipment is located within five minutes of any location within the LLBG. Spill cleanup materials are readily available from the 272WA building and the Central Waste Complex staging area (overpack drums, protective clothing, handling and cleanup equipment). The Building Emergency Plan (Contingency Plan) lists the emergency equipment."</p>	

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203. Comment: Section 7.2, Emergency Coordinators, Page 7-2

The identification of emergency coordinators is under development through the facility wide permit negotiations. The need to identify these individuals along with their addresses and phone numbers will be addressed upon resolution of this issue. WAC 173-303-350(3)(d)

DOE-RL/WHC Response: The names of Building Emergency Directors and Building Wardens are maintained by the Hanford Patrol Operations Center and the Hanford Occurrence Notification Center (ONC) on a twenty four hour basis. These names may accessed by calling the ONC.

204. Deficiency: Section 7.4.1.3, Notification of Authorities, Page 7-19

The discussion in the first paragraph on this page does not address Ecology's Nuclear and Mixed Waste Program Policy for spill reporting. Also, WAC 173-303-082 is an incorrect citation for spill reporting.

Requirement: The above referenced policy, to be outlined in a forthcoming letter from Ecology, must be incorporated into the text. The correct regulatory citation is WAC 173-303-145.

DOE-RL/WHC Response: The citation will be corrected as requested. The text will be revised as required to respond to the forthcoming letter that defines Ecology's Nuclear and Mixed Waste Program Policy.

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205.	<p><u>Comment:</u> Section 7.4.1.3, Notification of Authorities, Page 7-19</p> <p>Spill reports should be submitted to Ecology's Kennewick office:</p> <p>Washington State Department of Ecology 7601 West Clearwater Suite 102 Kennewick, WA 99336 Phone: (509) 546-2990</p>	
	<p>Please note that the proper zip code for Ecology's Olympia Office is 98504-8711, not 98501-8711.</p>	
	<p>DOE-RL/WHC Response: The address will be changed to identify the Kennewick office for reporting.</p>	
206.	<p><u>Comment:</u> Section 7.4.6, Treatment, Storage, or Disposal, Page 7-32</p> <p>The text should indicate that releases of dangerous wastes or materials which, upon release, would be considered a dangerous waste, must be handled in accordance with WAC 173-303.</p> <p>DOE-RL/WHC Response: The text will be revised to comply with the revised regulations in WAC 173-303-340.</p>	
207.	<p><u>Deficiency:</u> Section 9.2.1.2.2, Migration Through the Vadose, Page 9-8</p> <p>Based upon discussions in Section 2.1.2.1 regarding past practices, the statement that "no liquid waste is disposed of in the LLBG" is incorrect.</p> <p><u>Requirement:</u> Delete or edit the sentence containing this phrase on line 34 and 35.</p> <p>DOE-RL/WHC Response: The sentence will be edited as follows: "A leak of this magnitude is unlikely because free liquid currently in containers within the LLBG is to be retrieved. Since November 23, 1987, no free liquid has been accepted in the LLBG."</p>	

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208. Deficiency: Section 11.1.4.3, Gas Sampling, Page 11-27

Hydrogen gas generation recently created concerns in the tank farms and grout vaults. Therefore, it may not have been prudent to discontinue gas sampling.

Requirement: In light of the recent hydrogen gas concerns, justification should be provided for not taking gas samples until immediately before retrieval.

DOE-RL/WHC Response: Unlike the tank farms, it is expected that radiogenic hydrogen will escape into the atmosphere through the relatively permeable soils and that dangerously high concentrations are unlikely. However, this issue will be addressed in the health and safety plan for waste retrieval, described in Section 11.1.4.6. The word "immediately" will be deleted from Section 11.1.4.3.

209. Comment: Section 11.1.5.2, Cover Design, Page 11-29

There is a reference on line 33 and throughout this application citing a 1982 EPA guidance document on landfill design. The EPA has published numerous technical guidance documents on this subject since that document was issued. In addition, a substantial amount of regulatory changes concerning dangerous waste landfills have occurred since that time. The LLBG permit application will be evaluated against the more recent documents. It is therefore recommended that past and future work be assessed against the most current guidance.

DOE-RL/WHC Response: The cover design in the permit application is conceptual and was prepared in accordance with regulatory guidance existing at the time of writing (1988). Actual (detailed) cover design has yet to be done and will be performed in accordance with the most current regulations and guidance. The text in Section 11.1.5.2 will be modified to include this discussion.

210. Comment: Section 11.1.5.2.1, General Description, Page 11-30

Comment 146 also applies here.

DOE-RL/WHC Response: 3H:1V slopes have been included around the margins of the covers because of limited horizontal distance between the waste trenches and the boundaries of the burial grounds. As shown on Figure 11-9, this slope is only about 5 feet high, so toe

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support is substantial and stability will not be a problem. In addition, this slope will be covered with a 2-foot-thick riprap layer to prevent gullyng and animal intrusion. Hence, these slopes are considered adequate as designed.

211. Comment: Figures 11-15 and 11-16, Pages 11-43/44 and 11/45/46

Typos. The burial ground in Figure 11-15 should be "218-W-5", not "218-E-5". The burial ground in Figure 11-16 should be "218-W-6", not "218-E-6".

DOE-RL/WHC Response: Corrections will be made as requested.

212. Comment: Section 11.1.5.2.2.1, Native Soil Grade Layer, Page 11-48

A statement should be made that Ecology will be notified and provided a copy of the construction test pad plan for review and approval prior to initiating construction of this pad.

DOE-RL/WHC Response: Ecology will be provided with a copy of the test pad plan for review prior to construction. This also applies to a number of other plans and designs, many of which have not been completed or even identified at this time. On this basis, it is not appropriate to attempt to identify such submittals in the permit application. EPA guidance suggests preparation of a CQA Plan for landfill and closure cover construction, and such a plan will therefore be prepared for the LLBGs. As an example, Ecology is referred to the CQA Plan for the non-dragoff landfill, which was recently submitted for review and includes detailed plans for a test fill.

213. Deficiency: Section 11.1.5.2.2.3, Soil/Bentonite Layer, Page 11-49

The dinking method described for the soil/bentonite layer has been used with mixed results. The method of spreading bentonite on the ground and tilling it into the soil is fraught with inexactness. Soil/bentonite mixing can only be provided for with any certainty by processing in a pugmill. This method is being used for the LERF project and will also be used at the grout facility.

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215.	<u>Comment:</u> Section 11.1.5.2.2.6, Drainage Layer, Page 11-52	
	Comment 157 also applies here.	
	DOE-RL/WHC Response: The cover design in the permit application is conceptual and was prepared in accordance with regulatory guidance existing at the time of writing (1988). Actual (detailed) cover design has yet to be done and will be performed in accordance with the most current regulations and guidance. The text in Section 11.1.5.2 will be modified to include this discussion.	
216.	<u>Comment:</u> Section 11.1.5.2.2.9, Vegetative Cover, Page 11-54	
	The justification for vegetative specie selection should be provided or a document referenced which, at a minimum, discusses other vegetative varieties which were considered and the reasons for there dismissal.	
	DOE-RL/WHC Response: The selection of wheat grasses was based on successful past practice at the Hanford Site. Formal documentation of these practices has not been identified, but a comprehensive search will be conducted. In addition to the existing discussion in the permit application, the text will be modified to note that Russian wheat grasses develop a much higher root density than native wheat grasses and thus more rapidly extract water from the soil profile (Cadwell et al., 1983). The text will also be modified to note that other grasses, if proven more suitable, may be substituted if reseeding is required during the postclosure period.	
	Cadwell, M.M, Dean, T.J., Nowak, R.S., Dzurec, R.S., and Richards, J.H., 1983, "Bunchgrass Architecture, Light Interception, and Water Use Efficiency: Assessment by Fiber Optic Point Quadrants and Gas Exchange", <u>Oecologia</u> , Vol 59, pp. 178-184.	

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217.	<p><u>Comment:</u> Section 11.1.5.2.2.10, Riprap Bedding Layer, Page 11-55</p> <p>The bedding layers should also be designed as a filter. Otherwise the storm water runoff and wind will remove fines from beneath the riprap and eventually cause undermining of the riprap and failure.</p> <p>DOE-RL/WHC Response: A geotextile layer will be placed between the bedding layer and the riprap to serve as a filter. Figure 11-9 and the text in Section 11.1.5.2.2.10 will be modified accordingly.</p>	
218.	<p><u>Comment:</u> Section 11.1.5.3, Minimization of Liquid, Page 11-56</p> <p>The term "leakance factor" should be edited to read "leakage fraction".</p> <p>DOE-RL/WHC Response: The correction will be made as requested.</p>	
219.	<p><u>Comment:</u> Section 11.1.5.3, Minimization of Liquid, Page 11-57</p> <p>Although the regulations require the use of 24-hour, 25-year design storms, the text here specifies a 30-year storm event to match the design life of the covers. Although this makes sense, how does the 30-year design life compare to DOE's requirements for constructing mixed waste disposal facilities? (see comment 128). In addition, would it not be more conservative to design for a shorter duration storm (e.g. 6-hour duration as specified in DOE Order 6430.1A) as it is probably more indicative of the most intense storms received by the Reservation?</p> <p>DOE-RL/WHC Response: With respect to DOE's long-term performance objectives for mixed waste facilities, the permit application does not attempt to address compliance with these requirements. Section 11.1.1.1 states that "compliance with these objectives will be demonstrated through a radiological performance assessment as specified by the Department of Energy" and discusses this issue in more detail.</p> <p>For the purposes of HELP modelling discussed in Section 11.1.5.3, the 24-hour storm is more conservative than the 6-hour storm because it applies a greater total volume of precipitation to the cover (see Table 11.D.1). The intensity of the 24-hour storm is less than that of the 6-hour storm, but this consideration is not relevant to the proposed analysis.</p>	

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220.	<p><u>Comment:</u> Section 11.1.5.4.3, Deep-Rooted Plants, Page 11-58</p> <p>Roots will not penetrate a coarse, clean, dry, uniformly graded gravel layer. Such a layer, one foot thick and placed above the drainage layer, should be considered. This layer could be keyed into the riprap bedding layer to provide a biotic barrier across the entire cover.</p> <p>DOE-RL/WHC Response: This type of barrier will be evaluated during detailed cover design. The text in Section 11.1.5.4.3 will be modified accordingly.</p>	
221.	<p><u>Requirement:</u> Section 11.1.5.4.4, Burrowing Animals, Page 11-59</p> <p>The biotic barrier discussed in comment 220 would also address the burrowing animal concern. In addition, the HPDE liner should be designed with the following criteria to reduce the potential for attack by burrowing animals: 1) underground installation of free edges should be avoided, 2) angles of 90 degrees and less should be avoided, and 3) any radius of curvature should be greater than 60mm.</p> <p>DOE-RL/WHC Response: See response to Comment 220. With respect to the suggestions about HDPE liner design, the conceptual design incorporates all of these features, and it is expected that the detailed design will as well.</p>	
222.	<p><u>Deficiency:</u> Section 11.1.5.5.1, Cover Drainage, Page 11-60</p> <p>The text does not identify where the cover drainage goes. In addition, a means must be provided to monitor the amount of liquid collected from the cover.</p> <p><u>Requirement:</u> Define where the cover drainage will go and how the amount of cover drainage will be measured.</p> <p>DOE-RL/WHC Response: Cover drainage is shown on Figures 11-10 through 11-16. Drainage patterns were designed to conform to the extent possible with existing topography and to discharge into natural channels presently draining the cover areas. More comprehensive surface water management plans will be prepared as part of detailed cover design.</p>	

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223.	<p><u>Comment:</u> Section 11.1.5.4.3, Page 11-61</p> <p>In regards to the choice of storm duration, comment 219 also applies here.</p> <p>DOE-RL/WHC Response: The type of storm depends on the type of analysis and the model being used. In Appendix 11, appropriately conservative storms were always selected, for example, the 50-year, 20 minute rainfall for sheet erosion (Appendix 11.D) where intensity is critical. Also see response to Comment 219.</p>	
224.	<p><u>Comment:</u> Section 11.1.5.6, Settlement and Subsidence, Page 11-67</p> <p>Comment 107 also applies here.</p> <p>DOE-RL/WHC Response: Lift thickness for the grade layer will be selected so that the compaction specification can be satisfied. The compaction specification of 95% of modified Proctor density was selected as the maximum potentially achievable with conventional methods, and has been found to effectively minimize settlements under structures far less tolerant than the closure cover. Increasing the cover slope from 1.5% to 3%, as discussed above, will also lessen the impact of any areal settlements.</p>	
225.	<p><u>Deficiency:</u> Section 11.1.6, Schedule for Closure, Page 11-68</p> <p>It is unacceptable to defer closure of trenches containing mixed waste for extended periods of time in order to fill low-level waste trenches near the mixed waste trench. Overall, the current closure schedule does not provide for the timely isolation of the mixed waste trenches.</p> <p><u>Requirement:</u> The configuration of proposed trenches must be reevaluated to reduce the amount of time the trenches will remain open. In addition, acceleration of the retrieval schedule must be assessed to shorten the time mixed waste trenches are uncovered.</p>	

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DOE-RL/WHC Response: The schedule for LLBG closure is in review. A revised schedule may be forthcoming after the impact of acceleration has been completely evaluated. .

226. Deficiency: Section 11.2.1.2, Erosion Damage, Page 11-77

There is insufficient detail provided on the surveying to be conducted.

Requirement: A drawing of the final cover should be provided indicating where each monument will be located. A drawing or additional text should also be added detailing the design and installation of the monuments. In addition, surveying should be conducted quarterly for at least the first two years and then reduced to annually if no significant changes are noted.

DOE-RL/WHC Response: As noted in Section 11.2.1.2, surveying monuments will generally be installed on a 100-foot grid. More exact locations cannot be specified until the final cover designs are completed. The design and installation of survey monuments will also be addressed during final cover design. Quarterly surveying is not considered necessary given the long periods of time during the year when there is little or no precipitation at the Hanford Site.

227. Comment: Section 11.2.1.4, Vegetative Cover Condition, Page 11-77

The means to determine adequate vegetative cover must be discussed. Two possible methods are identified in the 183-H Basins Closure Plan.

DOE-RL/WHC Response: Methods for assessing the vegetative cover as described in the 183-H Basins closure plan will be incorporated as appropriate in the LLBG Permit Application.

228. Deficiency: Section 11.2.1.9, Benchmark Integrity, Page 11-78

It is insufficient to rely solely on visual inspections when determining benchmark integrity.

Requirement: Each benchmark should be surveyed to ascertain its integrity.

DOE-RL/WHC Response: Benchmark integrity refers to the absence of physical deterioration, for example spalling from frost action. Visual inspections are necessary to determine if changes in survey data are actually ground displacements or the result of other physical

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231.	<p><u>Comment:</u> Section 11.7, Post-Closure Cost Estimate, Page 11-84</p> <p>Comment 230 also applies to post-closure cost estimates.</p> <p>DOE-RL/WHC Response: The permit application will be revised to indicate that closure cost information will be provided as part of the annual reporting requirements of WAC 173-303-390. The schedule for initial submittal of projections of anticipated costs for closure will be established as part of discussions associated with the development of the Hanford Facility Permit. The text in Section 11.7 on page 11-84 will be changed to the following: "It is DOE-RL's understanding that federal facilities are not required to comply with WAC 173-303-620. However, projections of anticipated costs for closure will be provided annually during closure activities."</p>	
232.	<p><u>Comment:</u> Section 12.3, Transporter Requirements, Page 12-6</p> <p>Although transporter requirements are not required per WAC 173-303-260 and -270 at the Hanford Reservation, these requirements must still be fulfilled as requirements under WAC 173-303-395. This statement must be incorporated into the text.</p> <p>DOE-RL/WHC Response: The requirements to comply with other environmental protection laws and regulations as stated in WAC 173-303-395(2) pertain to receiving, storing, handling, treating, processing, and disposing of waste at a TSD facility; requirements for transport of waste are not specified. Additional clarification is requested.</p>	
233.	<p><u>Comment:</u> Section 12.4.1.5.1, Immediate Notification, Page 12-11</p> <p>Comment 204 is also applicable to this section and section 12.4.1.6.1.</p> <p>DOE-RL/WHC Response: The text will be revised as required to respond to the forthcoming letter that defines Ecology's Nuclear and Mixed Waste Program Policy and WAC 173-303-145.</p>	

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| 234. | <p><u>Comment:</u> Section 12.4.2.3.3., Closure and Post-Closure, Page 12-18</p> <p>Comment 230 also applies.</p> <p>DOE-RL/WHC Response: The permit application will be revised to indicate that closure cost information will be provided as part of the annual reporting requirements of WAC 173-303-390. The schedule for initial submittal of projections of anticipated costs for closure will be established as part of discussions associated with the development of the Hanford Facility Permit. The text in Section 12.4.2.3.3 will be changed to the following: "It is DOE-RL's understanding that federal facilities are not required to comply with WAC 173-303-620. However, projections of anticipated costs for closure will be provided annually during closure activities."</p> | |
| 235. | <p><u>Comment:</u> Appendix 4A, List of Mixed Waste, Page 4A-ii</p> <p>It is unclear what the term "UNSEG" means. Does this term identify trenches which could have any type of waste including TRU, mixed, etc.? Please clarify.</p> <p>DOE-RL/WHC Response: The following definition will be added to Appendix 4B: "Unseg is an abbreviation of unsegregated. The term arises from the description of waste buried prior to 1970 which did not have the transuranic waste component segregated from the low level component of the waste matrix."</p> | |
| 236. | <p><u>Comment:</u> Appendix 4A, List of Mixed Waste, Page 4A-18, 38, 44</p> <p>Trenches CU1 and TV7 are not identifiable on Figure 2-9. These trenches should be identified on the figure or the proper identification numbers provided in this appendix. In addition, trenches T05 and T10 are listed in this appendix but only trenches T05E and T10E exist on Figure 2-8. The text or the figure should be clarified.</p> <p>DOE-RL/WHC Response: "Trench CU1" is not a standard trench, but is a caisson that contains low level waste. This number 1 caisson is located in the area where trench 14 of burial ground 218-W-4B would be located as shown in Figure 2-9. Appendix 4B, page APP 4B-9 provides additional information. "Trench TV7" is a concrete portion of trench 7 in burial ground 218-W-4B as shown in Figure 2-9. The "E" will be removed from Figure 2-8.</p> | |

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237. Comment: Appendix 4B, Trench Classifications, Page 4B-3

Trenches 1D and 16 in burial ground 218-E-12B should be classified as LL-MW (low-level mixed waste) based upon information provided on page 4A-1. In addition, if trench 28 is closed, why is part of its classification "*" (trench will be dug)? Please clarify or correct.

DOE-RL/WHC Response: Trench 1D and 16 will be revised and classified as UG-MW which means unsegregated mixed waste. Trench 28 classification will be revised to be LL-MW and appropriate dates added.

238. Comment: Appendix 4B, Trench Classifications, Page 4B-9

Based upon information provided in Appendix 4A, trenches 3, 4, 8, 9, 10, 12, and 13 should also be classified as LL-MW (low-level mixed waste). Please correct or clarify.

DOE-RL/WHC Response: Trenches 3, 4, 6, 8, 9, 10, 12, and 13 will be redesignated UG-MW in the table.

239. Comment: Appendix 4F, Liner Material Specifications, Page 4F-1

The specific gravity of the liner must be no less than 0.94 and the maximum melt flow index must be no more than 0.3 grams per 10 minutes.

DOE-RL/WHC Response: A detailed set of Specifications has been prepared for the Project W-025 Landfill. These specifications require that the specific gravity of the FML resin be greater than 0.94. Melt index is required to be within the range of 0.1 to 1.1 g/10min, based on typical values reported by geomembrane manufacturers.

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240.	<p><u>Comment:</u> Appendix 4F, Liner Material Specifications, Page 4F-2</p> <p>The geosynthetic quality assurance consultant must not only verify the specifications identified, or to be identified, in Table 4F-1, but also every fingerprinting parameter (see comment 161).</p> <p>DOE-RL/WHC Response: Melt index and specific gravity are considered "fingerprinting" tests and will be required submittals from the FML manufacturer as discussed in the Specifications (Section 02275) and the CQA Plan (Section 4.4.1.1). Other 'fingerprinting' tests such as thermogravimetric analysis and differential scanning calorimetry will be performed as part of the 9090 testing program for evaluating chemical changes in the FML. These tests are also required for each lot of geomembrane as noted in Appendix A of the CQA Plan.</p>
241.	<p><u>Comment:</u> Appendix 4F, Liner Material Specifications, Table 4F-1</p> <p>Why are four identical values given for some parameters? The fingerprinting parameters must also be listed, with limits, on this table.</p> <p>DOE-RL/WHC Response: The Specifications prepared for the Project W-025 Landfill now contain only information pertinent to the geosynthetics actually used in the design. With respect to "fingerprinting" parameters, see responses to comments 239 and 240.</p>
242.	<p><u>Comment:</u> Appendix 4F, Liner Material Specifications, Page 4F-8</p> <p>One factor of the geomembrane layout which could be "detrimental to the project" is excessive seam footage. To reduce this problem, a minimum liner roll width should be specified. A list of other possible detrimental aspects should be listed.</p> <p>DOE-RL/WHC Response: This discussion has been eliminated in the revised Specifications. As described in Section 02275, the Geosynthetics Installer will be required to submit a panel layout plan for approval prior to construction, and general requirements for panel layout are explicitly stated. The specified geomembrane is supplied in 34-ft-wide rolls, among the widest in the industry.</p>

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| 243. | <p><u>Comment:</u> Appendix 4F, Liner Material Specifications, Page 4F-9</p> <p>The preferred method of seaming is double hot wedge welding. Any other method of welding will have to be justified over this method.</p> <p>DOE-RL/WHC Response: The 'best' seaming method for geomembranes is still an open issue, particularly for textured FMLs. It also depends on factors other than equipment, such as crew experience. Any seaming method used at the Project W-025 Landfill will be demonstrated and proved satisfactory by test seams, as well as ongoing destructive and non-destructive tests of actual seams. These requirements are in Section 02275 of the Specifications and Section 4.4 of the CQA Plan.</p> |
| 244. | <p><u>Comment:</u> Appendix 4F, Liner Material Specifications, Page 4F-10</p> <p>The specifications must include extreme temperatures (absolute maximum and minimum ambient temperatures) beyond which no seaming will occur. In addition, the methods must be specified which will be used during temperatures between the optimal range and the extreme range.</p> <p>DOE-RL/WHC Response: Construction Specification WHC-S-045, Section 02275, page 20, specifies the absolute maximum and minimum ambient temperatures for seaming and specifies methods that the installer must satisfactorily demonstrate for use during weather conditions between the optimal range and this extreme range.</p> |
| 245. | <p><u>Comment:</u> Appendix 4F, Liner Material Specifications, Page 4F-20</p> <p>Comment 213 also applies here. In addition, moisture adjustments cannot be made at the borrow site, but must be made at the pugmill.</p> <p>DOE-RL/WHC Response: The Design Report, Specifications, and CQA Plan provide a great deal of latitude for the Contractor (or Construction Manager) to determine the most suitable types of equipment and procedures for preparing and placing the admix liner. The Specifications require a submittal to the WHC Project Engineer and the CQA Engineer describing these activities. With this approach, the pertinent experience from the LERF Project will be incorporated as appropriate when the Project W-025 Landfill is constructed (see response to comment 19 in regards to an individual test fill).</p> |

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249.	<p><u>Comment:</u> Appendix 4F, Liner Material Specifications, Page 4F-25</p> <p>The drainage net must be stored above ground in a dust-proof wrapper.</p> <p>DOE-RL/WHC Response: This requirement has been included in the Specifications (Section 02275).</p>	
250.	<p><u>Comment:</u> Appendix 4F, Liner Material Specifications, Page 4F-27</p> <p>Frozen material will be removed from the fill and reprocessed through the pugmill or discarded.</p> <p>DOE-RL/WHC Response: The CQA Plan discusses restrictions on construction activity during freezing weather and establishes the requirement to protect the completed admix layer from freezing. See also response to comment 151.</p>	
251.	<p><u>Comment:</u> Appendix 4F, Liner Material Specifications, Page 4F-29</p> <p>The list of actual specifications to avoid desiccation cracking should be provided.</p> <p>DOE-RL/WHC Response: Measures to minimize desiccation as well as repair criteria are described in the CQA Plan (Section 4.3.2) and Specifications (Section 02224).</p>	
252.	<p><u>Comment:</u> Appendix 4F, Liner Material Specifications, Page 4F-44</p> <p>Ecology shall be notified of the date, time, and place of resolution meetings. If Ecology plans to attend, the meeting must be delayed a reasonable length of time to allow their attendance. This is also applicable to the preconstruction meeting and problem/work deficiency meetings. This requirement must be reflected in the application.</p> <p>DOE-RL/WHC Response: The application will include that Ecology will be notified within a reasonable amount of time of the date, time, and place of resolution meetings, so that their non-attendance will not result in a delay of the meeting.</p>	

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253. Comment: Appendix 4F, Liner Material Specifications, Page 4F-49

The facility design and specifications will be part of the dangerous waste permit. Therefore, any changes to or deviations from the design or specifications must be approved by Ecology. Ecology will treat these changes as Class I permit modifications requiring pre-approval. Ecology assumes that these changes and deviations will be handled through the Engineer Change Notice (ECN) process and Nonconformance Report (NCR) process such as used for the Grout project. If this is true, Ecology must be provided a copy of the draft ECN/NCR to allow response, if necessary, prior to implementing the change or positioning the nonconformant condition. This requirement may be fulfilled by either 1) hand delivering the draft ECN/NCR to Ecology's on-site construction inspector, if one is present, or 2) sending a facsimile copy (fax) to Ecology's LLBG unit manager. Ecology will notify DOE-RL if the modification should be upgraded to a Class II or III modification. This method of handling modifications is limited to design and specification changes which occur during construction. All other changes must be handled in accordance with WAC 173-303-830. A statement reflecting this discussion must be made in the application.

DOE-RL/WHC Response: ECN/NCRs will be provided to the on-site inspector prior to implementation by the construction contractor. If the on-site inspector is unavailable, the ECN/NCR will be faxed to the Ecology office in Lacey, Washington for their immediate review. The turnaround time for this review is expected to be within 8 hrs.

254. Comment: Appendix 4F, Liner Material Specifications, Page 4F-51

Comment 246 also applies here.

DOE-RL/WHC Response: A Sealed Double Ring Infiltrometer (SDRI) test will be performed on the test fill (see response to comment number 19).

255. Comment: Appendix 4G, Construction Procedures, Page 4G-1

These procedures must be approved by Ecology before construction begins.

DOE-RL/WHC Response: Construction procedures are described in both the CQA Plan and the Specifications. Ecology will be provided with an opportunity to examine these procedures before construction begins.

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The following comments refer to Supplement 1 of the LLBG permit application, Request for Exemption from Lined Trench Requirements.

256. Deficiency: Section 2.3.2, Long-Term Migration, Page 2-8

This section discusses the reasons for requiring liner systems at dangerous waste land-based units. In addition to the reasons provided, the bottom liner system provides the function of detecting leachate. This liner system is, in fact called the leachate detection, collection and removal system (LDCRS). Although Ecology agrees that the SRC's are designed such that we can be reasonably sure liquids will not leach from/through the SRC's, the most prudent practice in this case is to provide a means to verify that the SRC system performs as asserted in this document.

Requirement: A means to monitor the amount of liquids, if any, that could pass from/through an SRC needs to be included in the disposal design. Ecology recommends that a catch basin similar to those beneath the grout vaults be installed beneath one of the SRC's as a demonstration project. The basin would need to be capable of collecting liquids as well as provide a means to measure the quantity and assess the composition of any liquids which could reach the basin.

DOE-RL/WHC Response: Ecology comments 143, 256, 261, and 262 require further technical evaluation.

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257.	<p><u>Comment:</u> Section 3.1, General Description, Page 3-1</p> <p>Typo. "U.S. Ecology" should be edited to read "US Ecology".</p> <p>DOE-RL/WHC Response: The text will be corrected to read US Ecology.</p>	
258.	<p><u>Comment:</u> Section 4.1, Waste Characteristics, Page 4-1</p> <p>Are the bulkheads which are added at Bremerton Navy Yard welded with the same specifications and performance standards utilized in welding the original hull? Describe any differences between the specifications and standards used for the original hull and those used on the bulkheads welded for disposal purposes.</p> <p>DOE-RL/WHC Response: The new welding to install shipyard fabricated disposal bulkheads is also accomplished using Navy shipbuilding and repair welding processes and electrodes to produce the same high-integrity welding as found on original ship construction.</p> <p>Since the initial construction of nuclear powered submarines, the Navy has established the highest standards for critical welds, including submarine hull welds and reactor plant welds. In general, these Navy welding standards are more rigorous than private sector critical welding standards.</p> <p>The strength of the Navy standards lies not only in the proper selection and qualification of materials and welding parameters, but also in the rigorous personnel training and qualification process, nondestructive testing (NDT) and audit and surveillance programs. Most importantly, official records for each of these areas are maintained as objective quality evidence that welding and NDT were completed satisfactorily.</p> <p>All weld materials are tested and maintained to ensure the materials meet specified standards. Welding procedures are formally developed and qualified in accordance with Navy requirements. The personnel performing the welds must be qualified, and periodically requalified, to demonstrate the ability to perform the welding in accordance with the weld procedure. Finally, nondestructive testing is performed by personnel who are qualified, and periodically requalified on the use of nondestructive test equipment. In addition, in-process surveillances are conducted by independent quality assurance personnel to evaluate work performance and to verify welding is being performed in accordance with specifications.</p>	

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	<p>The original welding of the SRC hull was accomplished to Navy standards designed to ensure the integrity of deep diving hull structures, which must resist submergence pressures and potential battle shock while protecting human life and the operating reactor plant. The only significant difference between original hull welding and new welding is that since the new welds will not be subjected to the cyclic stresses experienced by deep diving hulls, they do not require the radiographic inspection used on original hull welds. It should be noted that all containment boundary welds (both original and new) are subjected to a package air test to verify their integrity.</p>	
259.	<p><u>Comment:</u> Section 5.1.1, Integrity of the SRC, Page 5-2</p> <p>This section should include a discussion regarding: 1) the effects of radiation on corrosion rates; and, 2) the corrosion potential of original hull and new bulkhead welds.</p> <p>DOE-RL/WHC Response: The text will include:</p> <p>a. "The corrosion rate of the hull, containment bulkheads, and containment bulkhead welds is not affected since these materials are basically non-irradiated."</p> <p>b. "There is no difference in corrosion potential between the ship's original welds and new welds accomplished in preparing the SRC package for disposal."</p>	
260.	<p><u>Comment:</u> Section 5.1.2.1, Lead, Page 5-5</p> <p>Typo. The word "At" in line 6 should be edited to read "As".</p> <p>DOE-RL/WHC Response: The text will be changed to "As".</p>	
261.	<p><u>Comment:</u> Appendix 5A, Conceptual Design of Cathodic Protection, Page 5A-1</p> <p>The specifications for the epoxy-polyamide paint should be provided to include a discussion of the durability of this paint under the handling, transportation and disposal scenarios expected.</p> <p>DOE-RL/WHC Response: Ecology comments 143, 256, 261, and 262 require further technical evaluation.</p>	

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	<p>The original welding of the SRC hull was accomplished to Navy standards designed to ensure the integrity of deep diving hull structures, which must resist submergence pressures and potential battle shock while protecting human life and the operating reactor plant. The only significant difference between original hull welding and new welding is that since the new welds will not be subjected to the cyclic stresses experienced by deep diving hulls, they do not require the radiographic inspection used on original hull welds. It should be noted that all containment boundary welds (both original and new) are subjected to a package air test to verify their integrity.</p>	
259.	<p><u>Comment:</u> Section 5.1.1, Integrity of the SRC, Page 5-2</p> <p>This section should include a discussion regarding: 1) the effects of radiation on corrosion rates; and, 2) the corrosion potential of original hull and new bulkhead welds.</p> <p>DOE-RL/WHC Response: The text will include:</p> <ul style="list-style-type: none">a. "The corrosion rate of the hull, containment bulkheads, and containment bulkhead welds is not affected since these materials are basically non-irradiated."b. "There is no difference in corrosion potential between the ship's original welds and new welds accomplished in preparing the SRC package for disposal."	
260.	<p><u>Comment:</u> Section 5.1.2.1, Lead, Page 5-5</p> <p>Typo. The word "At" in line 6 should be edited to read "As".</p> <p>DOE-RL/WHC Response: The text will be changed to "As".</p>	
261.	<p><u>Comment:</u> Appendix 5A, Conceptual Design of Cathodic Protection, Page 5A-1</p> <p>The specifications for the epoxy-polyamide paint should be provided to include a discussion of the durability of this paint under the handling, transportation and disposal scenarios expected.</p> <p>DOE-RL/WHC Response: Ecology comments 143, 256, 261, and 262 require further technical evaluation.</p>	

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262. Comment: Appendix 5A, Conceptual Design of Cathodic Protection

The report states that if the passive cathodic protection fails, an impressed current can be substituted. If the conductors fail, how will an impressed current work? If the sacrificial anodes fail, why not replace them?

DOE-RL/WHC Response: Ecology comments 143, 256, 261, and 262 require further technical evaluation.

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