INFORMATION CLEARANCE FORM

A. Information Category

- [ ] Abstract
- [ ] Summary
- [ ] Visual Aid
- [ ] Full Paper
- [ ] Journal Article
- [ ] Internet
- [ ] Software
- [x] Report
- [ ] Other ______

B. Document Number HNF-1517, Rev. 1

C. Title

River Protection Project Immobilized Low-Activity Waste Disposal Plan

D. Internet Address

E. Required Information

1. Is document potentially Classified? (●) No ( ) Yes (MANDATORY)

   Manager's Signature Required

   If Yes ______ -ADC (●) No ( ) Yes Classified

   ADC Signature Required

2. Internal Review Required? (●) No ( ) Yes

   If Yes, Document Signatures Below

   Counsel ______

   Program ______

3. References in the Information are Applied Technology (●) No ( ) Yes

   Export Controlled Information (●) No ( ) Yes

4. Does Information Contain the Following: (MANDATORY)

   a. New or Novel (Patentable) Subject Matter? (●) No ( ) Yes

      If "Yes", Disclosure No.: ______

   b. *Information Received in Confidence, Such as Proprietary and/or Inventions?*

      (●) No ( ) Yes If "Yes", Affix Appropriate Legends/Notices.

   c. Copyrights? (●) No ( ) Yes If "Yes", Attach Permission.

   d. Trademarks? (●) No ( ) Yes If "Yes", Identify in Document.

5. Is Information requiring submission to OSTI? ( ) No (●) Yes

   If Yes UC-721 and B&R-EW02J1220

6. Release Level? (●) Public ( ) Limited

7. Charge Code 105859

F. Complete for a Journal Article

1. Title of Journal

G. Complete for a Presentation

1. Title for Conference or Meeting ______
2. Group Sponsoring ______
3. Date of Conference ______
4. City/State ______
5. Will Information be Published in Proceedings? ( ) No ( ) Yes
6. Will Material be Handed Out? ( ) No ( ) Yes

H. Author/Requestor

DA Burbank

(Print and Sign)

Responsible Manager

RW Root

(Print and Sign)

I. Reviewers

	Yes	Print M.A. Williams - for	Signature	Public Y/N (If N, complete J)
General Counsel	[x]	Steve Brumley		Y / N
Office of External Affairs	[ ]	N/A.		Y / N
DOE-RL	[x]	See attached RCR		Y / N
Other	[ ]			Y / N
Other	[ ]			Y / N

J. If Information Includes Sensitive Information and is not to be released to the Public indicate category below.

- [ ] Applied Technology
- [ ] Personal/Private
- [ ] Proprietary
- [ ] Business-Sensitive
- [ ] Predecisional
- [ ] UCNI
- [ ] Protected CRADA
- [ ] Export Controlled
- [ ] Procurement-Sensitive
- [ ] Patentable
- [ ] Other (Specify) ______

Information Clearance Approval

APPROVED FOR RELEASE OFFICIAL DOCUMENT Date 9/7/99

K. If Additional Comments, Please Attach Separate Sheet

A-6001-401 (02/98)

RELEASE AUTHORIZATION

Document Number:	HNF-1517, Rev 1
Document Title:	River Protection Project Immobilized Low-Activity Waste Disposal Plan

This document, reviewed in accordance with DOE Order 241.1, "Scientific and Technical Information Management," and 241.1-1, "Guide to the Management of Scientific and Technical Information," does not contain classified or sensitive unclassified information and is:

APPROVED FOR PUBLIC RELEASE

M. A. Williams 9/1/99

Lockheed Martin Services, Inc.
Document Control/Information Clearance

Reviewed for Applied Technology, Business Sensitive, Classified, Copyrighted, Export Controlled, Patent, Personal/Private, Proprietary, Protected CRADA, Trademark, Unclassified Controlled Nuclear Information.

REVIEW COMMENT RECORD (RCR)

	1. Date	2. Review No.
	3. Project No.	4. Page Page 1 of 6

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
HNF-1517, RPP RPP Retrieval and Disposal Mission Immobilized Low-Activity Waste Disposal Plan, Rev1, draft	River Protection Project - Immobilized Product Storage Disposal	P. E. LaMont	Office of River Protection/Tank Waste Processing and Disposal Program division (DPD)	2440 Stevens/Rm 2108 376-6117

17. Comment Submittal Approval:

Organization Manager (Optional)

10. Agreement with indicated comment disposition(s)

8/27/99
Date

P. E. LaMont
Reviewer/Point of Contact

Doug G Burbank
Author/Originator

11. CLOSED

8/27/99
Date

P. E. LaMont
Reviewer/Point of Contact

Doug G Burbank
Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1.	Title - Change the title to "River Protection Project Immobilized Low-Activity Waste Disposal Plan". Explain in the Introduction or somewhere that this addresses an element of the Retrieval and Disposal mission.	yes	Agree.	
2.	pviii - Replace WDD with DPD (for Tank Waste Processing and Disposal Program Division). WDD is no longer Division in DOE.	yes	Agree.	
3.	p2-1, Section 2.1, para 2 - In sentence 1 replace "low activity and high-level" with "radioactive". After sentence 1 insert "Treatment will produce a small volume of high-level waste and a much larger volume of low-activity waste. After immobilization, the high-level waste will be held in interim storage for eventual shipment to a high-level waste repository and the low-activity waste will be disposed of on site."	yes	Agree.	
4.	p2-1, Section 2.1, para 3 - Verify that Phase 2 will begin after Phase 1. This reviewer recalls that there might be some overlap.	yes	Agree. Phase 2 starts in 2012.	
5.	p2-2, last para - Explain the background of the grout vaults and the GTF, what	yes	Agree.	

REVIEW COMMENT RECORD (RCR)

	1. Date	2. Review No.
	3. Project No.	4. Page Page 2 of 6

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	was done, etc. Also explain that prior planning was based on a planned start up of ILAW production in 2002. Explain that the new BNFL contract schedule provides sufficient time for the ILAW PA.			
6.	p2-3, bullets - Add a bullet ;indicating that the ILAW project will continue waste form and disposal system data acquisition and will prepare periodic updates of the Performance Assessment. Also indicate that the PA activity will provide input to Phase 2 ILAW product specifications.	yes	Agree.	
7.	p3-1, Section 3.1, para 2 - Explain the term "technical baseline documents" at the end of the para.	yes	Not accepted. Technical baseline documents are described in section 11.2.	
8.	p4-1, Section 4.2, title - The title implies that radionuclide inventories in the ILAW will be discussed. This is not the case, however. Please reconcile.	yes	Partially accepted. Title does not mention radionuclides inventory. Intent is to describe the total quantity of ILAW that will be disposed. Reword to clarify	
9.	p4-1, Section 4.2, para 2 - Explain in more detail what is meant by RH and CH packages. Also, describe the privatization contract spec's for ILAW inventory and what it means to the disposal program.	yes	Partially accept. Add explanation of RH & CH. Add contract limits for Cs, Sr, & Tc concentrations.	
10.	p4-2, para 2 - Explain the term 800 units of LAW.	yes	Agree. Add "(As described n specification 7.2.3 of the Priv. Contract)	
11.	p4-2, Table 1 - Explain the terms 50% and 90% in more detail.	yes	Agree. Add Reference to report to congress.	
12.	p4-5, para 1 - Explain the 5,000 packages. This reviewer remembers capacity for about 7,000 packages in the Vaults. Also, explain the last sentence. It would seem that the studies mentioned would have already been completed.	yes	Agree. Capacity of vaults is 7000 packages. (1.4m cube)	
13.	p4-6, bullets 4&8 - Explain in more detail what is incidental waste and why this subject is important.	yes	Requested discussion can be found in Section 5.1, Pg 5-2, 5-3. No change	
14.	p4-6, last bullet - Clearly explain the schedule proposed by BNFL was substantially different than the previous schedule and how it differed.	yes	Agree.	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
3. Project No.	4. Page Page 3 of 6

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
15.	p4-8, Figure 2 - Figure needs to highlight the grout vaults.	yes	Agree.	
16.	p4-10, para 2 - The mention of the RCRA delisting is confusing. This reviewer does not recall that delisting was determining factor in evaluating the trench versus the vault concepts, even though it is intended to pursue delisting.	yes	Agree. Delete sentence referring to delisting.	
17.	p4-10, para 3 - Verify that it is contemplated that we would excavate up to 30 meters deep. This seems extremely deep.	yes	Agree. Change text to 10 meters.	
18.	p5-1, para 1 - The description of the important radionuclides seems overly simplified. Tc-99 is the major contributor to groundwater dose; however, the predicted dose is below the limit. Also, Sn-126, as this reviewer recalls, is the major contributor to the intrusion scenario dose, which is not a "long-term" concern. Please confirm and rewrite accordingly.	yes	Agree. Reword to indicate importance of Sn-126 in intruder scenario.	
19.	p5-2, para 3 - DOE Order 435.1 is no longer a draft and it has been issued. It would be better to say that the ILAW Disposal Program was historically structured to comply with 5820.2A and associated policy guidance and that the impacts of coming under compliance with 435.1 are anticipated to be small.	yes	Agree.	
20.	p5-2, para 4 - Waste that complies with the RFP specification will meet the requirements for disposal. Unfortunately, the specifications in the privatization contract were changed such that it is possible that a waste that meets the current contract specification might not meet disposal performance objectives. It would be better to say that the ILAW Disposal Project is working with BNFL and the Tank Focus Area to develop glasses that will meet criteria for production as well as performance requirements for disposal and that test results to date are encouraging.	yes	Agree. Delete the paragraph.	
21.	p5-2/3 Waste Classification - This information is good, but the reader will wonder about it before now, since you mention incidental waste earlier.		No change.	
22.	p5-3, para 3 - Please review the Incidental Waste Classification report. This reviewer recalls that each important radionuclide was considered based on its	yes	Agree. Reword this paragraph to better explain.	

REVIEW COMMENT RECORD (RCR)	1. Date	2. Review No.
	3. Project No.	4. Page Page 4 of 6

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	technology, etc., and was not discounted simply on its curie inventory in comparison with Cs-137.			
23.	p5-3, para 4 - It doesn't seem like a good idea to transport the ILAW packages before final acceptance since they could be buried right away (before the final acceptance period of 60 days is up). Please re-evaluate this subject.	yes	Detailed procedure has not yet been developed. The current guidance is as stated. No Change.	
24.	p6-1, para 2 - Explain the level for performance tracking and reporting. Is it Level 7?	yes	The WBS table show the level of detail used for tracking and reporting as stated in paragraph 2.	
25.	p6-1, Table 2 - Explain how there can be two 1.01.09.01 entries. Also, explain/define TW09 and the 460.xxx numbers.	yes	Typos will be corrected	
26.	p6-3, Section 6.1 - The scope also includes providing a facility for disposal.	yes	Scope statements in Sections 6.1 to 6.5 come straight from HSTD. No Change.	
27.	p6-3, Section 6.2 - The title refers to disposal, but the text refers to storage. Please reconcile.	yes	Agree. Text changed to disposal.	
28.	p8-1, Section 8.1 - Indicate that this program plan is based on the new privatization schedule and provide a reference for the new privatization schedule.	yes	Ok. Added reference to report to Congress	
29.	p8-2, Section 8.3 - Explain the schedule referred to in line 1, "old" or "new" and reference DOE guidance, if possible.	yes	Schedule presented is "current"	
30.	p8-3, Section 8.3.2 - Provide or identify the actual critical path schedule and explain constraints like start of production.	yes	Agree. Schedule will highlight critical path activities.	
31.	p9-1, para 1 - Explain escalation assumed for Table 5, if any, and contingency, if any.	yes	Foot note added to table indicating which years are excalated.	
32.	p9-1, para 2 - Text discusses activities and products in the future, but have, in fact already happened. Please review the entire report to ensure that previous accomplishments and on-going activities are addressed in past and present	yes	Agree.	

REVIEW COMMENT RECORD (RCR)

	1. Date	2. Review No.
	3. Project No.	4. Page Page 5 of 6

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	tense as appropriate.			
33.	p9-2, Table 5 - Please include costs from the start through FY 99 so that life-cycle costs can be obtained. Explain the ILAW operational expenses starting in FY03; this seems unwarranted. Also, it is unclear how some of the categories have no costs associated with them. If this is true, how could there be any workscope? Also, explain when the data for Table 5 was prepared, i.e., is it consistent with the PBS's, the FY 99 or 00 draft MYWP, or what.	yes	FY 2003 Ops expense is for FY 2003 PA. Add footnote explaining error. No scope for WBS 1.1.9.1.2 or 1.1.9.1.3. FY 1999.	
34.	p10-2, Figure 6 - Revise to show where the Performance Assessment organizational responsibilities belong.	yes	Ok.	
35.	*p11-3, para 3 - Change WDD to DPD.*	yes	Ok.	
36.	p11-5, Section 11.1.9 - The monthly meetings should also include review of actions requiring contractor support to DOE, e.g., support for meetings, etc., other actin items and risk management information.	yes	Agree.	
37.	p11-13, last para - It doesn't make sense to this reviewer that the authorization basis for ILAW disposal would be an addendum to the TWRS FSAR because it is totally disconnected from the tanks. This strategy should be reviewed and verified. It does not appear to be consistent with the strategy for the IHLW storage in the CSB, where the strategy is to amend the CSB SAR. Please review and verify this approach.	yes	The approach described reflects current plans. No change.	
38.	p11-14, last bullet - The Spent Nuclear Fuel health and safety plan does not seem applicable to ILAW.	yes	Agree.	
39.	p12-3, last para - The PA (not preliminary) was issued to DOE-HQ in March 1998. An updated PA will be issued in 2001. Disposal operations are no longer being planned for June 2002.	yes	Agree. Fred Mann to revise.	
40.	p14-1, Section 14.1 - The LFRG has provided (unofficially at this point) conditional approval of the FY 1998 PA. HQ has not yet agreed with that and	yes	Agree no change.	

REVIEW COMMENT RECORD (RCR)

	1. Date	2. Review No.
	3. Project No.	4. Page Page 6 of 6

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	has not yet issued a letter. Hopefully, this will happen in the near future.			
41.	pB-3, Table B-2 - Verify that the WHC documents are still valid and have not been replaced.	yes	Delete tables B.2 & B.3.	
42.	pC-i - The reference to the PA is obsolete. The current PA is DOE/RL-97-69 "Hanford Immobilized Low-Activity Waste Performance Assessment", March 1998.	yes	Agree.	
43.	Section C - Text may or may not be current, but referenced PA is obsolete. Review text with principal author to verify currency.	yes	Agree. Text is current from RL-97-69.	
44.	pC-18, para 2 - Add discussion of specific plans in more detail, i.e., the White Paper to support the August 2000 decision to proceed with privatization, the 2001 update. Also, discuss glass testing plans and other anticipated actions per the conditions from the LFRG, as we understand them today.	yes	App. C. Contains the exec. Summary from the P.A. verbatim. Additional discussion, if desired, should be in Section 12.1.2 main text.	
45.	Section D - Indicate completed milestones, including M-90-01 and Issue the 1998 PA. The PA also satisfied M-90-05T. Also, indicate the proposed dates based on the BNFL contract and DOE guidance to the PHMC.	yes	Partial accept. Indicate completed m/s proposed dates are not appropriate here.	
46.	Section F - Remove handwritten note from sheets and make sure that final submittal of this section is as clear as possible.	yes	Agree.	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
August 19, 1999	
3. Project No.	4. Page
	1 of 6

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
HNF-1517 Revision 1 DRAFT "River Protection Project Retrieval and Disposal Mission Immobilized Low-Activity Waste Disposal Plan"	River Protection Project – Immobilized Low-Activity Waste Disposal	C. A. Babel	Waste Processing and Disposal Program Division	2440 Stevens, Rm 2109 MSIN: H6-60 (509)373-9281

17. Comment Submittal Approval:

Organization Manager (Optional)

10. Agreement with indicated comment disposition(s)

8/27/99
Date

P. E. Lamont for C. A. Babel
Reviewer/Point of Contact

Author/Originator

11. CLOSED

8/27/99
Date

P. E. Lamont for C. A. Babel
Reviewer/Point of Contact

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1.	**GENERAL COMMENT** Due to the change from TWRS to Office of River Protection (ORP) and the River Protection Project (RPP) throughout the document the use of TWRS needs to reflect this change.	yes	Agree.	
2.	**GENERAL COMMENT** The ORP FSAR has been approved, therefore throughout the document any statement about "when" the FSAR is approved or "will be incorporated in the TWRS BIO", and any other type phrases need to be changed to reflect this.	yes	Agree. Change tense to indicate current status.	
3.	**GENERAL COMMENT** DOE O 435.1 was issued July 9, 1999, therefore any wording throughout the document referring to DOE O 5820.2A should be changed to reflect this.	yes	Disagree. FDH & LMHC have been working to 5820.2A and contract requires 5820.2A.	
4.	**GENERAL COMMENT** Throughout the document when describing the packaged ILAW, glass release rate, waste loading, in other words all the area where it is stated "in accordance with contract specifications described in the TWRS Privatization Contract with BNFL, Inc." or similar phrasing I suggest adding 'or subsequently	yes	Disagree. Negotiated terms will be incorporated into the contract. Referring to the contract as the source of requirements is appropriate.	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
August 19, 1999	
3. Project No.	4. Page

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	negotiated'. Since the specs in the contract are known to not be strict enough to assure an acceptable waste form, based on current glass testing results.			
5.	Page 1-1, 1.0 Introduction, first line. Is "The Project Plan Immobilized Low-Activity Waste Disposal Subproject, Revision 0" the correct title? I thought actual title was "TWRS Retrieval and Disposal Mission, Immobilized Low-Activity Waste Disposal Plan". Please make change or explain the title used here.		Ok. Change to correct title.	
6.	Section 2.3, page 2-3, second line, sentence "The disposal action itself will be planned to include a period for product retrieval if circumstances make it necessary". After the word suggest inserting 'of 50 years' for clarity.		Disagree. 50 year retrievability is not a requirement, and the design does not provide it. No change.	
7.	Section 4.1, page 4-1, second paragraph, first line, typo, change "than" to 'that'.		Ok. Typo corrected.	
8.	Section 4.2, page 4-2, second paragraph, fourth sentence, "For Phase I these specifications include 800 units of LAW treated each year". What is a 'unit'? Suggest adding this definition for clarity.		Ok. Added reference to Spec 7.2.3 for definition of "Unit"	
9.	Section 4.2, page 4-2, second paragraph, last sentence, "These quantities are considered minimum package counts because preliminary testing of glass at the higher waste loadings indicate that the waste form performance may not meet the waste acceptance requirements in the contract specifications". Explain and reference what does this do to the package count or at least refer the reader to the next section where you discuss this.		Package count impacts are discussed in the previous sentence. No change.	
10.	Section 4.5, page 4-7, line at the bottom of the page, "...the 200 East Area, as shown in Figure 2. The second site, shown in Figure 3, consists of...		Agree. References to figures will be corrected.	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
August 19, 1999	
3. Project No.	**4. Page**

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	The Figure numbers seem to be switched, 200 East Area is actually shown in Figure 3 and the second site in Figure 2, please check and correct reference to these figures.			
11.	Section 4.5, page 4-10, second paragraph , second sentence, "These vaults illustrated in Figure 2....". Again it appears this should be Figure 3 instead of Figure 2.		Agree.	
12.	Section 4.5, page 4-10, second paragraph, last sentence, "About 95,000 (98,200 in Orme 1996) ILAW packages may result from treatment of waste from all 177 tanks (Burbank 1997)". Page 4-2, second paragraph eleventh line and Table 1 on page 4-3, give the reader different numbers for the total number of packages. This is confusing, please be consistent or explain why different numbers are provided.	yes	Agree. Text revised to reflect range of 56,800 to 81,200 packages.	
13.	Section 4.5, page 4-10, fourth line from the bottom of the page, "The disposal area is currently expected to be used for interim storage and disposal of Phase I product...." What does "interim storage" mean here? Will there be a 'staging' area in the 200 East Area to 'store' waste packages before they are placed into their final resting place, disposal? Is that what "interim storage" means here?	yes	Agree. Delete reference to interim storage.	
14.	Section 4.5, page 4-10, second to last sentence, "Disposal capacity will be constructed on a phased basis as needed." Please provide a reference for this statement. Are you referring to 'new construction' only here, or to the phases as phase I and phase II of the privatization contract?	Yes	Agree. Reword to clarify.	
15.	Section 4.5, page 4-10, second paragraph, line 10, "...a slope as low as 1 to 3 as in...." and line 12, "....a slope of 1 to 5)."		Unitless. Unitless numbers. No change.	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
August 19, 1999	
3. Project No.	4. Page 4 of 6

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	Is the slope 1 to 3 and 1 to 5 degrees, or are these unitless numbers?			
16.	Section 5.1, page 5-1, seventh line, typo, "Based of the *Hanford Immobilized...*" Change "of" to on.		Ok. Fixed typo.	
17.	Section 5.2, page 5-2, end of first paragraph, "A supplemental analysis (DOE 1998) was performed....." Please add a sentence on what the supplemental analysis concluded, like you did with the TWRS EIS ROD and the TWRS EIS.	yes	Ok. Added sentence describing findings of the S. A.	
18.	Section 5.2, page 5-2, third paragraph. This is a good example of the document referring to DOE O 5820.2A and DOE O 435.1. This whole paragraph needs to be rewritten to reflect the issuance of DOE O 435.1	Yes	Agree. Text changed.	
19.	Section 5.2, page 5-2, first bulleted item at the bottom of the page, "waste has been processed (or will be further processed) to remove key radionuclides to the maximum extent technically and economically practical." I know this came from the NRC, but I was just wondering if we have a definition for "maximum extent technically and economically practical."		Petersen (1996) provides the requested analysis. No change.	
20.	Section 5.2, page 5-3, first sentence after bulleted item at the top of the page, "This classification removes the ILAW from the high-level waste disposal licensing authority of the NRC and permits its disposal...." My question or concern is with the word "permits" this letter did not 'permit' disposal, we have to get a Disposal Authorization Statement (DAS) form	Yes	Agree. Change "Permits" to "Allows"	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
August 19, 1999	
3. Project No.	4. Page
	5 of 6

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	DOE-HQ for that. Please change the word permit and explain that this allows us to proceed with obtaining a DAS.			
21.	Section 5.2, page 5-3, last paragraph, "The ILAW product will be accepted by DOE and disposed of on the Hanford Site…." Also, Section 6.1, page 6-3, "Dispose Immobilized LAW on Site". Will there be any staging / storage of the waste packages before they are placed in their final disposal location? If so this component may need to be added to this document, and to all planning documents.	Yes	Current DOE guidance has eliminated ILAW storage from PHMC scope. All storage will be provided by BNFL.	
22.	Section 6.5, page 6-4, "Store ILAW" and last word in this section, "storage". Should this be 'dispose' instead of store?	Yes	This is directly from HSTD. No change to document, but HSTD should be changed.	
23.	Section 8.1, Table 3, page 8-2. Milestone number M-90-05T due date is given as 3/31/01 and then below that it says Complete. Should this be deleted? What is complete?	Yes	All major milestones are listed. Those that have been completed are noted. No change.	
24.	Section 11.3.1, page 11-11, fifth line, "The permitting plans address environmental permitting requirements for the treatment and interim storage of ILAW…." Question is with "interim storage", do the permitting plans also cover 'disposal'? Also this document should describe the plans for revising the permitting plans consist with the BNFL schedule. The actual plans should be clear in the schedule contained in appendix F.	Yes	Agree. Replace "Interim Storage" with "Disposal" Permitting plans have been revised to reflect new schedule and are shown in APP. F, WBS 1.1.9.1.1.4.8 and WBS 1.1.9.1.1.5.8	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
August 19, 1999	
3. Project No.	4. Page

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
25.	Section 11.3.2, page 11-12, first paragraph duplicates second paragraph. Suggest deleting first paragraph.		Agree. Duplicate Deleted.	
26.	Section 11.3.3, page 11-13, **Program Level** at the bottom of the page. This is a good example of text that needs updated due to the completion and approval of the ORP FSAR.	Yes	Ok. Revise to reflect current status.	
27.	Appendix B, page B-3, Table B-2 has many WHC document numbers, these should be updated to HNF numbers or current document numbers	Yes	Agree. Delete tables B-2 & B-3	
28.	Appendix F, Immobilized Low-Activity Waste Subproject Schedule. Where in the schedule and cost is the April 2000 white paper that will be prepared for the August 2000 DOE decision to proceed with BNFL contract? Shouldn't this be a line item?	Yes	Readiness to Proceed white paper lead organization is TW-04. The TW-09 support for this task is founded under activity T946005K2, "RTP rebaselining support." No change.	

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
August 18, 1999	
3. Project No.	**4. Page**
	Page 1 of 3

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
HNF-1517 Revision 1 (Draft) ILAW Waste Disposal Plan	2440 Stevens	Bob Williams	DOE/WPD	Rm 2109/372-1985

17. Comment Submittal Approval:

Organization Manager (Optional)

10. Agreement with indicated comment disposition(s)

8/27/99
Date

P.S. Tallent for B.L. Williams
Reviewer/Point of Contact

Author/Originator

11. CLOSED

8/27/99
Date

P.S. Tallent for B.L. Williams
Reviewer/Point of Contact

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1 blw	DOE Order 4700 is mentioned throughout document as a planning and guidance document. Since this Order has been replaced with 430.1a, is there a reason why it is still included?	Y	Both orders have been used to develop this plan. No Change	
2 blw	Pg 2-3; Objectives of project are listed by bullets on this page with the qualifier that more detail is discussed in subsequent sections. Please insert sections where these are discussed after bullets.	Y	Reference to applicable sections will be added.	
3 blw	Pg 2-3; Bullet on support of development of conceptual design reports for initial disposal facilities, needs to be rewritten to support development of design and construction of all required disposal facilities.	Y	Bullet already mentions additional disposal facilities. Add Detailed Design	
4 blw	Pg 3-1, 3-2; Bullets listed under the statement that the project plan covers the following key project planning elements: Please insert sections where these key planning elements can be found.	Y	These bullets can be found in T.O.C. No Change.	
5	Pg 4-3; Need table on new package size (cylindrical vs square)	Y	Disagree. Current baseline is square 1.4m cube.	

REVIEW COMMENT RECORD (RCR)

1. Date August 18, 1999	2. Review No.
3. Project No.	4. Page Page 2 of 3

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
blw			No Change.	
6 blw	Pg 8-1; Table 3 lists TPA Milestones, add column with proposed due dates that should be renegotiated	Y	Added reference to report to congress per reader referral.	
7 blw	Pg 8-3; Provide a appendix with critical path shown	Y	See Lamont comment #30.	
8 blw	Pg 9-3; FY10 costs have comma in wrong place	Y	Ok. Correct typo.	
9 blw	Pg 11-1; Section 11.1.1 states that a PEP will be developed for projects however Table 7 on page 12-3 does not list PEP	Y	Ok. Change "Project Management Plan" in table 7 to "Project Execution Plan (PEP)."	
10 blw	Pg 11-4; Section 11.1.8 states that contingency will be managed and controlled as identified in Section 11.1.4,(which does not describe how contingency will be managed)	Y	Ok. Add reminders (in 11.1.4) that contingency is an integral part of subproject & line-item cost baselines.	
11 blw	Pg 11-13; First paragraph that does not have a bullet, states that a three-tier review process will be reserved for the final authorization basis then says see section 13.2.2; there is no section 13.2.2	Y	OK. Remove reference to Section 13.2.2.	
12 blw	Pg 12-1 section 12.1; need to rewrite paragraph, to explain external authorities with no schedule commitments. Table 7 lists these external authorities however it contains ORP and DOE-HQ who some would argue that they have schedule commitments and are not external. Table 7 lists design and construction under other permits and does not include a PEP. Confusing table need to clarify.	Y	Ok. Reword to emphasize that the subproject cannot impose schedule commitments on the reviewing organizations.	
13 blw	Pg 12-3; Last paragraph needs to reflect present status,ie. Preliminary PA was issued etc,etc	Y	Agree. Reword to reflect current status.	
14 blw	Pg 14-1; Last sentence states details of approval authorization requirements are given in Appendix B. Appendix B is actually list sources of requirements and constraint documents, not authorization requirements.	Y	Agree. Corrected to refer to App. E	

REVIEW COMMENT RECORD (RCR)	1. Date August 18, 1999	2. Review No.
	3. Project No.	4. Page Page 3 of 3

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
15 blw	Pg D-1; Table D-1 list key deliverables and performance measurements, many of the due dates are past due, need to add column to add revised or projected delivery dates.	Y	Agree. Revise table to reflect completed activities.	

HNF-1517
Revision 1

River Protection Project Immobilized Low-Activity Waste Disposal Plan

Prepared for the U.S. Department of Energy

FLUOR DANIEL HANFORD, INC.
Richland. Washinoton

Hanford Management and Integration Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

APPROVED FOR PUBLIC RELEASE

Available to the U.S. Department of Energy
and its contractors from
U.S. Department of Energy
Office of Scientific and Technical Information (OSTI)
P.O. Box 62
Oak Ridge, TN 37831
(615) 576-8401

Available to the public from the U.S. Department of Commerce
National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

Printed in the United States of America

DISCLM-1.CHP (8-95)

HNF-1517
Revision 1

River Protection Project Immobilized Low-Activity Waste Disposal Plan

D. A. Burbank
Lockheed Martin Hanford Corporation

Date Published
September 1999

Prepared for the U.S. Department of Energy

FLUOR DANIEL HANFORD, INC.
Richland, Washington

Hanford Management and Integration Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

APPROVED FOR PUBLIC RELEASE

CONTENTS

1.0 INTRODUCTION 1-1
  1.1 DOCUMENT PURPOSE 1-1

2.0 HANFORD SITE MISSION 2-1
  2.1 RIVER PROTECTION PROJECT MISSION 2-1
  2.2 RIVER PROTECTION PROJECT IMMOBILIZED TANK WASTE STORAGE AND DISPOSAL MISSION 2-2
  2.3 IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL MISSION AND OBJECTIVES 2-2

3.0 SCOPE OF IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SUBPROJECT 3-1
  3.1 SCOPE OF IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SUBPROJECT PLAN 3-1

4.0 PROJECT BACKGROUND AND TECHNICAL APPROACH 4-1
  4.1 GENERAL CHARACTERISTICS OF TANK WASTE AND VITRIFICATION FEEDS TO BE PROCESSED 4-1
  4.2 PROJECTED INVENTORIES OF IMMOBILIZED LOW-ACTIVITY WASTE 4-1
  4.3 OPTIONS FOR GOVERNMENT AND COMMERCIAL ACTIVITIES AND CONCEPT SELECTION AND IMPLEMENTATION 4-4
  4.4 CURRENT GOVERNMENT/COMMERCIAL LOW-LEVEL WASTE DISPOSAL ACTIVITIES 4-8
  4.5 DISPOSAL FACILITIES DESCRIPTION 4-8

5.0 REQUIREMENTS 5-1
  5.1 PERFORMANCE ASSESSMENT REQUIREMENTS 5-1
  5.2 REGULATORY REQUIREMENTS 5-1

6.0 TOP-LEVEL WORK BREAKDOWN STRUCTURE 6-1
  6.1 DISPOSE IMMOBILIZED LAW ON SITE 6-3
  6.2 MAINTAIN SAFE & COMPLIANT IMMOBILIZED LAW DISPOSAL FACILITY IN CP AREAS 6-3
  6.3 TRANSITION IMMOBILIZED LAW DISPOSAL FACILITY 6-3
  6.4 CLOSE IMMOBILIZED LAW DISPOSAL FACILITY 6-4
  6.5 STORE ILAW 6-4

7.0 RIVER PROTECTION PROJECT IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL LOGIC 7-1

8.0 RIVER PROTECTION PROJECT IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SCHEDULE 8-1
  8.1 TRI-PARTY AGREEMENT CONTROLLING MILESTONES 8-1
  8.2 OTHER REQUIREMENTS 8-2
  8.3 SCHEDULE REQUIREMENTS 8-2
    8.3.1 Milestones, Key Deliverables, and Performance Measures 8-3
    8.3.2 Schedule Critical Path 8-3

9.0 PROJECT COST 9-1

10.0 PROJECT ORGANIZATION, ROLES, AND RESPONSIBILITIES 10-1

11.0 MANAGEMENT APPROACH 11-1
11.1 BUSINESS OPERATIONS 11-1
11.1.1 Project Execution Plans (Phase 1 and 2 ILAW Disposal Line-Item Projects) 11-1
11.1.2 Acquisition Strategy 11-2
11.1.3 Schedule Baseline Control 11-2
11.1.4 Cost Baseline Control 11-3
11.1.5 Performance Measurement and Reporting 11-3
11.1.6 Work Authorization 11-4
11.1.7 Funds Management 11-4
11.1.8 Contingency Management 11-4
11.1.9 Meetings and Reviews 11-5
11.1.10 Project Validations 11-5
11.1.11 Critical Decisions 11-5
11.2 ENGINEERING 11-5
11.2.1 System Engineering Management 11-5
11.2.2 Technical Baseline Control 11-8
11.2.3 Test and Evaluation Plan 11-8
11.3 QUALITY, SAFETY, AND ENVIRONMENTAL PROTECTION 11-10
11.3.1 Environmental Management 11-10
11.3.2 Regulatory Compliance with Disposal Facility Requirements 11-12
11.3.3 Nuclear Safety Activities and Authorization Basis Process 11-12
11.4 BASELINE MANAGEMENT 11-17

12.0 RISK MANAGEMENT 12-1
12.1 APPROVAL REQUIREMENTS 12-1
12.1.1 Performance Assessment Approval 12-1

13.0 CONFIGURATION MANAGEMENT 13-1

14.0 INTERFACE MANAGEMENT 14-1
14.1 INTERFACING ORGANIZATIONS AND APPROVAL AUTHORITIES 14-1

15.0 QUALIFICATIONS AND TRAINING 15-1

16.0 REFERENCES 16-1

APPENDICES

A Cross-Check Matrix of Plan Elements .... A-i

B Applicable Documents .... B-i

C Summary of Hanford Low-Level Tank Waste Performance Assessment, DOE/RL-97-69, Rev. 0 .... C-i

D Key Deliverables and Performance Measurements .... D-i

E Division of Responsibility Matrix• Immobilized Low-Activity Waste Storage/Disposal Subproject .... E-i

F Immobilized Low-Activity Waste Subproject Schedule .... F-i

LIST OF FIGURES

Figure 1. Immobilized Low-Activity Waste Disposal Program. 4-5

Figure 2. Site Plan for the Immobilized Low-Activity Waste Disposal Location. 4-9

Figure 3. Immobilized Low-Activity Waste Disposal Concept Using Grout Vaults....4-10

Figure 4. Conceptual Immobilized Low-Activity Waste Disposal Site Development Plan. 4-12

Figure 5. Low-Activity Waste Storage and Disposal Subproject. 7-2

Figure 6. Immobilized Low-Activity Waste Disposal Subproject Organizational Relationships....10-2

Figure 7. Systems Engineering Activities and Documentation—Project W-465. 11-7

Figure 9. Programmatic Risk Management Process. 12-2

LIST OF TABLES

Table 1. Summary of Immobilized Low-Activity Waste Package Production for the Immobilized Low-Activity Waste Disposal Subproject. 4-3

Table 2. Immobilized Low-Activity Waste Disposal Subproject Work Breakdown Structure. .6-1

Table 3. Tri-Party Agreement Milestones for the Immobilized Low-Activity Waste Storage and Disposal Project. 8-1

Table 4. Major Subproject Activities and Activity Durations. 8-3

Table 5a. Immobilized Low-Activity Waste Storage Subproject Estimated Life-Cycle Costs - FY 2000-FY 2018. 9-2

Table 5b. Immobilized Low-Activity Waste Storage Subproject Estimated Life-Cycle Costs - FY 2019-FY 2050. 9-4

Table 6. Safety-Related Activities and Schedule. 11-15

Table 7. Immobilized Low-Activity Waste Disposal Subproject Activities that Require Approval. 12-3

TERMS

AGA	alternatives generation and analysis
CAT	construction acceptance test
CD	critical decision
CDR	conceptual design report
CENRTC	Capital expense not related to construction
CFR	*Code of Federal Regulations*
CSB	canister storage building
CWBS	contractor work breakdown structure
DOE-HQ	U.S. Department of Energy-Headquarters
DOE	U.S. Department of Energy
DPD	Tank Waste Processing and Disposal Program Division
DRD	design requirements document
DST	double-shell tank
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FSAR	final safety analysis report
FY	fiscal year
HLW	high-level waste
ICD	interface control document
IHLW	immobilized high-level waste
ILAW	immobilized low-activity waste
LAW	low-activity waste
LLW	low-level waste
MYWP	multi-year work plan
NEPA	*National Environmental Policy Act of 1969*
NRC	U.S. Nuclear Regulatory Commission
ORP	Office of River Protection
PA	performance assessment
PHMC	Project Hanford Management Contractor
PEP	project execution plan
PSAR	preliminary safety analysis report
PSE	preliminary safety evaluation
QAPP	quality assurance project plan
RCRA	*Resource Conservation and Recovery Act of 1976*
RFP	request for proposals
RL	U.S. Department of Energy, Richland Operations Office
ROD	record of decision
RPP	River Protection Project
SAR	safety analysis report
SEMP	system engineering and management plan
SEPA	"State Environmental Policy Act of 1971"
SSC	structures, systems, and components

SST	single-shell tank
TPC	total project cost
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TWRS	Tank Waste Remediation System
WAC	*Washington Administrative Code*
WBS	work breakdown structure

RIVER PROTECTION PROJECT IMMOBILIZED LOW-ACTIVITY WASTE DISPOSAL PLAN

1.0 INTRODUCTION

The *TWRS Retrieval and Disposal Mission Immobilized Low-Activity Waste Disposal Plan*, Revision 0, was issued in fiscal year (FY) 1998 (Shade 1997). Since the issuance of this Plan, several important programmatic events have occurred that warrant revision of the Plan. The primary events that impact the immobilized low-activity waste (ILAW) waste disposal mission are the evolution of the Phase 1A privatization contract to Phase 1B; new planning guidance (Taylor 1998) from the U.S. Department of Energy, Office of River Protection (DOE ORP) to the Project Hanford Management Contract (PHMC) team based on the Phase 1B contract, update of cited references, change to the format of the Plan to provide consistency with the format of HNF-1883, *Program Plan for the River Protection Project* (Norman 1999); and general editorial modifications to the document.

This plan supports the privatization need dates as described in the 90% confidence case in the July 1998 report to Congress (DOE 1998).

1.1 DOCUMENT PURPOSE

This project plan has a twofold purpose. First, it provides a waste stream project plan specific to the River Protection Project (RPP) (formerly the Tank Waste Remediation System [TWRS] Project) Immobilized Low-Activity Waste (ILAW) Disposal Subproject for the Washington State Department of Ecology (Ecology) that meets the requirements of *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) Milestone M-90-01 (Ecology et al. 1994) and is consistent with the project plan content guidelines found in Section 11.5 of the Tri-Party Agreement action plan (Ecology et al. 1998). Second, it provides an upper tier document that can be used as the basis for future subproject line-item construction management plans. The planning elements for the construction management plans are derived from applicable U.S. Department of Energy (DOE) planning guidance documents (DOE Orders 4700.1 [DOE 1992] and 430.1 [DOE 1995a]). The format and content of this project plan are designed to accommodate the requirements mentioned by the Tri-Party Agreement and the DOE orders. A cross-check matrix is provided in Appendix A to explain where in the plan project planning elements required by Section 11.5 of the Tri-Party Agreement are addressed.

The RPP TWRS Immobilized Waste Storage and Disposal Project is divided into three subprojects.

- The Canister Storage Building (CSB) Subproject
- The ILAW Disposal Facility Subproject
- The IHLW Storage Modules Subproject, Part 2.

This document discusses the project plan for the ILAW Disposal Subproject. Updates to this document (i.e., scope, cost, and schedule) will be reflected in appropriate multi-year activity planning and subproject technical baseline documents.

This project plan is supplemented by the information contained in the following:

- Appendix A—Cross-Check Matrix of Plan Elements
- Appendix B—Applicable Documents
- Appendix C—Summary of *Hanford Immobilized Low-Activity Tank Waste Performance Assessment* (Mann 1998a)
- Appendix D—Key Deliverables and Performance Measurements
- Appendix E—Division of Responsibility Matrix—Immobilized Low-Activity Waste Disposal Subproject
- Appendix F—Immobilized Low-Activity Waste Subproject Schedule.

2.0 HANFORD SITE MISSION

As part of the Hanford Site mission, the DOE has established the Office of River Protection (ORP) to manage the tank waste activities. The *Office of River Protection Integration Management Plan for the Hanford Tank Waste Remediation System* (DOE/RL-99-06) (RL 1999) states:

> "The ORP mission is to store, treat, and immobilize highly radioactive Hanford Site waste (including current and future tank waste and cesium and strontium capsules) in an environmentally sound, safe, and cost-effective manner. The long-term goal is to protect the Columbia River from future tank waste leaks."

2.1 RIVER PROTECTION PROJECT MISSION

The RPP will provide safe storage and management of the legacy and new waste, retrieval and disposal of the waste, decontamination and decommissioning (D&D) of RPP facilities, and closure of RPP sites.

To support environmental remediation and restoration at the Hanford Site, the ORP has established a two-phase approach of using private contractors to treat and immobilize the radioactive waste currently stored in underground tanks at the Site. Treatment will produce a small volume of high-level waste and a much larger volume of low-activity waste. After immobilization, the high-level waste will be held in interim storage for eventual shipment to a high-level waste repository and the low-activity waste will be disposed of on site. The request for proposals (RFP) for the first phase of waste treatment and immobilization was issued in February 1996 (Wagoner 1996) and initial contracts for two private contractor teams led by BNFL Inc. and Lockheed-Martin Advanced Environmental Services (RL 1996b) were signed in September 1996. In 1998, the BNFL contract was amended to continue with more detailed design and planning activities (RL 1998a). Phase 1 is a proof-of-concept and commercial demonstration effort with the following goals:

- Demonstrate the technical and business feasibility of using private facilities to treat Hanford Site waste
- Maintain radiological, nuclear, process, and occupational safety
- Maintain environmental protection and compliance while reducing life-cycle costs and waste treatment times.

Phase 1 production of ILAW is planned to begin in June 2008 and could treat up to about 13 percent of the waste. Phase 1 production is expected to be completed in 2018. Phase 2 is a full-scale production effort that will begin in 2012 and treat and immobilize most of the remaining waste. ILAW production in Phase 2 is scheduled to be completed by 2024.

The DOE will supply the feed to the private contractors and will receive the ILAW product from the private treatment facilities during Phase 1. For Phase 2, retrieval and feed delivery, as well as waste treatment and immobilization, will be done by private contractors.

The DOE will pay the private contractors for each ILAW package that meets the product specifications. DOE, the ILAW disposal Project, and the contractor are working closely to develop product specifications that will meet the performance requirements. Acceptance of immobilized waste will be based on private contractor activities to qualify, verify, document, and certify the product and DOE activities to audit, review, inspect, and evaluate the treatment and immobilization process and products. The acceptance process is expected to result in ILAW product packages certified for transport and disposal at the Hanford Site safely and in compliance with environmental regulations.

2.2 RIVER PROTECTION PROJECT IMMOBILIZED TANK WASTE STORAGE AND DISPOSAL MISSION

The DOE ORP established the RPP Storage and Disposal (S&D) Project to perform storage and disposal functions for IHLW and ILAW products generated as part of the RPP privatization effort. The Project also will provide integration with federal disposal facilities. To accomplish its mission, the RPP S&D Project is divided into three subprojects: the Canister Storage Building Subproject, the ILAW Disposal Facility Subproject, and the IHLW Storage Modules Subproject. This plan addresses the ILAW Disposal Facilities Subproject.

2.3 IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL MISSION AND OBJECTIVES

The mission of the ILAW Disposal Subproject is to receive the certified ILAW packages produced by private contractor, transport the packages to a disposal site on the 200 Area Plateau of the Hanford Site, and dispose of the packages at the Hanford Site. The mission includes the following activities:

- Designing, constructing, and operating ILAW disposal facilities for initial Phase 1 production (retrofitted grout vaults). This includes developing and operating a system for transporting the product from the private contractors to the disposal facilities.

- Preparing performance assessments for U.S. Department of Energy-Headquarters (DOE-HQ) authorization for construction and operation of disposal facilities.

- Constructing additional disposal facilities for the remaining Phase 1 production and all the Phase 2 production.

- Developing closure procedures and obtaining authorization from DOE-HQ and other regulatory agencies via permitting and performance assessment analyses for closure and long-term monitoring activities to establish a permanent ILAW package disposal system.

Initial project planning contemplated interim storage of ILAW in the grout vaults in the year 2002 pending completion of the disposal performance assessment work and disposal authorization. The revised BNFL contract schedule allows the ILAW disposal performance assessment and disposal authorization to be completed before production begins. Therefore, the grout vault modifications will now be completed for operation as a disposal facility. The disposal action itself will be planned to include a period for product retrieval if circumstances make it necessary.

The objectives of this project are to evaluate, select, and implement alternatives for design, construction, operation, and closure of ILAW disposal facilities. The following specific objectives are discussed in more detail in subsequent sections.

- Select the optimum alternatives for a disposal system that meet expected ILAW package specifications and production rates as well as disposal constraints. These alternatives are evaluated and selected by alternatives generation and analysis (AGA) studies. (Section 4.3)

- Select an appropriate site for the disposal system on the 200 Area plateau and obtain authorization designating the site for ILAW disposal. Site authorization has been obtained from the RL Site Infrastructure Division (Rutherford 1997). (Section 2.3)

- Develop package transportation and handling facilities consistent with expected package characteristics, such as contact versus remote handled, based on contract requirements and private contractor interface agreements. (Section 11.2)

- Construct ILAW disposal facilities including obtaining construction and operational permits (e.g., Part B) and have ILAW disposal facilities operational on a schedule consistent with private contractor production schedules and Tri-Party Agreement obligations. (Section 4.5)

- Prepare and maintain performance assessments (PA) of facility design, including obtaining required DOE approvals for construction and operation. An interim PA was completed in September 1997. A PA was issued in March 1998 and forwarded to DOE for approval. As of June 1999, the subpanel of the Low-Level Waste Federal Review Group dealing with Hanford PAs has recommended approval of the PA with conditions. DOE-HQ management must still act. (Section 12.1)

- Acquire waste from performance and disposal system data to support maintenance updates of the PA and input to Phase 2 product specifications. (Section 12.1)

- Develop and implement all operational and closure plans including postclosure monitoring of ILAW facilities. (Section 4.7)

- Develop interfaces with the privatization contractor, DOE, and Ecology as required for schedule, system operation, and regulatory compliance. (Section 14.0)

- Support development of a conceptual design report (CDR) and detailed designs for both initial disposal facilities (grout vaults) and additional disposal facilities including project validation. (Section 11.2)

- Support environmental, safety, and health requirements through compliance with the *National Environmental Policy Act of 1969* (NEPA) and safety analyses. (Section 11.3)

3.0 SCOPE OF IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SUBPROJECT

The packaged ILAW will be supplied by private contractors to DOE in accordance with contract specifications described in the TWRS Privatization Contract with BNFL Inc. (RL 1998a). The ILAW disposal subproject includes activities and functions to provide and operate product transportation facilities and facilities for disposal of ILAW packages on the Hanford Site. Initially the ILAW production will be disposed of in the existing four grout vaults, which will be modified as part of Project W-465. Later product will be disposed of in additional facilities in the 200 East Area in a separate low-activity waste disposal complex under Project W-520. These permanent disposal systems will be designed to accommodate the complete inventory of ILAW packages produced during the treatment of Hanford Site tank waste, currently contained in 177 underground tanks.

3.1 SCOPE OF IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SUBPROJECT PLAN

This subproject plan is intended to outline the activities and requirements for the receipt of packaged ILAW that has been certified and accepted by DOE in containers with specified dimensions and properties.

This subproject plan presents organizational and management approaches that will be used to control and execute the subproject. It also identifies the elements needed for subproject and line-item project management and includes subproject schedules and milestones. The cost and schedule information presented in this document are derived from the TWRS Immobilized waste portion of the annual multiyear program plan. Future cost, scope, and schedule updates will be reflected in the MYWP and technical baseline documents.

Specifically, the project plan covers the following key project planning elements:

- Mission and objectives
- Subproject scope
- Subproject definition and background
- Approach to subproject and line-item construction project management and controls.
- Schedules, outputs, and milestones
- Cost
- Approach to risk assessment and mitigation
- Responsible Organizations and interfacing organizations or projects

- Acquisition strategy
- Approach to quality, safety, environmental protection and test and evaluation.

4.0 PROJECT BACKGROUND AND TECHNICAL APPROACH

4.1 GENERAL CHARACTERISTICS OF TANK WASTE AND VITRIFICATION FEEDS TO BE PROCESSED

High-level radioactive waste has been stored at the Hanford Site in large underground tanks since 1944. This chemically neutralized waste is generally non-uniform between tanks, highly caustic, and composed of various chemicals and radionuclides in different forms distributed in liquids, slurry, sludge, and salt cake. These waste forms originated from different process separations technologies and have been transferred and mixed among 177 tanks over the years. For a more detailed description of tank waste chemical characteristics and variability see Kupfer et al. (1997).

In general, the neutralized waste consisted mainly of insoluble solids that tend to settle to the bottom of the tanks and supernates that were treated by evaporation. These treated supernates resulted in soluble salt cake that is primarily stored in single-shell tanks (SST) and more concentrated supernate that is generally transferred to newer double-shell tanks (DST) for storage. Current plans are for supernates, salt cake, and sludges to be recovered from all 177 tanks and separated into high-level waste (HLW) and low-activity waste (LAW) fractions. The LAW fraction will be treated to remove ^{137}Cs, ^{90}Sr, and ^{99}Tc, then immobilized in a glass or similar waste form to become the ILAW. The contract specifies that the average concentrations of ^{137}Cesium (^{137}Cs), ^{90}Strontium (^{90}Sr), and Technetium (^{99}Tc) shall be limited as follows: ^{137}Cs<Ci/m^3, ^{90}Sr<Ci/m^3 and ^{99}Tc<0.1 Ci/m^3. The contractor is also required to remove 80% of the ^{99}Tc present in the feed. These plans are described in more detail in the privatization contract (Wagoner 1996) and the TWRS environmental impact statement (EIS), DOE/EIS-0189 (DOE 1996). The following section summarizes the history of the actions and decisions that led to the current strategy for disposal of ILAW.

4.2 PROJECTED INVENTORIES OF IMMOBILIZED LOW-ACTIVITY WASTE

As a result of a diverse fuel separation process history and waste transfers among tanks and tank farms over approximately 50 years, variability exists in waste inventories among tanks. Sixty-seven of the older SSTs have been designated as confirmed or suspected leakers (Hanlon 1999). Liquids have been removed from all leakers and many other SSTs by the salt well pumping program. The liquid volumes were reduced in evaporator campaigns with evaporator bottoms being returned to non-leaking tanks. This activity has resulted in much of the salt cake waste residing in the SST farms, while liquids dominate the DST farms. As a result of these transfers and processes, the majority of the ^{137}Cs and ^{99}Tc is contained in the DST farms.

The current strategy is to immobilize LAW from the DST inventory in Phase 1 and possibly in the initial periods of Phase 2 (Kirkbride 1999). This implies that, because of the differences in waste types and levels of specific radionuclides among the tanks, and waste loading specifications in the contract, both remote- handled (>200 mRem/hr) and contact-handled ($\leq$200 mRem/hr) ILAW packages may be produced. Because higher levels of radioactivity exist in the

DST farms, more remote-handled ILAW packages are likely to be generated during treatment of DST waste. The ILAW Disposal Project currently is planning for the receipt of both waste types; however, further study to determine the feasibility of producing contact-handled ILAW is required.

The TWRS tank waste privatization contract specifies three types of waste feed composition envelopes, designated A, B, and C, for LLW streams to be supplied to the privatization contractor during the Phase 1 effort. The waste feeds will be staged in AP tank farm before delivery to the Phase 1 private contractor. The composition envelopes were based in part on waste composition variability uncertainty, pretreatment process assumptions, actual tank waste characterization data, and vitrification process limitations. Studies are in progress to develop optimum tank waste retrieval sequences, blending strategies, and mass balance determinations to ensure that waste feeds meet contract waste feed supply requirements (Kirkbride et al. 1999). This information, along with the waste loading specifications in the contract, were used to estimate the total inventory of ILAW to be received by the ILAW Disposal Project.

An estimate of the expected number of ILAW packages from Phase 1 and Phase 2 privatization production activities is given in Table 1. Dates are based on the 50% confidence and 90% confidence cases desorbed in the Privatization Report to congress (RL 1998b). For a more complete analysis, see *Reanalysis of Alternatives for Immobilized Low-Activity Waste Disposal* (Burbank 1999). The bases for this estimate are the contract specifications for waste loading and durability and the preliminary block flow diagram provided by BNFL in the privatization Part 1A deliverables. For Phase 1 these specifications include 800 units as described in specification 7.2.3 of the Privatization Contract of LAW treated each year. The minimum waste loadings, specified in the contract, were used to derive a maximum inventory and the waste loadings, found in the BNFL block flow diagrams, were used to derive the minimum expected inventory. Based on contract specifications and DOE guidance, the individual package size is assumed to be a 1.4 m cube. These assumptions yield a maximum inventory of 7,900 packages (21,000 m^3) for Phase 1 privatization and maximum total production of 81,200 packages (223,000 m^3). If the higher waste loadings proposed by BNFL in the Part A deliverables are used, the Phase 1 package count is reduced to 6,000 and the total mission production would be 56,000 packages (154,000 m^3). These quantities are considered minimum package counts because preliminary testing of glass at the higher waste loadings indicate that the waste form performance may not meet the waste acceptance requirements in the contract specifications.

Table 1. Summary of Immobilized Low-Activity Waste Package Production for the Immobilized Low-Activity Waste Disposal Subproject.

Item	Phase 1		Phase 2		Total
	50% Confidence	90% Confidence	50% Confidence	90% Confidence	90% Confidence
Hot operations start date	01/01/07	01/01/08	01/03/12	01/03/12	01/01/08
Hot operations end date	02/28/18	02/28/18	07/31/25	07/31/25	07/31/25
Post-closure monitoring start					08/01/25
Post-closure monitoring end					12/21/34
Waste inventory (per contract specification)	7,900 packages 21,000 m^3		73,300 packages		81,200
Waste inventory (per BNFL proposal)	6,000 packages 16,000 m^3		50,800 packages		56,800 packages 156,000 m^3
Nominal package receipt rate	2 per day		15 per day		
Peak package receipt rate	5 per day		29 per day		
Nominal waste package size	1.4 m x 1.4 m x 1.4 m = 2.744 m^3				

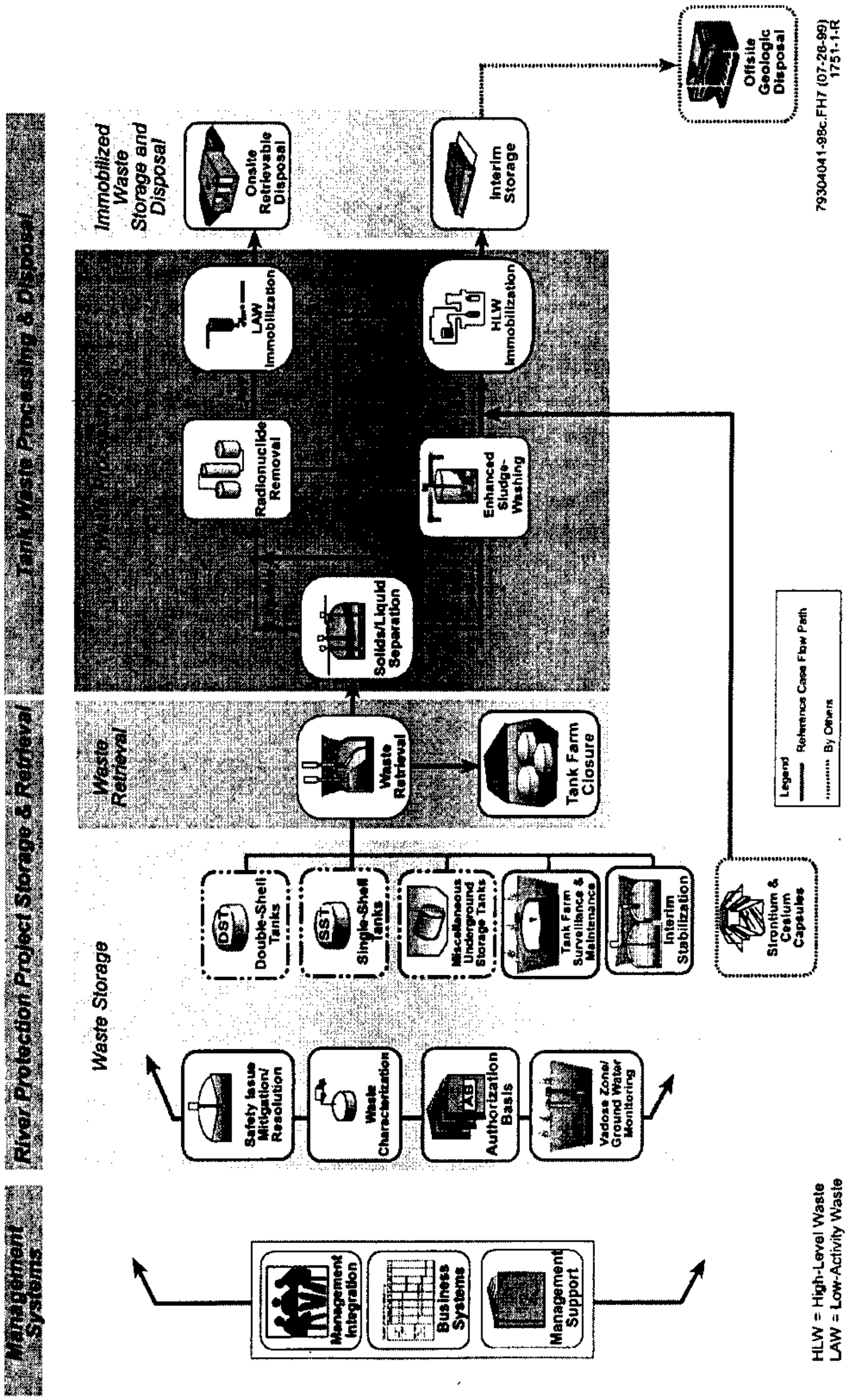
Sources: Privatization Authorization to Proceed, Waste Disposal Division Planning Guidance, Baseline Updating Guidance.

4.3 OPTIONS FOR GOVERNMENT AND COMMERCIAL ACTIVITIES AND CONCEPT SELECTION AND IMPLEMENTATION

The BNFL contract identifies the services that DOE will provide to the treatment contractor and specifies ILAW product requirements for Phase 1 privatization. A separate RFP will be issued for Phase 2 privatization and may include modified product requirements based on experience from the Phase 1 privatization results that could affect ILAW disposal capacity. A possible impact could be a change in the waste form durability specification that limits waste loading and results in more packages than currently anticipated. Also, the current baseline schedule anticipates Phase 2 ILAW production starting in 2012 and running to 2024. If this schedule is changed, disposal system planning must be modified to meet the new schedule. For ILAW disposal, these contingencies are considered by taking a staged approach to disposal system construction.

Figure 1 is a logic flow diagram for the ILAW disposal program that shows the interaction with the privatization contractors. ILAW disposal of packages from Phase 1 production in retrofitted grout vaults is planned for between 2008 and 2014 when additional disposal facilities must be made available. Performance assessments have been prepared (Mann et al. 1998a) to verify that both disposal system designs and sites meet long-term performance objectives.

Figure 1. Immobilized Low-Activity Waste Disposal Program.



Current plans are to modify the existing grout vaults for disposal of the initial Phase 1 production. Based on a stacking height of 7 packages, 10 cm spacing between stacks, and space requirements for handling equipment, about 7,000 packages could be stored in the existing 4 vaults. This should accommodate approximately 5 years' production. The remaining Phase 1 and Phase 2 production will be disposed of in separate facilities to be provided by the ILAW Storage and Disposal Project in the 200 East Area disposal facility.

Summary of Earlier LLW Management and Disposition Options. The history of previous low-level waste treatment and disposal options at the Hanford Site can be summarized as follows:

- A Hanford Site tank waste environmental impact statement issued in 1987 (DOE 1987) and a record of decision (ROD) issued in 1988 (53 FR 12449) focused on the disposal of tank waste. The ROD included the following conclusions:
- DST waste would be separated into two fractions.
  - The high-level waste fraction of DST would be vitrified and disposed in a geologic repository off site. This waste is not of concern to the ILAW disposal project.
  - The low-activity fraction of DST waste would be solidified as grout and disposed in near-surface vaults on site at the Hanford Site.
  - Additional development and evaluation would be done on SST waste before a disposal decision would be made.
- Since the 1988 ROD, the following events have occurred:
  - The DOE, EPA, and Ecology signed the Tri-Party Agreement (Ecology et al. 1989).
  - B Plant was eliminated from consideration as a waste pretreatment facility.
  - The TWRS Program was established by the Secretary of Energy in December of 1991 to safely treat, store, and dispose of the tank waste.
  - SST waste retrieval was included as a planning basis in the TWRS program. If all Hanford Site LAW from both DST and SST was immobilized as grout, the disposal space requirements would be greatly enlarged. The original grout disposal site was planned only for grout from DST LAW.

- Public concern over the use of grout. As recommended by the Hanford Tank Waste Task Force, the grout concept was put on hold because of public perceptions about difficult retrievability of grout monoliths and durability uncertainties concerning release of hazardous materials.

- The 1989 Tri-Party Agreement was renegotiated in September 1993 and was signed by all parties in January 1994 (Ecology et al 1994). A decision was made to use the vitrification option for LAW as well as for HLW.

- A TWRS EIS was issued in August 1996 that includes a multiple disposal option (DOE 1996). The preferred alternative is to retrieve the waste, separate it into HLW and LAW fractions, and immobilize the LAW with disposal on the Hanford Site.

- In November 1996, RL submitted to the NRC the technical basis for incidental waste and requested that the NRC grant an incidental waste determination on the LAW fraction.

- DOE decided to privatize the treatment and immobilization of tank waste. DOE issued an RFP for privatized treatment of tank wastes (Wagoner 1996) in early 1996 and contracts for Phase 1A were signed with two private contractor teams in October 1996.

- The ILAW product specifications were based on the assumption that the product would be glass or equivalent based on the short-term release rate as measured by the product consistency test (ASTM C1285-94).

- The TWRS EIS ROD (62 FR 8693) confirmed interim storage of ILAW at the Hanford Site and final disposal of ILAW in near-surface disposal facilities on Site.

- In June 1997, the NRC granted an incidental waste determination on the LAW fraction, subject to certain conditions (Paperiello 1997).

- In August 1998, the DOE signed a contract modification (RL 1998a) with the private contractor team lead by BNFL Inc. authorizing them to proceed with conceptual design of the combined HLW/LAW treatment facility, according to a revised schedule that would start ILAW production in 2008 instead of 2002.

To support the RPP program strategy, a site evaluation study was conducted (Shord 1995) to identify a TWRS tank waste treatment, storage, and disposal complex site. As a result of the study, a preferred site was selected in the 200 East Area. This site included a 36.5 ha (90-acre) parcel for disposal of ILAW. After the TWRS complex site evaluation, the Phase 1 tank waste immobilization privatization approach was initiated. A site for the Phase 1 privatization tank waste immobilization facilities was identified in the former grout disposal site area. In parallel with this activity, the four existing grout vaults were identified as storage and disposal facilities for initial privatization Phase 1 production and the 36.5 ha (90-acre) site was identified as the location for construction of disposal facilities for the remainder of Phase 1 production and all of Phase 2 production.

4.4 CURRENT GOVERNMENT/COMMERCIAL LOW-LEVEL WASTE DISPOSAL ACTIVITIES

A number of government and commercial organizations both in the U.S. and in the international nuclear community currently operate facilities for the disposal of LLW. Most of these facilities are near-surface trenches or vaults that may or may not be lined or designed according to RCRA requirements, depending on the type of waste involved and its classification. Other facilities for LLW disposal, such as the Centre de l'Aube in France, are based on the tumulus (burial mound) concept. In general, the currently operating LLW facilities dispose of solid waste from a variety of sources such as contaminated laboratory materials or low-level process or decontamination components, including filters, or cemented and containerized ion exchangers. At the Hanford Site, much of these kinds of activities are conducted by US Ecology commercially and the solid waste program that includes the Waste Receiving and Processing facility for DOE. Similar activities are conducted at other DOE sites. Procedures have been established for receiving and disposing of heterogenous waste with various nonradioactive components from different sources and diverse packaging.

Probably the closest analog to the Hanford ILAW disposal project is the Savannah River Site Saltstone Disposal Facility. The saltstone grout is produced by mixing an aqueous LLW stream with slag, fly ash, and cement, which will be poured into concrete vaults where it will harden and cure. Up to 15 vaults will be constructed. The vaults will be divided into cells each of which will contain the volume of saltstone produced from treating approximately 4.2 million L (1.1 million gal) of waste. The vaults will be built at or near grade. Once full, the vaults will be backfilled and covered with materials that include a moisture barrier and a clay and gravel drainage system. Similarities of the Savannah River Site concept and the Hanford Site concept for LLW disposal include features of large volumes of similar liquid waste treated to form a large amount of a single waste type in consistent packaging. The waste generally originate from a single type of source, i.e., of tank waste pretreatment. This makes the immobilized waste product and packaging relatively homogenous and consistent compared with the kinds of waste typically received from a variety of sources in other LLW disposal sites. About 200,000 m^3 of the same type of waste form (vitrified monoliths in packages) are expected to be generated by the ILAW privatization contractors at the Hanford Site. Also, the immobilized product will be disposed of in near-surface vault systems.

4.5 DISPOSAL FACILITIES DESCRIPTION

ILAW disposal requires appropriate site selection and characterization, performance assessment, facility design and construction, development of systems to transport packages from private contractors to the facility, and all necessary supporting activities to implement these functions. Two sites in the 200 East Area have been selected for disposal of ILAW packaged waste. The first site is the existing four grout vaults as authorized in Taylor (1996), at the eastern portion of the 200 East Area, as shown in Figure 2. The second site, shown in Figure 2, consists of

Figure 2. Site Plan for the Immobilized Low-Activity Waste Disposal Location.

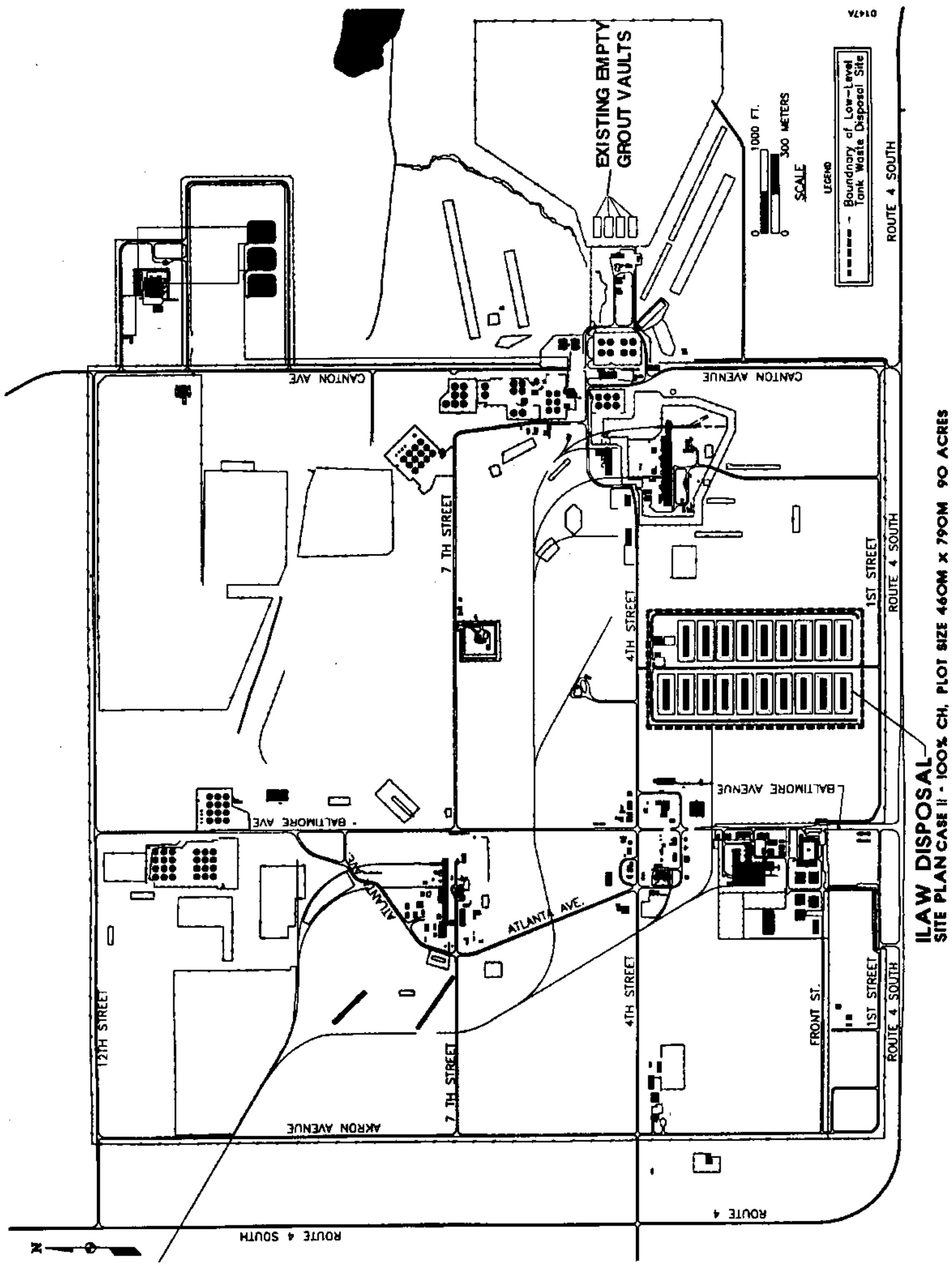
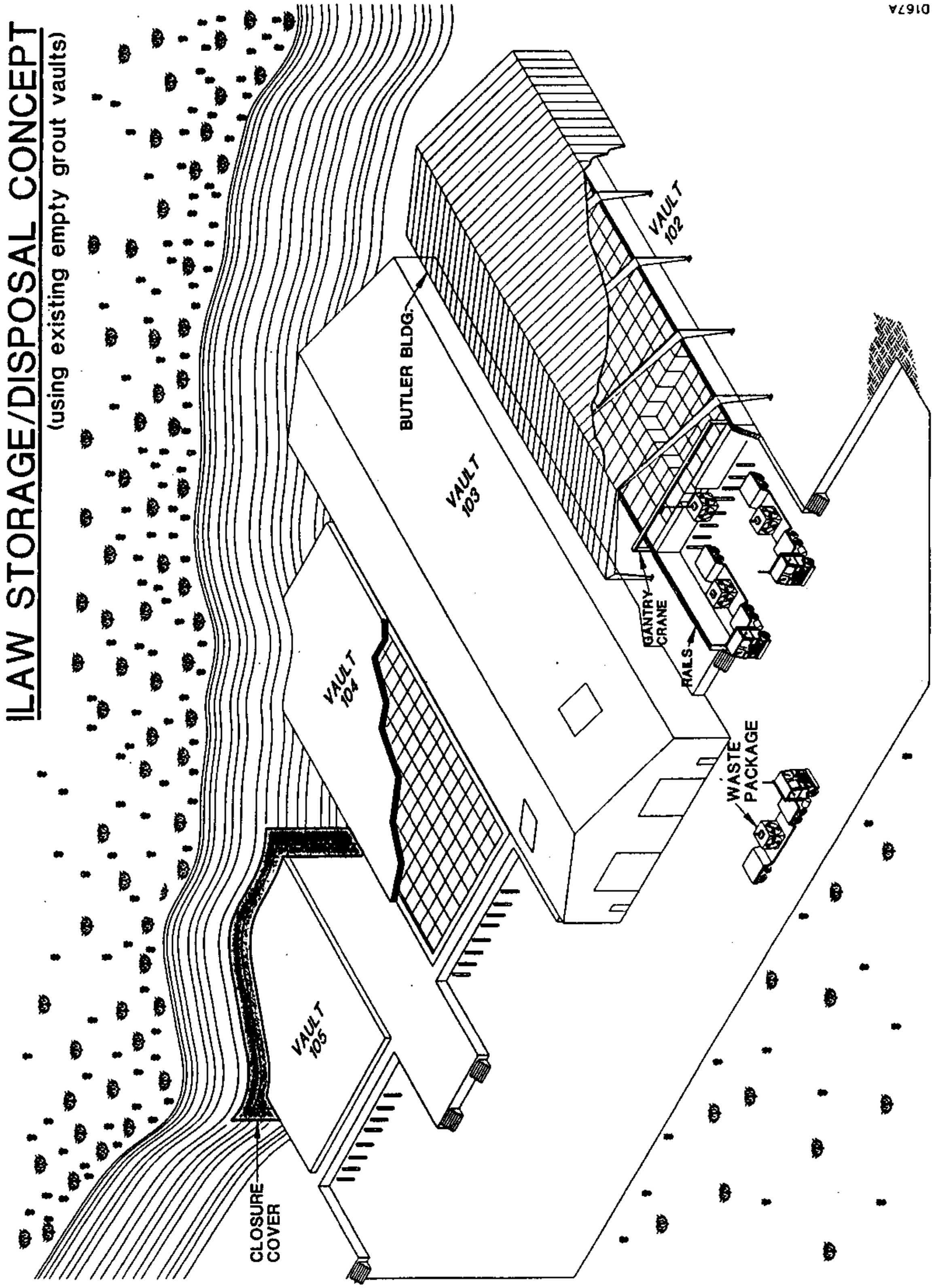


Figure 3. Immobilized Low-Activity Waste Disposal Concept Using Grout Vaults.

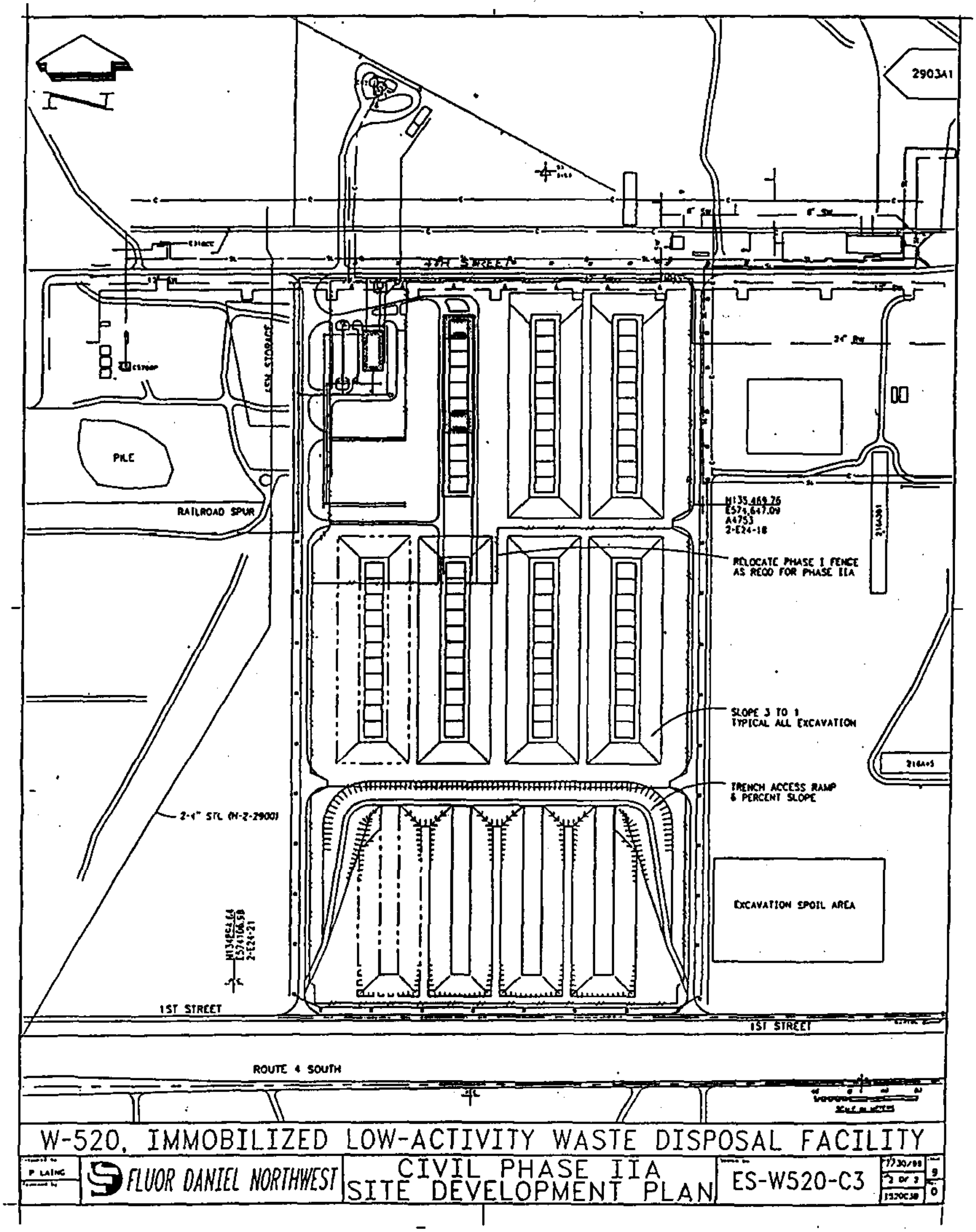


approximately 90 acres west of the Plutonium-Uranium Extraction Plant. It will be used to construct additional disposal facilities. This site is identified in the TWRS Complex Site Evaluation Report (Shord 1995) and has been approved by the RL Site Infrastructure Division in Rutherford (1997).

The grout vaults are located east of the grout treatment facility and have the capacity for about 7,000 ILAW packages based on product specifications given in the Phase 1 Privatization Contract. These vaults, illustrated in Figure 3, will be modified for disposal of ILAW. Because more than 7,000 packages may be produced during the Phase 1 Privatization Contract, additional disposal space will be required. The additional disposal facilities, designated as the Low-Activity Waste Disposal Complex, located in the south central portion of the 200 East Area will contain disposal units for the portion of Phase 1 production that exceeds the grout vault capacity, as well as all remaining ILAW production expected during Phase 2 Privatization resulting from treatment of all remaining tank waste. Depending on the level of package radioactivity, some ILAW packages may require remote handling; others may be contact handled. The package activity level, combined with the package hazardous waste classification, is expected to allow both trench and vault disposal concepts to be used. Depending on the waste loading achieved by BNFL, between 56,800 and 81,200 ILAW packages may result from treatment of all 177 tanks (Burbank and Hohl 1999).

A 36.5 ha (90-acre) disposal system site has been identified in the south central portion of the 200 East Area for additional permanent disposal of the ILAW inventory (Shord 1995). A conceptual design has been prepared for this area that evaluated alternative concepts for the actual disposal system layout. All layout concepts assume that packages can be stacked up to six high and may include any combination of four different waste types. These are remote- or contact-handled mixed waste and remote- or contact-handled non-mixed waste. The different waste types have different shielding and disposal system liner requirements. The disposal system space requirements include the actual waste package footprint, excavations up to 10 m deep to allow for both package volume and an infiltration (capillary break) diversion cap on closure, and excavations with a slope as low as 1 to 3 as in solid waste excavation practices (U.S. Occupational Safety and Health Administration requirements are a slope of 1 to 1.5). The disposal system area requirements include roads and related infrastructure, buildings for operations, and coordination with other 200 East Area facilities. The disposal area is currently expected to be used for disposal of Phase 1 product in excess of the grout vault capacity, as well as for disposal of Phase 2 production. Disposal modules will be constructed on a time phased basis as needed. Figure 4 shows the proposed layout of this site.

Figure 4. Conceptual Immobilized Low-Activity Waste Disposal Site Development Plan.



5.0 REQUIREMENTS

5.1 PERFORMANCE ASSESSMENT REQUIREMENTS

The performance assessment (PA) evaluates the long-term potential for contaminant migration from disposal systems to estimate its potential effect on human health and the environment. The function of the PA is to establish requirements on disposal facility design, waste form acceptance, and disposal system operations that provide 'reasonable expectation" that releases from the disposal system will meet performance objectives. This analysis is based on site-specific geologic, hydraulic and geochemical parameters, disposal system design, inventory of waste to be disposed of, waste form durability, as well as radiological dose factors. Based on the *Hanford Immobilized Low-Activity Tank Waste Performance Assessment* 1998 (Mann et al. 1998a), ^{99}Tc is the major low-activity radionuclide contributing to the long-term dose. Uranium isotopes, ^{129}I, and ^{126}Sn contribute significantly less long term dose although 126 Sn is the major contributor to dose in the intruder scenarios. The next update of the PA is expected to be published in the spring of 2001. Additional details and programmatic impacts of the PA are discussed in Section 12.1. Appendix C contains the summary of the 1998 ILAW PA.

Also, depending on the amount of ^{137}Cs and other isotopes removed during waste pretreatment, individual ILAW packages received from privatization contractors may or may not require remote handling. Accordingly, current planning anticipates that both contact- and remote-handled packages will be received. A trade study has been identified to evaluate the proportion of remote- to contact-handled packages, based primarily on cesium loading. These factors affect the total number of ILAW packages produced during both phases of privatization. They also affect the design and selection of transportation, storage, and disposal methods.

5.2 REGULATORY REQUIREMENTS

This section summarizes and lists references of regulatory requirements applicable to the project. Approaches to meeting these requirements are discussed in Chapter 8. The requirements include federal and Washington State regulations along with DOE orders applicable to the design, construction, operation, decommissioning, and closure of the ILAW disposal facilities.

In compliance with DOE Orders 5400.1, *General Environmental Protection Program* (DOE 1988a), and 5484.1, *Environmental Protection, Safety and Health Protection Information Reporting Requirements* (DOE 1981), a site evaluation study for a TWRS integrated waste immobilization complex that included both vitrification facilities and storage/disposal facilities was completed before the privatization RFP was issued (Shord 1995). This study identified the 36.5 ha (90-acre) site within the selected complex in the 200 East area as a proposed site for the ILAW disposal system. Also, as part of this compliance process, an environmental baseline site characterization plan was prepared (Reidel et al. 1995) that includes establishing baseline preexisting conditions for the ILAW disposal site. The plan will be implemented during the preconstruction phase.

A NEPA review of TWRS proposed treatment and disposal actions resulted in a TWRS EIS (DOE 1996) that includes disposal of ILAW at the Hanford Site. This has been completed and a record of decision (ROD) (DOE 1997) was issued. The TWRS EIS ROD describes a phased implementation alternative with an initial demonstration phase where ILAW is prepared for disposal in grout vaults or similar facilities, and a second phase that will treat and immobilize the remainder of the LAW for onsite disposal in near-surface facilities. A supplement analysis (DOE 1998) was performed to evaluate the impact of revised tank waste inventory, accident analysis, vadose zone data, engineered parameters, and technology development activities that have occurred since the original ROD. The analysis showed that the changes would have no effect on the conclusions of the EIS.

An environmental requirements checklist for interim storage of Phase 1 production has been drafted (Borneman 1997) that includes an evaluation of both NEPA and the "State Environmental Policy Act of 1971" (SEPA) documentation requirements as well as other state and federal requirements for applicability to the project. Checklists also will be prepared for future disposal facilities. Because the waste will contain hazardous constituents, RCRA Part A and B dangerous waste permits will be required unless delisting is feasible. A permitting plan for Part A and Part B permits has been drafted (Deffenbaugh 1997). Also, a proposed EPA "Hazardous Waste Identification Rule" (60 FR 66343) may revise existing rules and develop risk-based exit levels for hazardous waste constituents that may allow the ILAW product to be regulated as ordinary low-level waste instead of under RCRA. The DRD for the ILAW interim storage project (Burbank 1997) lists government and DOE regulations applicable to the project. These are given in Appendix B along with the environmental checklist results.

In addition, various DOE orders apply; DOE Order 5820.2A requires an approved performance assessment of the proposed facility before construction begins. DOE Order 435.1, which will replace DOE Order 5820.2A, still requires a performance assessment to get disposal authorization from DOE. Performance assessment requirements and implementation guidance are discussed in Chapter 7. The ILAW Disposal Project is working closely with the private contractor to develop classes that will meet performance requirements.

Waste Classification. At the request of the ILAW Disposal project, the NRC recently determined that ILAW is "incidental waste" (Paperiello 1997) subject to the following conditions:

- The "waste has been processed (or will be further processed) to remove key radionuclides to the maximum extent technically and economically practical."

- The "waste will be incorporated in a solid physical form at a concentration that does not exceed the applicable concentration limits for Class C low-level waste as set out in 10 CFR [*Code of Federal Regulations*] Part 61."

- The solid, immobilized waste will be managed, pursuant to the *Atomic Energy Act of 1954*, so that safety requirements comparable to the performance objectives set out in 10 CFR Part 61 are satisfied.

This classification removes the ILAW from the high-level waste disposal licensing authority of the NRC and allows its disposal from both SSTs and DSTs under DOE requirements in shallow land disposal facilities. DOE Order 5820.2A, Chapter 3 (DOE 1988), contains DOE policy and requirements for managing low-activity waste.

The technical basis, supporting the NRC determination to classify ILAW as incidental waste, was provided by Petersen (1996). Nine key radionuclides were considered for removal because they represent 99.9 percent of the waste tank curie inventory. Cesium-137 was the only radionuclide to meet the "technical and economically practical" removal criteria for incidental waste. The other radionuclides were either technically or economically impractical to remove. The technical basis recommended removing Cesium-137 without removing the other soluble radionuclides. The NRC classification will be revisited under any of the following circumstances:

- The tank radionuclide inventory is higher than or different from that described in the technical basis report
- The LAW fraction is not vitrified or the final waste form is significantly different from that described in the technical basis report
- Changes in the ILAW disposal site or site characterization parameters adversely affect the conclusions drawn in the final performance assessment.

Product Acceptance Process. The product acceptance process ensures that the ILAW product meets the specifications listed in the privatization contract and serves as the basis for DOE payment to the contractor. A preliminary product acceptance strategy was began when the RFP was issued; the draft was updated after the contracts were awarded. When completed, the strategy, along with more recent interface control documents, will serve as guide for preparing a detailed product acceptance procedure that will describe the transfer mechanism and detail the supporting documentation needed to transfer the ILAW product from the private contractor to the ILAW Disposal Subproject. This procedure, to be developed and implemented by DOE, is expected to ensure that each ILAW package received by the ILAW Disposal Subproject is within specifications and has the required documentation to comply with all permitting, safety, performance assessment, and operating requirements. As part of the interface control document process, the ILAW Disposal Subproject has supplied DOE with a list of assumptions and requirements based on RFP specifications that must be addressed in the acceptance procedure (Interface Control Document [ICD] 15, ILAW Product). While a detailed acceptance procedure has not been developed, current guidance calls for interim product acceptance 15 days after production on a batch basis, and final acceptance within 60 days. The ILAW Disposal Subproject will transport the product after interim acceptance.

The ILAW product will be accepted by DOE and disposed of on the Hanford Site by the ILAW Disposal Subproject, making it subject to DOE orders for radioactive waste management. The current order, 5820.2A (DOE 1988) and its replacement, 435.1, require that a performance assessment of the disposal system be conducted and approved before beginning construction. For new disposal facilities, both a performance assessment and a site composite analysis must be submitted to the Deputy Assistant Secretary for approval before beginning construction.

Construction may not start until authorization from the Assistant Secretary for Environmental Management is received.

6.0 TOP-LEVEL WORK BREAKDOWN STRUCTURE

A work breakdown structure (WBS) was established for planning, execution, and control of the ILAW Disposal Subproject work. The WBS represents the way in which work will be estimated, scheduled, budgeted, performed, and managed. The WBS defines all authorized ILAW Disposal Subproject work regardless of funding source by relating elements of work to each other and to the end products. Because it describes all the work to be done on the ILAW Disposal Subproject, the WBS provides the basis for technical, schedule, and cost control. The status of each active element is monitored regularly to determine if the planned work is being accomplished on schedule and within budget.

The ILAW Disposal Subproject WBS is broken into discrete packages for performance tracking and reporting. Major work activities for the Subproject have been defined as shown in the WBS, Table 2, and are detailed in activity data sheets held as backup to the TWRS multi-year program plan. The activity data sheets are available from the TWRS Storage and Disposal Project files.

Table 2. Immobilized Low-Activity Waste Disposal Subproject Work Breakdown Structure. (3 sheets)

Activity identification number	Activity description
1	Hanford Site
1.01	River Protection Project
1.01.09	Immobilized Waste
1.01.09.01	Immobilized LAW Disposal Facility
1.01.09.01.01	Dispose Immobilized LAW On Site
1.01.09.01.01.01	ILAW Project Management
1.01.09.01.01.01.01	ILAW Project Management
1.01.09.01.01.02	ILAW Systems Definition
1.01.09.01.01.02.01	Maintain Interface with Private Contractor
1.01.09.01.01.02.02	Maintain Technical Requirements for Storage/Disposal
1.01.09.01.01.02.03	Project Management Plan Update
1.01.09.01.01.02.04	Prepare/Maintain Technical Requirements for Disposal
1.01.09.01.01.03	ILAW Performance Assessment
1.01.09.01.01.03.01	1998 Performance Assessment
1.01.09.01.01.03.02	Data Collection for 2001 Performance Assessment
1.01.09.01.01.03.03	2001 Performance Assessment
1.01.09.01.01.03.04	Data Collection for Performance Assessment
1.01.09.01.01.04	ILAW Project W-520, Immobilized LAW Disposal Complex
1.01.09.01.01.04.01	W-520 Conceptual Design

Table 2. Immobilized Low-Activity Waste Disposal Subproject Work Breakdown Structure. (3 sheets)

Activity identification number	Activity description
1.01.09.01.01.04.02	W-520 Advanced Conceptual Design
1.01.09.01.01.04.03	W-520 Project Validation
1.01.09.01.01.04.04	W-520 Design
1.01.09.01.01.04.05	W-520 Equipment Procurement
1.01.09.01.01.04.06	W-520 Construction
1.01.09.01.01.04.07	W-520 Procurement/Training/OTP/ORR (Bal Part I)
1.01.09.01.01.04.08	W-520 Regulatory Requirements
1.01.09.01.01.04.09	W-520 Authorization Basis Development/Approval
1.01.09.01.01.05	ILAW Future Projects
1.01.09.01.01.05.01	ILAW Project Management
1.01.09.01.01.05.02	Update Technical Baseline
1.01.09.01.01.05.03	Maintain Technical Baseline
1.01.09.01.01.05.04	CDR, ACDR, and Validation
1.01.09.01.01.05.05	Design
1.01.09.01.01.05.06	Construction
1.01.09.01.01.05.07	Permits
1.01.09.01.01.05.08	Authorization Basis
1.01.09.01.01.06	ILAW Operations
1.01.09.01.01.06.01	W-520 Operations (Balance Part I)
1.01.09.01.01.06.02	Operations and Monitoring
1.01.09.01.01.06.03	Maintain ILAW Part I Per Assessment
1.01.09.01.02	Maintain Safe/Compliant ILAW Disposal Facility in CP Area
1.01.09.01.02.01	Compliant ILAW
1.01.09.01.03	Transition ILAW Disposal Facility
1.01.09.01.03.01	ILAW Transition
1.01.09.01.04	Close ILAW Disposal Facility
1.01.09.01.04.01	ILAW D&D
1.01.09.01.04.01.01	Close ILAW Disposal Facilities
1.01.09.01.04.01.03	Closure/D&D
1.01.09.01.04.01.04	Initiate Post-Closure Monitoring
1.01.09.01.05	Store ILAW On Site
1.01.09.01.05.01	Project W-465 Immobilized LAW Interim Storage Facility

Table 2. Immobilized Low-Activity Waste Disposal Subproject Work Breakdown Structure. (3 sheets)

Activity identification number	Activity description
1.01.09.01.05.01.01	W-465 Project Revalidation
1.01.09.01.05.01.02	W-465 Advanced Conceptual Design
1.01.09.01.05.01.03	W-465 Design
1.01.09.01.05.01.04	W-465 Equipment Procurement
1.01.09.01.05.01.05	W-465 Modify Vaults
1.01.09.01.05.01.06	W-465 Procure/Train/OTP/ORR (Init Part I)
1.01.09.01.05.01.07	W-465 NEPA Documentation
1.01.09.01.05.01.08	W-465 RCRA Permits
1.01.09.01.05.01.09	W-465 Authorization Basis Dev./Approval
1.01.09.01.05.02	W-465 Operations
1.01.09.01.05.02.01	W-465 Operations (Init Part I)

6.1 DISPOSE IMMOBILIZED LAW ON SITE

The scope of work for the *Dispose Immobilized Low Activity Waste (LAW) On-Site* function is to provide on-site disposal of Immobilized LAW. Transport, receive, unload, emplace and cover sealed containers of immobilized LAW from the LAW Treatment Facility, Phase 2. It also includes monitor, control, containment and handling for disposal of Immobilized LAW. This function includes transporting the Immobilized LAW from the Interim Storage site (if necessary) to the disposal site.

6.2 MAINTAIN SAFE & COMPLIANT IMMOBILIZED LAW DISPOSAL FACILITY IN CP AREAS

The scope of work for the *Maintain Safe and Compliant Immobilized Low Activity Waste Disposal Facility in the Central Plateau (CP) Area* function is to maintain the Immobilized LAW Disposal facility structures, operating systems and equipment, and monitoring systems within the approved safety and compliance requirements until the facility is ready for closure.

6.3 TRANSITION IMMOBILIZED LAW DISPOSAL FACILITY

The scope of work for the *Transition Immobilized Low Activity Waste (LAW) Disposal Facility* function is to initiate the transition phase of decontamination and decommissioning for the Immobilized LAW Disposal Facility.

6.4 CLOSE IMMOBILIZED LAW DISPOSAL FACILITY

The scope of work for the *Close Immobilized Low Activity Waste (LAW) Disposal Facility* function begins at the completion of the long term storage mission of the Immobilized LAW Disposal Facility. The facility will be placed into a state to be the final disposal site for the ILAW. This could include decontamination, filling and sealing the storage vaults, and emplacement of an engineered surface barrier.

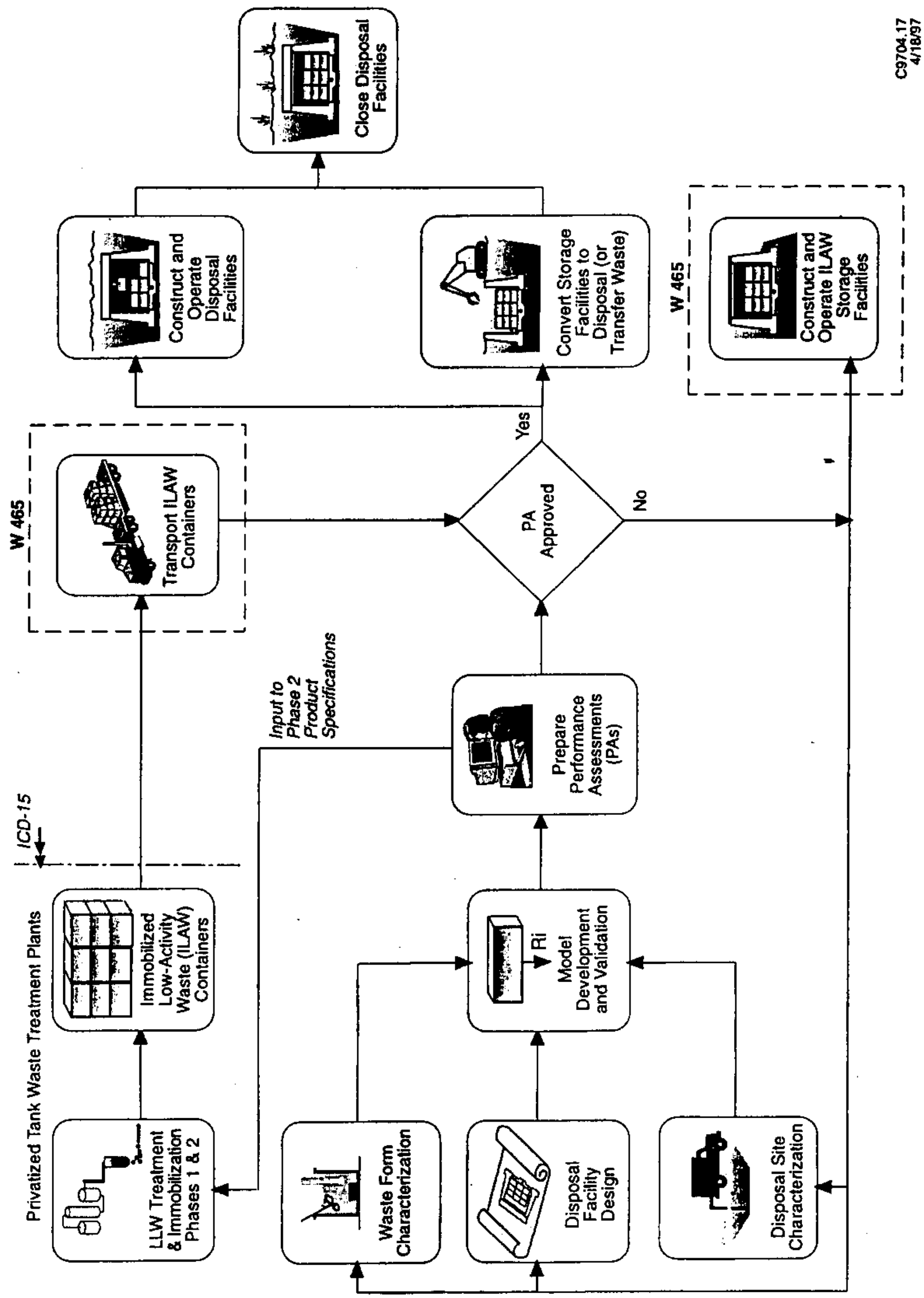
6.5 STORE ILAW

The scope of the *Store Immobilized Low Activity Waste (ILAW) Onsite* function is to package, transport, receive, unload, emplace and store sealed containers of immobilized LAW from the LAW Plant Phase 1 and the LAW/HLW Plant, Phase 1. Monitor the receipt, movement, placement and containment integrity of the immobilized LAW during storage.

7.0 RIVER PROTECTION PROJECT IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL LOGIC

Figure 1 presents the overall logic for the ILAW treatment, vitrification, storage, and disposal of Hanford Site tank waste. Figure 5 presents the logic for the ILAW Disposal Subproject. This logic indicates the subproject functions included and identified in the interfaces with the ILAW private contractor (BNFL 1998) and the performance assessment activities for the ILAW disposal program. The multi-year work plan (LMHC 1998) provides more detailed logic.

Figure 5. Low-Activity Waste Storage and Disposal Subproject.



8.0 RIVER PROTECTION PROJECT IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SCHEDULE

8.1 TRI-PARTY AGREEMENT CONTROLLING MILESTONES

The ILAW Disposal Subproject is governed by the Tri-Party Agreement Milestones. These milestones and their due dates are shown in Table 3. A complete list of milestones and deliverables, including both Tri-Party Agreement and RL milestones, and associated descriptions for the ILAW Disposal Subproject are given in Appendix D. These milestones are currently being renegotiated to reflect the new privatization schedule (RL 1998b).

Table 3. Tri-Party Agreement Milestones for the Immobilized Low-Activity Waste Storage and Disposal Project. (2 Sheets)

Milestone Number	Milestone Title	Due Date
M-90-01	Submit Project Management Plan to Ecology	12/31/97 Complete
M-90-02T	Complete Conceptual Design of ILAW Interim Storage Facility	6/30/98 Complete
M-90-07T	Complete Conceptual Design of ILAW Additional Storage Facilities	6/30/00
M-90-04T	Complete Detailed Design of ILAW Interim Storage Facility	6/30/01
M-90-03	Key Decision 3 - Initiate Construction ILAW Interim Storage Facility	6/29/01
M-90-06	Initiate Hot Operations - ILAW Interim Storage Facility - Phase 1	12/31/02
M-20-00	Submit Part B Permit Application or closure/post-closure plans for all RCRA TSD units. Permit applications, closure, and post-closure plans will be submitted to Ecology and/or EPA for approval in accordance with their respective authorities.	2/28/04
M-20-57	Submit Interim ILAW Facility Part B Permit Application to Ecology	12/31/00
M-20-58	Submit ILAW Disposal Facility Part B Permit Application to Ecology	12/31/03

Table 3. Tri-Party Agreement Milestones for the Immobilized Low-Activity Waste Storage and Disposal Project. (2 Sheets)

Milestone Number	Milestone Title	Due Date
M-90-09T	Complete Detailed Design - ILAW Additional Storage & Disposal	3/31/03
M-90-08	Key Decision 3 - Initiate Construction - ILAW Additional Storage and Disposal	6/30/03
M-90-05T	Submit Final PA to Ecology for Review	3/31/01 Complete
M-90-10	Initiate Hot Operations - ILAW Disposal Module 1	12/30/05

Ecology = Washington State Department of Ecology
EPA = U.S. Environmental Protection Agency
ILAW = immobilized low-activity waste
PA = performance assessment
RCRA = *Resource Conservation and Recovery Act of 1976*
TSD = treatment, storage, and disposal

8.2 OTHER REQUIREMENTS

Other requirements and guidelines that are imposed on the project include orders, regulations and codes that are beyond the control of design, construction, and operating organizations. The key requirements come from the *Code of Federal Regulations* (CFR), the *Washington Administrative Code* (WAC), and DOE orders. The primary requirements that have been identified for the ILAW Disposal Subproject are discussed in the DRD (Burbank 1997), the AGA for ILAW (Burbank and Klem 1997), and the *Reanalysis of Alternatives for ILAW Disposal* (Burbank and Hohl 1999). Appendix D contains a comprehensive list of these requirements. Activities to ensure compliance with these requirements are included in the MYWP for the ILAW Disposal Subproject (LMHC 1998).

8.3 SCHEDULE REQUIREMENTS

The current ILAW subproject baseline schedule, provided in Appendix F, also is provided in the TWRS FY 1999 multiyear work plan (LMHC 1998). It identifies major Tri-Party Agreement, DOE, and PHMC milestones. The activities making up the subproject baseline schedule have been defined and are included in milestone logs that will be maintained under project change control (see Chapter 12). Table 4 summarizes the major project activities and their durations. This summary is presented in accordance with the established subproject WBS (see Section 11.1.1). The complete baseline schedule that shows critical path activities is given in Appendix F.

8.3.1 Milestones, Key Deliverables, and Performance Measures

A complete list of Tri-Party Agreement and RL milestones and key deliverables for the ILAW subproject is given in Appendix D. This appendix briefly describes the activities and performance measures for each milestones or key deliverable for the subproject.

Table 4. Major Subproject Activities and Activity Durations.

Activity	Start	Finish
Phase 1		
W-465 Conceptual Design	2-97	12-97
W-465 Adv Conceptual Design	10-99	9-01
W-465 Detailed Design	2-02	6-03
Modify Vaults	7-03	1-06
NEPA/RCRA	10-02	3-06
Safety Authorization Basis	10-00	10-05
Operations	1-08	3-11
Phase 2		
W-520 Conceptual Design	2-98	12-98
W-520 Adv Conceptual Design	1-04	12-05
W-520 Detailed Design	12-05	6-07
W-520 Construction	1-08	8-10
Permits	10-06	4-09
Performance Assessment	10-97	12-01
Safety Authorization Basis	10-03	9-09
Operations	5-11	6-14

NEPA = *National Environmental Policy Act of 1969*
RCRA = *Resource Conservation and Recovery Act of 1976*

8.3.2 Schedule Critical Path

The project critical path is derived from the MYWP for Projects W-465 and W-520. The critical path activities emphasize the congressional budget cycle, facility design, construction, and startup.

This page intentionally left blank.

9.0 PROJECT COST

The total projected cost for the ILAW Disposal Subproject is shown in Table 5. The costs are provided for the life of the project and are presented according to established ILAW Disposal Subproject WBS Level 6. A more detailed cost for each discreet project activity is provided in the FY 1999 MYWP (LMHC 1998).

More definitive total project cost (TPC) estimates for the ILAW Storage and Disposal line-item projects have been developed as part of each project's conceptual design activities. The TPC is made up of a total estimated cost (plant and capital equipment funding); other project costs, consisting of operating expense; and capital equipment not related to construction (CENRTC) funding. The TPC estimates and associated components are detailed in the Conceptual Design Report and validation packages. Other project costs are based on estimates conducted as part of the project budget submission to DOE-HQ, as validated by DOE-HQ, and are provided by the project performer, the PHMC. These other project costs are an integral part of the MYWP baseline estimate (LMHC 1998). Project costs will be evaluated during the project life cycle through a value engineering process to identify opportunities for cost reductions.

Table 5a. Immobilized Low-Activity Waste Storage Subproject Estimated Life-Cycle Costs - FY 2000-FY 2018. (2 sheets)

WBS	FY00 ($)	FY01 ($)	FY02 ($)	FY03 ($)	FY04 ($)	FY05 ($)	FY06 ($)	FY07 ($)	FY08 ($)	FY09 ($)	FY10 ($)	FY11 ($)	FY12 ($)	FY13 ($)	FY14 ($)	FY15 ($)	FY16 ($)	FY17 ($)	FY18 ($)	Total activity cost ($)
1.01.09.02.01.01.02 ILAW Systems Definition																				
Expense	474.5	475.6	128.1	128.7	129.2	128.7	128.1	128.7	128.7	128.7	128.7	128.7	128.7	128.1	128.7	128.7	129.2	128.1	42.5	3,050.1
1.01.09.01.01.03 ILAW Performance Assessment																				
Expense	3,432.1	4,290.0	2,128.5	503.6	42.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10,396.9
CENRTC	67.1	279.4	265.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	611.6
1.01.09.01.01.04 ILAW Project W-520 Immobilized LAW Disposal Complex																				
Expense	--	--	--	500.0	2,018.7	1,955.6	1,191.7	1,000.0	2,131.5	3,916.3	--	--	--	--	--	--	--	--	--	16,893.1
CENRTC	--	--	--	--	--	--	--	--	804.8	195.2	--	--	--	--	--	--	--	--	--	1,000.0
Capital	--	--	--	--	--	3,797.3	11,872.3	24,020.8	17,501.6	14,719.2	1,127.9	--	--	--	--	--	--	--	--	72,949.1
1.01.09.01.01.05 ILAW Future Projects																				
Expense	--	--	--	--	--	415.4	948.2	527.6	13,844.2	945.8	945.8	7,445.8	945.8	7,442.1	945.8	945.8	7,449.6	1,026.6	7,952.7	51,781.3
Capital	--	--	--	--	--	--	--	--	--	44,973.9	44,973.9	13,511.7	26,704.2	13,086.1	26,651.0	26,651.0	13,511.7	26,597.8	13,192.5	249,853.9
1.01.09.01.01.06 ILAW Operations																				
Expense	--	--	--	955.0	605.2	551.4	545.3	505.4	370.0	340.0	340.0	6,454.1	8,736.9	8,572.7	7,579.3	4,839.5	4,858.8	4,820.3	4,829.6	54,903.4
1.01.09.01.02.01 Compliant ILAW																				
N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1.01.09.01.03.01 ILAW Transition																				
N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1.01.09.01.04.01 ILAW Decontamination and Decommissioning																				
Expense	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,157.7	938.7	164.0	162.7	163.4	2,586.6
Capital	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,732.1	6,354.7	4,260.6	--	14,347.4
1.01.09.01.05.01 Project W-465, Immobilized LAW Interim Storage Facility																				
Expense	724.2	1755.0	1653.2	1505.7	1570.4	896.0	729.5	118.3	--	--	--	--	--	--	--	--	--	--	--	9,416.8
CENRTC	--	--	--	--	506.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	506.0
Capital	--	--	3,510.6	5,318.7	18,536.0	9,021.5	2,521.4	--	--	--	--	--	--	--	--	--	--	--	--	38,908.3
1.01.09.01.05.02 W-465 Operations																				

Table 5a. Immobilized Low-Activity Waste Storage Subproject Estimated Life-Cycle Costs - FY 2000-FY 2018. (2 sheets)

WBS	FY00 ($)	FY01 ($)	FY02 ($)	FY03 ($)	FY04 ($)	FY05 ($)	FY06 ($)	FY07 ($)	FY08 ($)	FY09 ($)	FY10 ($)	FY11 ($)	FY12 ($)	FY13 ($)	FY14 ($)	FY15 ($)	FY16 ($)	FY17 ($)	FY18 ($)	Total activity cost ($)
Expense	--	--	--	--	--	--	1,324.0	1,989.3	8,621.2	10,753.7	10,753.7	5,316.1	7.0	7.0	2.9	--	--	--	--	38,765.6

Notes:

1.) All costs are in thousands of dollars.

2.) Costs from FY01 out are not escalated.

3.) FY03 through FY05 operations expense is for performance assessment maintenance.

4.) Prior year costs (FY 95-99) are $13,960.

CENRTC =

FY = fiscal year

ILAW = immobilized low-activity waste

N/A = not applicable

WBS = work breakdown structure

Table 5b. Immobilized Low-Activity Waste Storage Subproject Estimated Life-Cycle Costs - FY 2019-FY 2050.

WBS	FY19 ($)	FY20 ($)	FY21 ($)	FY22 ($)	FY23 ($)	FY24 ($)	FY25 ($)	FY26 ($)	FY27 ($)	FY28 ($)	FY29 ($)	FY30 ($)	FY31 ($)	FY32 ($)	FY33 ($)	FY34-FY50 ($)	Total activity cost
1.01.09.01.01.05 ILAW *Future Projects*																	
Exp.	1,634.3	1,647.3	8,140.8	1640.8	8,134.3	1,640.8	1,640.8	1,061.6	1,061.6	1,061.6	568.7	566.5	568.7	571.0	568.7	4,166.8	34,674.3
1.01.09.01.01.06 ILAW Operations																	
Exp.	4,780.4	4,818.7	4,799.6	4,819.4	4,808.7	4,808.7	4,808.7	4,808.7	4,808.7	4,871.5	--	--	--	--	--	--	48,136.2
1.01.09.01.04.01 ILAW Decontamination and Decommissioning																	
Exp.	162.7	164.0	163.4	162.7	163.4	163.4	163.4	163.4	163.4	190.6	163	162.7	163.4	164.0	163.4	2,449.4	4,946.2
Cap.	--	--	--	--	--	--	--	--	22,488.7	22,669.3	--	--	--	--	--	--	45,158.0

NOTE: All costs are in thousands of dollars.

FY = fiscal year

ILAW = immobilized low-activity waste

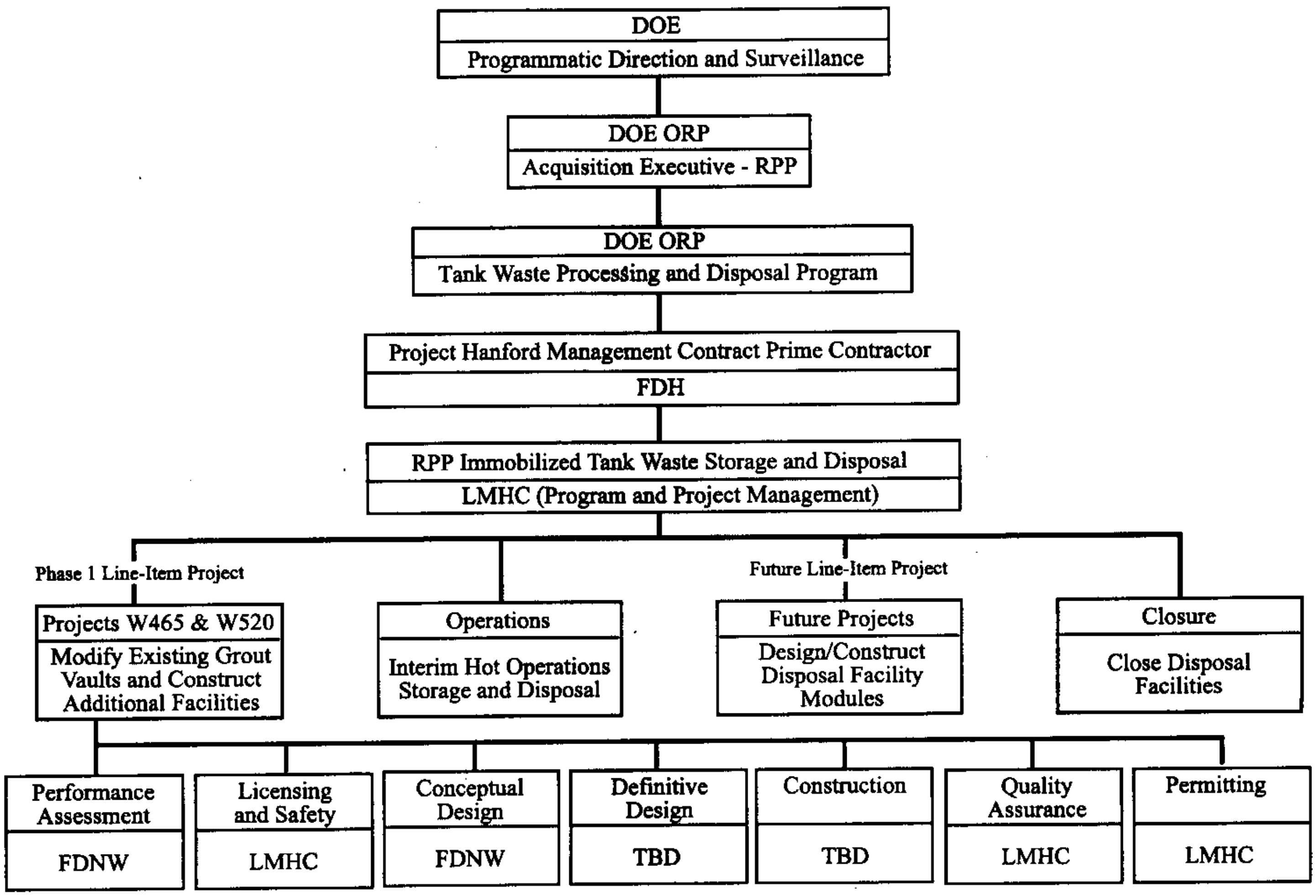
WBS = work breakdown structure

10.0 PROJECT ORGANIZATION, ROLES, AND RESPONSIBILITIES

The ILAW Disposal Subproject organization is based on the PHMC team concept. Active participants include the ORP, performing RPP program or project organizations, and, as appropriate, subcontracted architect-engineer and construction contractors. The performing subproject organizations provide program and project management and technical direction for the ORP during all phases of the project. Appropriate onsite support services, quality, safety, environmental, and health organizations are called on to provide expert support in their areas of expertise.

The organizational relationship of the ILAW Disposal Subproject is shown in Figure 6. The overall responsibility matrix is provided in Appendix E. Responsibilities, authorities, and the activities required of each participating organization throughout the project are described in DOE Order 430.1, *Life-Cycle Cost Management* (DOE 1998b). A more definitive subset will be developed before definitive design using guidance provided in Hanford Site procedures specific to line-item PMPs [HNF-PRO-1997, *Construction Program Overview* (FDH 1998)].

Figure 6. Immobilized Low-Activity Waste Disposal Subproject Organizational Relationships.



D&D = Decontamination and Decommissioning
DOE = U.S. Department of Energy
FDH = Fluor Daniel Hanford, Inc.
FDNW = Fluor Daniel Northwest, Inc.
LMHC = Lockheed Martin Hanford Corporation
ORP = U.S. Department of Energy, Office of River Protection
RPP = River Protection Project
TBD = To Be Determined

1517-6-R

11.0 MANAGEMENT APPROACH

The Subproject management and control process consists of the following elements: project planning, baseline management and control, performance measurement and reporting, work authorizations, funds management, contingency management, meetings and reviews, project validation, critical decisions, and external interface control.

11.1 BUSINESS OPERATIONS

The intent of the project management system and project planning is to ensure the successful execution of the LAW Storage Subproject management and system definition activities, and design, procurement, construction, testing, and startup of the LAW Storage facilities (Phase 1 and 2) within baseline cost and schedule and meeting technical criteria.

Sections 11.1.1 through 11.1.5 describe the LAW Storage Subproject management systems to be used, including procedures, practices, hardware, and software.

The LAW Storage Subproject Control organization will perform an annual assessment of the participant's management systems. The assessment scope and content will be tailored to an evaluation of implementation or execution and relate to some or all of the management system elements listed in Sections 11.1.1 through 11.1.5.

As Phase 1 and future projects (Phase 2) line-item projects are validated in accordance with DOE Order 4700.1 or its equivalent, contractors will be responsible for developing contractor WBSs (CWBS) and preparing CWBS dictionaries at the cost-account level to support the ILAW Storage and Disposal Subproject WBS for DOE. Each CWBS dictionary will specify what work will be performed, how it will be done, and who will do it. The CWBS dictionary also will contain other significant data, such as the identity of technical work scope and planning documents that further describe the work activities.

11.1.1 Project Execution Plans (Phase 1 and 2 ILAW Disposal Line-Item Projects)

A PEP will be developed for Phase 1 and 2 validated line-item projects in accordance with relevant PHMC procedures and DOE orders. These orders and procedures include DOE Orders 4700.1 (1992) and are expected to include 430.1 (1995a). Each line-item project PEP will identify the plans, organizational interfaces, management control systems, and reporting requirements that will be used by those responsible for managing the line-item projects. The line-item PEPs will be part of the line-item project-specific baseline and will be controlled documents subject to configuration management. Documents that will be developed after and to support the line-item PEP also are considered controlled documents and must be subject to disciplined configuration management procedures. The line-item PEP will be updated annually and will be supplemented to meet the requirements of the RL Site Management System and the annual multiyear work plan. Each line-item PEP will be developed after the line-item project's conceptual design activity is complete.

11.1.2 Acquisition Strategy

Conceptual design information and cost estimates developed during the conceptual design activity for Projects W-465 and W-520, and future disposal units will be used to prepare the PEP. A construction/procurement strategy will be developed during conceptual design and will be used to develop a detailed acquisition strategy that will be included in the PEP. The primary purpose of the PEP acquisition strategy is to describe line-item project acquisition objectives and contracting processes and provide them to line-item project participants for implementation. The PEP acquisition strategy is intended to be a framework for providing the requirements for lower tier documents to direct implementation, not a detailed roadmap for implementation.

The Subproject's intent is that retrofit of the grout vaults to accommodate initial Phase 1 ILAW production will be performed based on fixed-price, competitive-bid contracts. Long-lead materials, including items and components, may be procured by either the construction manager's subcontractors or by the PHMC Procurement organization. Contracting for construction will be performed by the line-item project construction manager.

11.1.3 Schedule Baseline Control

The LAW Storage Subproject baseline schedule is reflected in the annual multiyear work plan.

For each WBS element identified in the Subproject summary WBS, separate detail schedules will be prepared that identify the activities needed to successfully complete that phase of the subproject work scope. Each detail schedule will identify the logic ties and interfaces necessary to coordinate the completion of that phase of the work scope with the other elements of the Subproject summary schedule. Detail schedules will contain sufficient detail to allow integration of all detail schedules into the Subproject summary schedule. Detailed schedules will also identify the critical path and critical path activities.

All detail schedules will be resource loaded with staff hours associated with the particular skills mix that is identified for each activity and other direct costs. Schedule control of the Subproject will be implemented through critical path schedule analyses (resulting in the identification of schedule float) and establishment of milestones and corrective actions for schedule variances (determined by Earned Value Methodology). PHMC and its subcontractors will analyze schedule variances and evaluate trends on schedule performance using acceptable methodologies on their PHMC-approved master schedule. Performance reporting and variance analyses will be reported to the Subproject manager as specified in Section 12.6. When variance analyses reveal problems, the PHMC and its subcontractors will ensure that the affected participants take appropriate corrective actions. Changes to the Subproject schedule baseline will be processed in accordance with HNF-PRO-533 and implemented in accordance with the appropriate procedures in HNF-IP-0842.

11.1.4 Cost Baseline Control

The Subproject cost baseline is the Subproject cost estimate and is established and controlled in the annual multiyear work plan. Cost estimates are built up from activities or subactivities. The cost estimate level of detail is specified in the general guidance for the preparation of program plans issued annually by DOE and is generally at the activity level. The Subproject estimate will include contingency (as identified in the validated line-item project cost). The budget authorization requirement will consider the requirements of contract commitments and phase funding allowances. Carryover of expense funds to support the budget authorization/budget outlay profile will be required.

Cost control is implemented by PHMC through corrective action in response to cost variances reflected in the routine Earned Value analysis of the established cost performance baseline. The PHMC will prepare estimates to complete for the Subproject and line-item projects (including contingency), taking into account the cost-performance index. The PHMC and other Subproject contractors will prepare and seek appropriate approval for documentation of corrective action for any cost estimate change that exceeds the thresholds established in HNF-MD-008.

The PHMC prime contractor, Fluor Daniel Hanford, has the primary responsibility for preparing and reporting cost performance data to the ORP Disposal Program Division (DPD) as specified in Section 12.6. Significant variances, corresponding variance analyses, and recommended corrective action will be included in the report. The estimates to complete for each Subproject WBS element will be prepared by the PHMC subcontractors based on the status of the work element and the cost-performance index, and reported monthly at the status review meeting. The estimates to complete will be based on the latest performance data, current assessment conditions, current and projected pricing factors and rates, and knowledgeable forecasts of projected conditions.

Changes to the Project and Subproject cost baselines including line-item project contingency will be processed through Change Control in accordance with the procedures found in HNF-PRO-533 and as outlined in the PEP. The PHMC will ensure that all Subproject cost estimates and revised estimates are based on current schedules and that the basis for cost estimates is consistent with the documented Subproject scope baseline.

11.1.5 Performance Measurement and Reporting

Earned Value methodology will be used to measure performance on this Project. Each PHMC contractor and subcontractor will use and maintain internal cost and schedule performance measurement information that provides responsible managers with timely, accurate, and objective performance data. Performance will be measured against the multi-year program plan cost estimate and the TPC for the line-item projects.

The line-item projects will submit monthly status data to the LAW Storage Subproject for integration in their overall report. Reporting format and content will comply with DOE Order 4700.1 or equivalent. The progress tracking system and the site management system will be used for the monthly status reports. Line-item project reporting will be coordinated with the overall Subproject reporting. The line-item project will support overall Subproject weekly and monthly planning and other reporting systems and meetings.

11.1.6 Work Authorization

Overall work authorization occurs by contractual arrangements between the DOE contracting officer and the PHMC. All funding and work scope will be authorized by the DOE contracting officer. A PHMC internal process will be established to authorize specific projects.

Capital work will be controlled within the subprojects by cost account plans following project authorization from DOE. Appropriate work performed by the PHMC A/E will be authorized by a letter of instruction.

11.1.7 Funds Management

Allocation and authorization of funds will come from DOE to the integrating contractor and from the integrating contractor to the responsible subcontractor. Control of fiscal year costs will be accomplished in accordance with financial plan ceilings. Line-item project expense and CENRTC funding that is authorized but not spent (i.e. carry-over) within a fiscal year will remain with the Subproject for use to meet the next fiscal year CENRTC line-item project needs in accordance with the Subproject's cost, schedule, and technical baselines. Uncosted commitments will be carried over as budget outlay.

Cost, commitment, and fund authority information will be provided by the PHMC prime contractor, Fluor Daniel Hanford, in monthly status review meetings, as requested by the DOE WDD. This information will be used to keep the DOE WDD and management advised of current cost and commitment levels and potential funding impacts. Controls will be established to ensure that costs and commitments do not exceed available funding.

11.1.8 Contingency Management

Formal contingency will be included for Subproject activities approved as part of a validated line-item project. Contingency will be included in the ILAW Storage and Disposal Subproject as a part of the Subproject's TPC. Contingency is intended to cover costs that may result from unforeseen and unpredictable conditions and uncertainties within the defined line-item project scope. Contingency analysis will be performed on all line-item project cost estimates to determine contingency requirements. Contingency will be managed and controlled as identified in Section 11.1.4, "Cost Baseline Control."

11.1.9 Meetings and Reviews

The Subproject will conduct monthly management review meetings with DOE DPD. The line-item projects have dedicated management review meetings. The Subproject team leader will be responsible for recording action items, agreements, and commitments resulting from the meeting. Monthly reviews will focus on immediate decisions, critical issues, cost and schedule variances and assessments, risk management, corrective actions, and the general status of work in progress. Data from the monthly status report should be used as much as possible. The review is intended to focus on exceptions and major significant issues that require management decisions.

11.1.10 Project Validations

The line-item projects will be validated in accordance with DOE Order 430.1 or equivalent and Office of Management and Budget requirements if required by DOE-HQ Facilities Management. Design and construction cost estimates will be reviewed independently. The basis for validation is the technical information and cost estimates developed during conceptual design, the cost estimate review was held late in FY 1998 for FYs 2000 through 2002 authorizations. A complete validation review was conducted during FY 1998 for Project W-465. Validation for Project W-520 is scheduled for 2004.

11.1.11 Critical Decisions

The first critical decision (CD), CD-1, authorization to initiate conceptual design, for Project W-465, was delegated by Alvin L. Alm, DOE Assistant Secretary for Environmental Management, to J. D. Wagoner, manager of RL, and granted by him. Future CDs are delegated to the ORP manager. CD-2, authorization to begin definitive design, will be granted by the ORP manager. CD-3 is authorization to begin construction activities and CD-4 is authorization to begin operation.

11.2 ENGINEERING

Engineering includes systems engineering management, technical baseline control, and testing and evaluation planning.

11.2.1 System Engineering Management

The ILAW Disposal subproject will use the TWRS *System Engineering and Management Plan* (SEMP) [HNF-SD-WM-SEMP-002 (Peck 1998)] as the basis for applying the systems engineering concept to the program. A Subproject SEMP has been prepared after the conceptual design is completed to ensure that the technical requirements and basic design criteria are clearly defined and traceable to the functions and requirements document.

The systems engineering process to apply scientific and engineering principles to accomplish the following goals:

- Transform an operational need into a system of defined performance and configuration characteristics through iterative, disciplined, and documented processes.
- Ensure that all necessary related parameters are integrated to optimize a system design that meets program cost, schedule, and technical performance goals
- Maintain a controlled definition of the system over its life cycle.

Adoption of the TWRS Systems engineering approach will provide the following benefits:

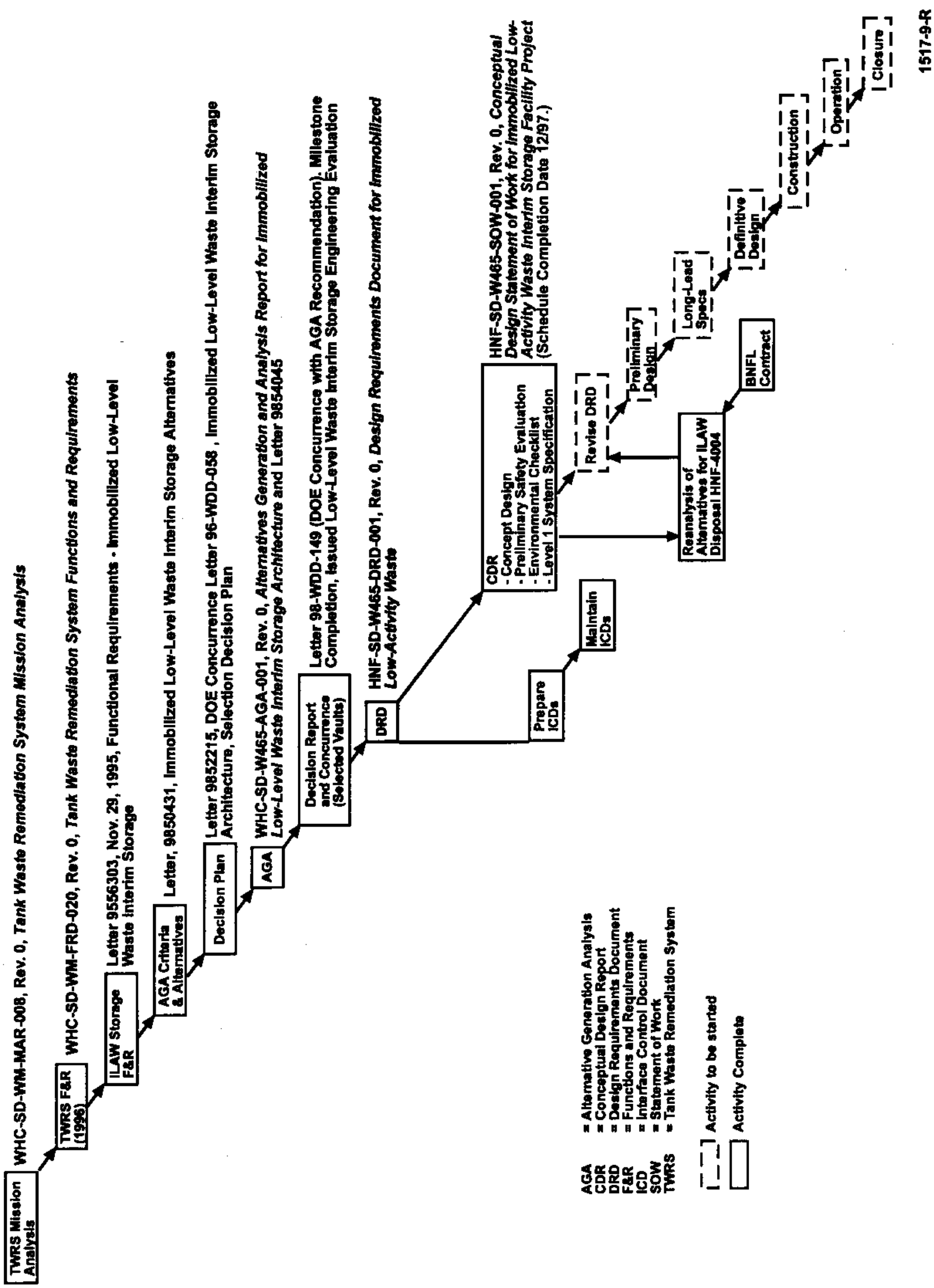
- An orderly and structured approach to systems development.
- A common understanding of program goals and expectations by all participants.
- An integrated schedule of activities showing how they relate to each other.
- Documented evidence of the current condition or status.
- Traceability of significant program characteristics and system configuration at any point in the program life cycle.
- Control of project cost, schedule, and technical performance.
- Ensurance that the system being built will accomplish the mission.

Line-item project-specific systems engineering management and implementation plans (SEMIP) have been prepared for Projects W-465 and W-520 to ensure that the technical requirements and basic design criteria of the line-item projects are clearly defined and traceable throughout the design, acquisition, construction, and operation phases.

The TWRS SEMP (Peck 1998) provides guidance to migrate to the approved systems engineering process for Hanford Site projects that were established before the approved TWRS SEMP was issued. Projects W-465 and W-520 were defined before development of the TWRS SEMP. Figure 7 summarizes the major systems engineering processes and products for Projects W-465 and W-520.

The Project W-465 and W-520 requirements were documented in DRDs. Changes to the Hanford Site and TWRS technical baselines in the Hanford Site Technical Database will be incorporated as updates to the Project DRDs. The DRDs will be converted to level 1 system specifications before preliminary design.

Figure 7. Systems Engineering Activities and Documentation—Project W-465.



Risk will be managed in accordance with the TWRS SEMP, TWRS programmatic risk management plan, the risk management plan for the ILAW Storage and Disposal Project (Murkowski 1995), and the appropriate risk management procedures in WHC-IP-0842, Volume IV (LMHC 1997).

Interface control will be managed in accordance with the TWRS SEMP and the appropriate interface control procedures found in WHC-IP-0842, Volume IV.

11.2.2 Technical Baseline Control

A technical baseline will be established for the ILAW Disposal Subproject as depicted by the Subproject WBS and Subproject activities. A more detailed technical baseline will be developed for each ILAW Disposal Subproject line-item projects following conceptual design. The technical baseline is the reference set of technical data used in establishing the Subproject and line-item projects. The Subproject technical baseline defines the technical data needs and requirements and data generation necessary to establish the line-item projects and includes the more detailed technical data developed by the line-item project to design, construct, start up, and operate the line-item project interim storage facilities. More specifically, the line-item project technical baseline includes functions and requirements, Level 1 process flow diagrams, performance specifications, interface control documentation, and design packages that contain specifications and drawings, quality assurance provisions, safety basis documents, and test and inspection requirements.

The PHMC will ensure that configuration management activities and systems engineering activities are performed and will maintain definition and control of the line-item project baseline and associated documentation. These activities will be applied to all systems and subsystems necessary to achieve all functional requirements and deliver all products to satisfy the integrated technical baseline and overall line-item project objectives. At all times during the life of the line-item projects, the current configuration will be maintained in orderly and auditable project files. These project files will include, but not be limited to, system descriptions, system specifications, conceptual and definitive system designs, system and material inspection reports, test reports, operating and surveillance procedures and vendor documentation.

11.2.3 Test and Evaluation Plan

A test and evaluation program based on systems engineering principles will be implemented on the Phase 1 ILAW Storage and Disposal Subproject to ensure that the completed facility and all installed systems meet the performance specifications. Detailed test plans, specifications, and procedures will be prepared, approved, controlled, and maintained in accordance with the requirements of this project plan and subsequent PEPs. These test plans or specifications and procedures will address testing requirements for all plant systems, subsystems, and individual pieces of equipment. The test planning and scheduling will coordinate development testing with design, and plant testing with plans for construction, turnover, and startup. The Subproject testing activities include construction and preoperational and operational testing.

Facility startup will be planned by a dedicated onsite PHMC organization. Actual startup will be performed by either an in-house group or a qualified subcontractor under direction of the Subproject.

Construction Testing. The Phase 1 Subproject startup program is an engineered multiphase sequence of activities culminating in successful startup and initial operation of the grout vault retrofit to accommodate ILAW interim storage. Startup activities physically begin during construction acceptance testing, continue with preoperational testing, and are completed during operational testing. These startup activities will be detailed in the Project W-465 ILAW Disposal Subproject startup plan.

Construction Acceptance Testing. Construction testing activities consist of factory acceptance tests and construction acceptance tests (CAT) that demonstrate compliance with procurement and construction specifications. Satisfactory completion of these tests is required to allow transition into startup testing activities: preoperational and operational testing.

The architect-engineer will prepare test requirements and acceptance criteria for facility acceptance tests and CATs to be included in procurement and construction specifications. Detailed test plans and/or acceptance test procedures may be prepared by the A-E, construction contractor, or vendors or subcontractors in accordance with the requirements of procurement and construction specifications and vendor data. These detailed test plans and/or acceptance test procedures will be reviewed and approved by the architect-engineer and PHMC. The facility acceptance tests and CATs will be performed by the responsible organization (i.e., the construction contractor, vendor, or subcontractor). The tests will be witnessed by DOE WDD and the PHMC as required to ensure that test requirements are met. The test data will be included in the structures, systems, and components (SSC) turnover package.

The CATs culminate with turnover of individual SSC segments to the PHMC for preoperational testing. The scope of each SSC segment and its turnover sequence will be determined by the PHMC. All test data and reports will be transferred to the PHMC along with the SSC segment. The construction contractor is responsible for controlling the vendor and construction test data until transfer. Information copies of the vendor data will be provided to the PHMC as requested to support preoperational testing.

Although the Startup organization is not responsible for acceptance testing, it may take administrative control of equipment and portions of systems before acceptance testing is complete to begin preoperational testing soon enough to meet Subproject milestones. The need to maintain custody control while allowing both acceptance testing and preoperational testing to proceed simultaneously is met by using a "blue tag" system, which passes jurisdictional control of the SSC, or a portion of the SSC, to Startup.

Preoperational Testing. Preoperational testing is performed on individual segments of SSC to demonstrate that plant systems or subsystems perform as designed. The architect-engineer will prepare test specifications containing test requirements and acceptance criteria for preoperational tests. The Subproject Startup organization will use these specifications to prepare test procedures that provide instructions for conducting the tests. The procedures will be reviewed and approved by the Subproject Test Review Board before testing. The Startup administrative procedures manual, which will provide the requirements and guidance for preoperational testing activities, will be prepared by the Subproject Startup organization and approved by the Test Review Board.

Operational Testing. Operational testing is performed to demonstrate integration of the entire facility. All systems are brought on line and operated under anticipated standard operating conditions and off-normal conditions using simulated, non-radioactive ILAW packages. Operational testing (e.g., product acceptance process) is performed with the actual plant equipment, operating procedures, and personnel. To ensure that operational testing is performed correctly, all testing activities will be performed in accordance with the requirements of detailed test procedures. These procedures will be prepared by the Subproject Startup organization and approved by the Subproject Test Review Board. Operational testing will be planned and scheduled to follow completion of preoperational testing. ILAW product acceptance testing and evaluation will be done by the DOE Waste Integration Team in accordance with the product acceptance process.

Dry-Run Demonstrations. A dry-run phase will follow completion of CSB preoperational testing to demonstrate that operators, procedures, and CSB equipment are in a final satisfactory state of readiness to safely and efficiently receive, handle, and store hot ILAW packages. The dry runs will be performed as part of the readiness review and culminate with receipt of Key Decision 4 from DOE to commence receipt of hot ILAW packages.

11.3 QUALITY, SAFETY, AND ENVIRONMENTAL PROTECTION

Effective quality and environmental safety and health protection programs will be established and maintained to ensure that a requisite level of quality, safety, and environmental compliance in all areas of transportation and disposal facility design, construction, test evaluation, operation, and closure.

11.3.1 Environmental Management

The environmental, safety, and health protection for the Subproject are established to ensure that all Subproject activities are carried out in compliance with federal, state, and local regulations, laws, and standards for the protection of the environment and the safety and health of employees and the public. Regulating agencies will be kept informed of Subproject plans and major activities.

The Subproject will cooperate with DOE and other federal, state, and local agencies and stakeholders at large, as appropriate, to ensure that its activities comply with environmental protection regulations and requirements. The necessary environmental permits and approvals will be procured at the appropriate times. Regulatory integration and public involvement are the responsibility of the PHMC organization charged with coordinating regulatory requirements and activities for the Subproject.

An environmental requirements checklist and a permitting plan have been prepared for Subproject. The environmental requirements checklist documents the TWRS Environmental Compliance organization's evaluation of the required environmental permits, approvals, and other documentation necessary for the project, and lists the contact person for each requirement. The permitting plans address environmental permitting requirements for the transportation and disposal of ILAW produced during the privatization effort. An environmental requirements checklist and permitting plan have been prepared for Projects W-465 (Deffenbaugh 1997). The permitting activities identified in the Projects W-465, W-520, and future projects permitting plans are included in the ILAW Disposal Subproject portion of the TWRS annual multiyear work plan. Important permitting activities are summarized in the ILAW Disposal Subproject summary schedule (Appendix F). For each applicable regulation, the permitting plan provides the following: a summary of data requirements, a discussion of alternatives, a recommended implementation strategy, and an estimated cost of implementing the recommended alternative.

The applicable environmental regulations identified in the Subproject permitting plan (Deffenbaugh 1997) are as follows:

- NEPA, 42 USC 4321, et seq., which was enacted to ensure environmental matters are considered before federal actions are initiated that might affect the quality of the human environment.

- SEPA, Chapter 43.21C, *Revised Code of Washington*, which is the Washington State equivalent of NEPA and is considered implementing regulations.

- RCRA, 42 USC 6901 et. seq., was enacted as a comprehensive program to mandate that hazardous waste will be treated, stored, and disposed of in a manner that minimizes the present and future threat to human health and the environment

- "Dangerous Waste Regulations," WAC 173-303, as amended, 1996, is the Washington State equivalent to RCRA and is considered implementing regulations.

- *Federal Clean Air Act of 1970*, 42 USC 7401 et seq., as amended in 1977 and overhauled and expanded in 1990.

- *General Environmental Protection Program*, DOE Order 5400.1 and *Radiation Protection of the Public and the Environment*, DOE Order 5400.5, which require that monitoring be performed to determine any impact on the environment from activities that involve potential emission of radionuclides.

11.3.2 Regulatory Compliance with Disposal Facility Requirements

Compliance with ILAW product specifications as stated in the privatization contract (Wagoner 1996) will be accomplished by a product acceptance process to be developed by the DOE Waste Integration team based on a product acceptance strategy. Implementation will be described in the final version of ICD 15, *Immobilized Low-Activity Waste.* DOE will assume responsibility for the ILAW product.

Compliance Documentation. The PHMC team will produce the documentation that DOE requires to allow the PHMC team to implement its Phase 1 tasks and to support follow-on DOE disposal actions for Phase 1 LAW products. Currently, the PHMC team is assuming that such supplemental compliance documentation will include at least the following:

- A document will be provided that contains the compliance approach that the PHMC team proposes to use for each applicable Phase 1 DOE product acceptance requirement.

- A document will be provided that contains evidence (e.g., analyses, test results, etc.) confirming that the proposed compliance approach is capable of meeting each such requirement.

11.3.3 Nuclear Safety Activities and Authorization Basis Process

This section covers the tasks needed to support the project activities to design and construct a facility that can be operated safely to protect the health of the public and the workers and preserve the environment.

The following discussion provides the approach to be used to implement the Project Safety Program based on implementation of HNF-PRO-430, Rev. 0, *Safety Analysis Program* (FDH 1997c) and HNF-PRO-705, Rev.0, *Safety Basis Planning, Documentation, Review, and Approval,* in accordance with applicable DOE orders, standards, and policies, as well as Hanford Site-specific guidelines and work procedures.

Nuclear Safety Activities—Project Support. A comprehensive, graded approach to safety is being developed for the Subproject. This approach will integrate the appropriate level of safety analysis and review to provide a continuous flow of safety inputs and requirements into the Subproject's technical, cost, and schedule baselines throughout the project life cycle. The approach will be implemented by establishing or performing the following activities.

- The PSE studies will be performed during the conceptual design stage (i.e., facility hazard categorization, preliminary hazard analysis, bounding accident scenario analysis and unmitigated consequences evaluations). These studies are expected to establish a set of safety functions to be further analyzed and tracked during the preliminary and definitive design phase. The PSE studies will be documented by a preliminary safety evaluation report as part of the CDR budget validation package. The primary objective of the PSE is to identify significant safety functions to support

CDR budget validation and to establish the safety basis for follow-on project phases. The PSE will not be submitted to DOE as an authorization basis document requiring a three-tier review. However, because a facility hazard categorization constitutes a safety basis, DOE will have to approve a PSE that contains a facility hazard categorization to be in compliance with DOE Orders 5480.23 and 5481.1B.

- Detailed safety analysis will be performed as necessary, depending on the PSE results (i.e., items needing further analysis), throughout the preliminary and detailed design phases. These studies will be used to establish the basis of the PSAR to be submitted to DOE for approval before the start of procurement and construction.

- Safety requirements will be addressed in the project design package using the safety equipment list, specific procurement requirements, and specific testing during start up.

The PSE and PSAR will undergo a Tier 1 PHMC functional review and a DOE review for approval. The three-tier review process will be reserved for the final authorization basis package to be approved for operation.

Authorization Basis Documentation Development Strategy and Approval Process. The safety process will be implemented in accordance with PHMC guidance on implementation of the authorization basis (Davis 1997). A safety plan (safety basis criteria document) will be developed in FY 1998 to outline the development, integration, and approval of overall nuclear safety documentation in accordance with HNF-PRO-705 requirements.

Program Level. The current RPP authorization does not include Project W-465 and future Phase 2 ILAW storage and disposal facility line-item projects or ILAW interim storage and disposal facilities. An integrated authorization basis will be developed to address these line-item projects and any interfaces with other Site projects or private contractors.

The baseline for the new integrated authorization basis will be a DOE-approved addendum to the upcoming TWRS FSAR, top-level up-front document that addresses the following issues for ILAW storage (Subproject W-465) and disposal (Subproject W-520):

- Site characteristics and natural phenomena data (boundaries, demography, climatology, meteorology, geology, etc.), which will rely on the existing approved TWRS authorization basis

- Overall vitrified waste management strategy throughout the Hanford Site (transportation, interim storage, and disposal)

- ILAW products description (i.e., radioactive material inventory, conditioning process, general characteristics, and certification)

- Interim storage and disposal facilities general description and purpose

- Overall hazard identification and control strategy (i.e., bounding potential scenarios including criticality, external exposure, heat removal, and canister drop)
- General nuclear safety functions that must be maintained
- Identification and discussion of applicable DOE, state, and federal rules and requirements
- Interfaces with other Site projects and private contractor facilities
- Site transportation basis (tracks, requirements, procedures, shipping, and cask maintenance)
- Operational safety basis and organization (should refer to the existing TWRS health and safety plan).

This TWRS FSAR addendum will form the basis for developing the line-item project safety analysis reports (SAR). The FSAR will be updated as the line-item project SARs are developed and specifically approved for each facility operation.

Subproject Level. Projects W-465 and W-520 and future projects will develop an independent FSAR to be approved by DOE for operation. A PSE has been developed (Mouette 1997). The FSAR will be completed before start up. However, the current plan, outlined in Table 6, assumes the development of stand-alone safety-basis documentation.

Transportation of Immobilized Low-Activity Waste. This means the transportation of radioactive materials only within Hanford Site boundaries. These areas are not accessible to the public and are not subject to U.S. Department of Transportation regulations. Transportation and packaging operations are authorized and controlled by contractor-approved procedures and safety evaluations.

The strategy for ILAW products packaging and transportation operations is addressed in HNF-SD-ENV-EE-003, Rev. 0, *Permitting Plan for the Immobilized Low-Activity Waste Project* (Deffenbaugh 1997). The permitting plan identifies the activities needed to conduct the design and safety evaluations in the onsite transportation program as described in WHC-CM-2-14, *Hazardous Material Packaging and Shipping*.

Safety Activity Schedule. A list of TWRS Storage and Disposal Project (W-465 and W-520) safety-related tasks, task durations, and performing organizations is provided in Table 6. The tasks and associated information (i.e., schedule, organizations) will be identified in more detail in the specific engineering task plans once the results of the PSE are known. Safety basis documentation development and the Project W-465 safety activity are identified in WBS 1.1.3.4.02.03.08.09, Project W-465, and WBS 1.1.3.4.01.04.18, Project W-520 Safety (see Table 2).

Quality Assurance. The scope of the project is defined as the transportation, interim storage, and disposal of immobilized LAW waste products provided by a private contractor. Interim storage is to be provided until disposal authorization is received by DOE. The project can only influence the quality of the immobilized product by confirming, documenting, and enforcing the continued quality of the private contractor's product. Projects W-465 and W-520 and future projects will implement the quality requirements to ensure that systems, structures, and components (design features) needed to ensure and document product quality are provided and available for use by individuals during the Conduct-of-Operations phase of the facility life cycle.

ILAW Storage and Disposal Subproject quality assurance activities are currently covered by the TWRS Quality Assurance Program Plan (QAPP) and associated implementing procedures. This program addresses the requirements of Fluor Daniel Hanford's *Quality Assurance Program Description*, HNF-MP-599 (FDH 1997d), which is based on 10 CFR 830.120 and DOE Order 5700.6C. 10 CFR 830.120 applies to all TWRS activities involving a nuclear facility and DOE Order 5700.6C applies to the other activities.

The project quality assurance requirements will be contained in a project-specific QAPP. The QAPP will be prepared after definitive design begins. Operational quality assurance is provided by existing operation quality assurance plans.

Requirements from HNF-MP-599 and applicable implementing procedures will be used as the baseline to produce line-item project-specific QAPPs.

Table 6. Safety-Related Activities and Schedule. (2 Sheets)

Tasks	Responsible and performing organizations	Observations/ project stages	DOE approval required	Tier review		
				1	2	3
Preliminary Safety Evaluation	RPP NS&L	Conceptual design	Validation as part of the conceptual design report - facility hazard categorization needs to be approved	x	x	(x)
Prepare safety plan	RPP NS&L, Licensing	Advance conceptual design and congress budget cycle	Approval per HNF-PRO-705	x	x	(x)
Preliminary TWRS FSAR addendum development	RPP NS&L, and Safety Analysis group	Basis for both low- and high-activity PSAR/ FSAR development - detailed design	No			
Update and final TWRS FSAR addendum	RPP NS&L, Safety Analysis group	Facility construction. Updates with separate facilities FSARs addendums (Grout Treatment Facility and Spent Nuclear Fuel Canister Storage Building)	Tier 3 review for each facility with separate safety basis documentation for operation	x	x	(x)

Table 6. Safety-Related Activities and Schedule. (2 Sheets)

Engineering task plan for development of PSAR	RPP NS&L, Licensing	Mobilization for detailed design	No	x		
Development and DOE approval of a PSAR	RPP NS&L, Safety Analysis and Licensing groups	Detailed design and prior to start of procurement	Authorization to start procurement	x	x	(x)
Development of transportation criteria related to safety	RPP NS&L, Licensing and Management Federal Services Hanford	Procurement specifications for trucks and casks	No			
SARP	TWRS NS&L, Licensing and Waste Management Federal Services Hanford	detailed design, construction and cold testing	Yes	x	x	x
USQ screening	TWRS NS&L, Licensing	Check that construction activities are covered by current AB	No			
Development and approval of a FSAR	TWRS NS&L, Safety Analysis and Licensing groups	construction and inactive testing	Yes	x	x	x

(x) Tier 3 review is assumed to be reserved to the specific facility safety basis documentation required to authorize operation.

RPP = River Protection Project
SA = Safety Analysis
SARP = Safety Analysis Report for Packaging
TBD = to be determined
USQ = unreviewed safety question
WMH = Waste Management Federal Services Hanford

Safety References

- HNF-PRO-430, Rev.1, Safety Analysis Program, based on the following orders, standards, and policies:
- DOE 5480.21, Unreviewed Safety Questions
- DOE 5480.22, Technical Safety Requirements
- DOE 5480.23, Nuclear Safety Analysis Reports, and DOE-STD-3009-94, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23

- DOE-STD-3009-94 and 3011-94, Guidance for Preparation of Nuclear Facility Safety Analysis Reports, Technical Safety Requirements and SAR Implementation Plans
- DOE 5481.1B, Safety Analysis and Review Systems
- DOE 6430.1A, General Design Criteria
- SEN-35-91, DOE Nuclear Safety Policy
- DOE-STD-1027-92, Hazard Categorization and Accident Analysis techniques for Compliance with DOE 5480.23
- DOE-EM-STD-5502-94, Hazard Baseline Documentation

- Davis 1997, Lockheed Martin Hanford Company Manual HNF-IP-0842, Volume IV, *Authorization Basis Amendment Process*
- Mouette 1997, HNF-SD-W465-PSE-001, Rev.0, Preliminary Safety Evaluation for project W-465 Immobilized Low-Activity Waste Interim Storage Facility
- HNF-SD-ENV-EE-003, Rev.0, Permitting Plan for the Immobilized Low-Activity Waste Project
- HNF-PRO-157, *Radioactive Material/Waste Shipments*
- HNF-PRO-705, Rev.1, Safety Basis Planning, Documentation, Review and Approval
- HNF-SD-BIO-001, Rev.1, Tank Waste Remediation System Basis for Interim Operation
- WHC-SD-WM-SAR-027, Rev.2, Hazard Identification and Evaluation for Operation of the Grout Facilities and Near Surface Disposal of Grout Phosphate/Sulfate Low Level Liquid waste
- WHC-SD-WM-SSP-005, Rev.0, *Grout Facilities Standby Plan.*

11.4 BASELINE MANAGEMENT

A total ILAW Disposal Subproject baseline is established for all activities to the completion of the subproject. All of these activities are reflected in the ILAW Disposal Subproject WBS. The technical baseline is the basis for the schedule and cost baselines that are reflected in the ILAW Disposal Subproject annual multiyear work plan. Effective control of the Subproject baseline is essential; changes to the baseline are managed in a disciplined fashion. The Subproject approach to managing baseline changes is based on maintaining an accurate description of the baseline, methodically evaluating proposals to alter it, and maintaining configuration to the technical baseline. This will be done by establishing change class levels (level of approval authority) and a project change control board as specified in HNF-PRO-533, *Change Control* (FDH 1998). This procedure defines the responsibilities and requirements for management, administration, and use of the technical, schedule, and cost baseline control systems for the subproject.

Controlled baseline documents will be changed through submittal of change requests that justify the proposed changes. Specific baseline change control requirements will be managed in accordance with Hanford Site change control procedures and established thresholds in accordance with appropriate procedures from HNF-IP-0842 (Davis 1997).

12.0 RISK MANAGEMENT

Risk planning, assessment, analysis, and management (Figure 8) will be used throughout the Subproject to identify significant risk factors and formulate mitigation plans. Risk management will be conducted in accordance with the RPP programmatic risk management plan (Zimmerman 1998) and procedure. Identified risks will be incorporated into the RPP risk management list for assessment and analysis. Risk assessment will be an ongoing, iterative, integrated process. The process will provide information needed to manage programmatic, technical, environmental, safety, and health risks. A risk management plan for the Storage and Disposal Subproject has been prepared. This plan includes developing and ranking a risk list, then tracking and reporting the status of the risks at monthly management review meetings. These meetings are held regularly to relay the status of all project activities.

The risk that disposal authorization will not be received from DOE-HQ in time to start disposal operations has been greatly reduced by the extension of the scheduled start date for the treatment plant. The ILAW subproject is working with DOE-HQ to obtain authorization for disposal and has received a conditional recommendation for approval from the Low-Level Waste Federal Review Group. Also, Line-Item Project W-465, which currently is scoped as an ILAW disposal facility, could be operated as an interim storage facility if necessary pending disposal authorization.

12.1 APPROVAL REQUIREMENTS

The ILAW Disposal Subproject includes several activities that require review and approval by external authorities. The subproject can not impose schedule commitments on the reviewing organizations. Activities that require external approval and the approving organizations are given in Table 7.

12.1.1 Performance Assessment Approval

The approval processes for most of the activities listed in Table 7 are established construction project requirements that apply to all construction projects and are considered in the MYWP planning activities. The performance assessment task also is well developed in the MYWP, but the approval process is not as well established because the PA applies only to disposal projects and approval requirements for those projects are changing. According to the recently issued DOE order on radioactive waste management (DOE O 435.1) and other DOE guidance (Guimond and O'Toole 1996), both a performance assessment and site composite analysis approved by DOE are required as the basis for the disposal authorization statement to be issued by the DOE Deputy Assistance Secretary for Waste Management. The performance assessment is required as part of the disposal process under the DOE order on radioactive waste management and is part of the ILAW Disposal Subproject. The performance assessment for ILAW disposal (Mann 1998a) covers ILAW disposal in both modified grout vaults and the additional ILAW disposal complex facilities. The composite analysis describes the impacts of contaminant

Figure 9. Programmatic Risk Management Process.

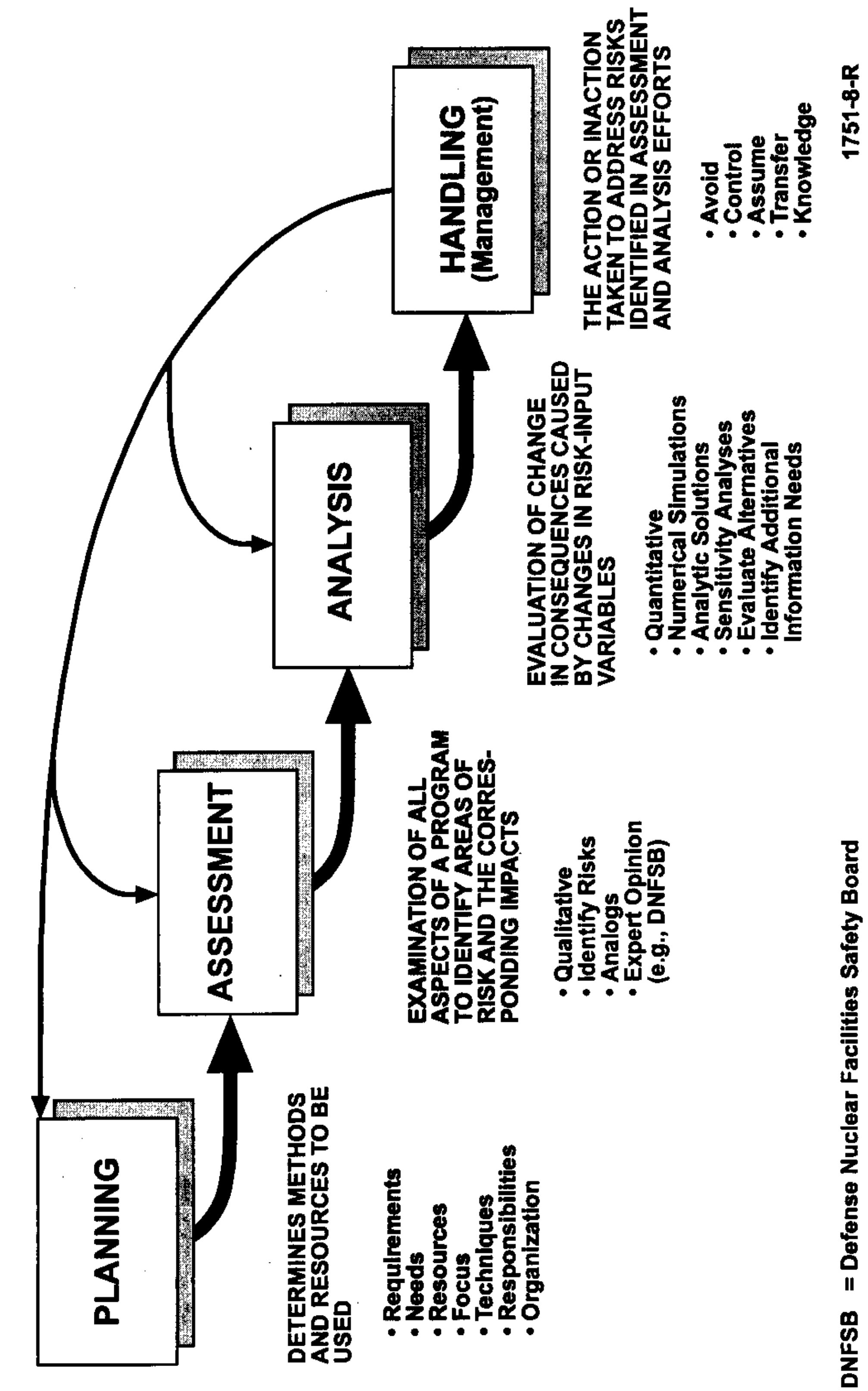


Table 7. Immobilized Low-Activity Waste Disposal Subproject Activities that Require Approval.

ILAW Disposal Subproject Activity	Approval Organization
Performance assessment	DOE-HQ, Deputy Assistant Secretary for Waste Management
Preliminary safety analysis report and final safety analysis report	ORP/DOE-HQ
RCRA Part A and Part B permits	Washington State Department of Ecology
Validation and capital funding	DOE-HQ, ORP
NRC incidental waste determination	NRC (Approved)
Design (Critical Decision 1,2,3)	DOE-HQ unless delegated to ORP
Construction	Various organizations
Project Execution Plan (PEP)	ORP
DOE approval to operate	DOE

DOE = U.S. Department of Energy
DOE-HQ = U.S. Department of Energy, Headquarters
ILAW = immobilized low-activity waste
NRC = U.S. Nuclear Regulatory Commission
RCRA = *Resource Conservation and Recovery Act of 1976*
ORP = U.S. Department of Energy, Office of River Protection

contributions from nearby sources on the disposal system performance objectives and is being conducted as a separate project by Pacific Northwest National Laboratory (Kincaid 1998). Both the ILAW performance assessment and composite analysis are now undergoing final DOE review. The timing and number of review cycles of the PA and composite analysis and the final disposal decision by DOE-HQ may affect the disposal system closure action budget and schedule.

This page intentionally left blank.

13.0 CONFIGURATION MANAGEMENT

Configuration Management maintains and controls changes to the technical baseline once the baseline is placed under change control. RPP will prepare a configuration management plan consistent with applicable DOE orders (DOE-STD-1073-93, *Guide for Operational Configuration Management Program*, and DOE Order 430.1, *Life-Cycle Asset Management*). The ILAW Disposal Subproject will follow Vann, 1998, and the current configuration management plan guidance (Treat et al. 1998). In addition, a line-item-project-specific configuration management plan will be developed consistent with the TWRS configuration management plan, applicable portions of DOE-STD-1073-93, and the TWRS SEMP. Line-item project configuration management plans will be developed following the respective conceptual design activities.

The Hanford Information Resource Management System develops and maintains the project files and ensures that information is available to support the subproject and line-item projects and that the information product is complete and accurate for the staging, interim storage, and disposal of Phase 1 and 2 ILAW products. Information resources are managed throughout the information life cycle, which includes information creation, collection, processing, distribution, management, and disposition or retirement. Life-cycle activities shall be managed toward making information useful, available, and effective in accomplishing the subproject and line-item project objectives. Project files will be developed and maintained in accordance with the Subproject's configuration management plan and the line-item project's document management plan. The line-item project's document management plan will be developed after the conceptual design is complete.

This page intentionally left blank..

14.0 INTERFACE MANAGEMENT

Interface activities between the privatization contractor and ILAW Disposal will be conducted in accordance with the procedures described in the ICD for ILAW product (BNFL 1999). The ICD addresses all aspects of the transfer of ILAW from BNFL to DOE. Internal PHMC interfaces (water, electricity, transportation, etc.) are described in the annual multiyear work plan.

14.1 INTERFACING ORGANIZATIONS AND APPROVAL AUTHORITIES

This project plan addresses the interfaces with DOE, the privatization contractor, permitting authorities such as Ecology and the U.S. Environmental Protection Agency (EPA), and specific organizations, such as Permitting and Safety, inside the Project Hanford Management Contractor (PHMC). Because both construction and ILAW disposal functions will be implemented, permitting requirements will include state (Ecology) and EPA regulations as well as DOE orders covering disposal. These permitting requirements apply to facility operation, surveillance, closure, and post-closure monitoring. PHMC organizations that will issue approvals include Safety, Environmental Compliance, Site Infrastructure Coordination, and Quality Assurance. An environmental requirements checklist evaluation and a safety evaluation are included in project plans. These will identify applicable requirements and regulations where approvals are required. Site infrastructure coordination is achieved through the infrastructure project and the RL Site Infrastructure Division. A quality assurance plan will be developed for the subproject through the Waste Disposal Division. DOE reviews and approvals are required for conceptual design, definitive design, and construction stages. Performance assessment approval is required before construction authorization for disposal systems. Accordingly, the performance assessment was submitted to DOE-HQ in March 1998 for review and has received a recommendation for conditional approval. Details of approval authorization requirements are given in Chapter 12 and Appendix E.

This page intentionally left blank.

15.0 QUALIFICATIONS AND TRAINING

Subproject staff qualifications and training will be conducted in accordance with DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*. This order requires that the following requirements be applied to contractors awarded DOE procurement, management, and operating contracts for operable DOE nuclear facilities.

- Implement the requirements of DOE Order 5480.20A as they apply to the facility and the position.

- Prepare and submit a training implementation matrix to the Operations Office manager for review and approval.

- Prepare and submit procedures that establish the requirements for granting exceptions to specific training or qualification requirements for an individual to the Operations Office manager for review and approval.

- Provide written requests for certification extensions to the Operations Office manager for approval.

- Prepare and submit an assessment of the need for a simulator to the Operations Office manager for review and approval (Category A test and research reactors only).

- Perform periodic systematic evaluations of training and qualification programs.

The line-item project baseline requirement documents (DRD, Level 1 specification) specify DOE Order 5480.20A, and the line-item PEPs will provide the implementation details.

This page intentionally left blank.

16.0 REFERENCES

10 CFR 61, "Licensing Requirements for Low-Level Waste Disposal," *Code of Federal Regulations*, as amended.

10 CFR 830.120, "Quality Assurance Requirements," *Code of Federal Regulations*, as amended.

53 FR 12449, 1988, "Record of Decision Hanford High-Level, Transuranic, and Tank Wastes," *Federal Register*, Vol. 53, pp. 12449, April 8.

60 FR 66344, 1995, "Hazardous Wastes: Identification and Listing; Proposed Ruling," *Federal Register*, Vol. 60, No. 245, pp. 66344, December 21.

62 FR 8693, 1997, "Record of Decision for the Tank Waste Remediation System," *Federal Register*, Vol. 62, pp. 8693, February 26, 1997.

Acree, C. D, Jr., 1995, *Tank Waste Remediation Analysis Mission Analysis*, WHC-SD-WM-MAR-008, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Alm, A. L., 1996, *Approval of Critical Decisions for Phase 1 Immobilized High-Level and Low-Activity Waste Interim Storage and Tank Farm Restoration and Safe Operations Projects (Projects W-464, W-465, and W-314)*, Letter to J. Wagoner, Manager, U.S. Department of Energy, Richland Operations Office, dated December 26, 1996, U.S. Department of Energy, Headquarters, Washington, D.C.

Ashworth, S. C., and D. A. Burbank, 1998, *Design Requirements Document For Project W-520 Immobilized Low Activity Waste Disposal*, prepared by COGEMA Engineering Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

ASME, 1989, *Quality Assurance Program Requirements for Nuclear Facilities*, ASME NQA-1-1989 with current addenda, American Society of Mechanical Engineers, New York, New York.

BNFL, 1999, *Interface Control Document ICD-15 for Immobilized Low-Activity Waste*, BNFL-5193-ID-15, Rev. 3, BNFL Inc., Richland, Washington.

Borneman, L. E., 1997, *Environmental Requirements Checklist for the Immobilized Low-Activity Waste Interim Storage Project W-465*, Appendix B of Deffenbaugh et. al., 1997, HNF-SD-ENV-EE-003, Rev. 0, Lockheed Martin Hanford Company, Richland, Washington.

Burbank, D. A., 1996, *Alternatives Generation and Analysis Report for Immobilized Low-Level Waste Interim Storage Architecture*, WHC-SD-W465-AGA-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Burbank, D. A., 1997, *Design Requirements Document for Project W-465, Immobilized Low-Activity Waste Interim Storage*, HNF-SD-W465-DRD-001, Rev. 0., SGN Eurisys Services Corporation, Richland, Washington

Burbank, D. A., and T. M. Hohl, 1999, *Reanalysis of Alternatives for Immobilized Low Activity Waste Disposal*, HNF-4003, prepared by COGEMA Engineering Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

Burbank, D. A. and M. J. Klem, 1997, *Analysis of Alternatives for Immobilized Low-Activity Waste Disposal*, HNF-SD-TWR-AGA-004, Rev. B.

Davis, J. S., 1997, *Authorization Basis Amendment Process*, HNF-IP-0842, Volume IV, Lockheed Martin Hanford Company, Richland, Washington.

Deffenbaugh, M. L., 1996, *Environmental Requirements Checklist for the High-Level Waste Storage Project Canister Storage Building*, letter to LAW IS Subproject, Correspondence No. 70100-96-004, dated 11-04-96, Lockheed Martin Hanford Company, Richland, Washington

Deffenbaugh, M. L., J. D. Guberski, C. J. Grando, V. L. Armstrong, J. E. Mercado, and M. W. Cline, 1997, *Permitting Plan for the Immobilized Low-Activity Waste Project*, HNF-SD-ENV- EE-003, Rev.0, Lockheed Martin Hanford Company, Richland Washington.

DOE, 1981, *Environmental Protection, Safety and Health Protection Information Reporting Requirements*, DOE Order 5484.1, U.S. Department of Energy, Washington, D.C.

DOE, 1987, *Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes*, DOE/EIS-0113, U.S. Department of Energy, Washington, D.C.

DOE, 1988, *General Environmental Protection Program*, DOE Order 5400.1, U.S. Department of Energy, Washington, D.C.

DOE, 1988, *Radioactive Waste Management*, DOE Order 5820.2A, U.S. Department of Energy, Washington, D.C.

DOE, 1991, *Quality Assurance*, DOE Order 5700.6C, U.S. Department of Energy, Washington, D.C.

DOE, 1992, *Project Management System*, DOE Order 4700.1, U.S. Department of Energy, Washington, D.C.

DOE, 1992, *Technical Safety Requirements*, DOE Order 5480.22, U.S. Department of Energy, Washington, D.C.

DOE, 1992, *Nuclear Safety Analysis Reports*, DOE Order 5480.23, U.S. Department of Energy, Washington, D.C.

DOE, 1993, *Guide for Operational Configuration Management Program*, DOE-STD-1073-93, U.S. Department of Energy, Washington, D.C.

DOE, 1993, *Radiation Protection of the Public and the Environment*, DOE Order 5400.5, U.S. Department of Energy, Washington, D.C.

DOE, 1993, *Startup and Restart of Nuclear Facilities Operational Readiness Review and Readiness Assessments.*

DOE, 1995, *Life-Cycle Asset Management*, DOE Order 430.1, U.S. Department of Energy, Washington, D.C.

DOE, 1996, *Tank Waste Remediation System, Hanford Site, Final Environmental Impact Statement*, DOE/EIS-0189, U.S. Department of Energy, Washington, D.C.

DOE, 1998a, *Life-Cycle Asset Management*, DOE Order 430.1A, U.S. Department of Energy, Washington, D.C.

DOE, 1998b, *EIS Supplement Analysis*, DOE/EIS-0189-SA2, U.S. Department of Energy, Washington, D.C.

DOE, 1999, *Radioactive Waste Management*, DOE Order 435.1, U.S. Department of Energy, Washington, D.C.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

Ecology, EPA, and DOE, 1994, *Hanford Federal Facility Agreement and Consent Order*, 2 volumes, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

FDH, 1997c, *Safety Analysis Program*, HNF-PRO-430, Fluor Daniel Hanford, Inc., Richland, Washington, Internet address: *//docs.rl.gov/phpp/procedures/disply.asp>doc_number= HNF-PRO-430.*

FDH, 1997d, *Quality Assurance Program Description*, HNF-MP-599, Fluor Daniel Hanford, Inc., Richland, Washington, Internet address: */docs.rl.gov/phpp/policy/disply.asp>doc_number= HNF-MP-599.*

FDH, 1998b, *Radioactive Material/Waste Shipments*, HNF-PRO-157, Fluor Daniel Hanford, Inc., Richland, Washington, Internet address: */docs.rl.gov/phpp/procedures/disply.asp>doc_number= HNF-PRO-157.*

FDH, 1998a, *Construction Program Overview HNF-PRO-1997*, HNF-PRO-1997, Rev. 2, Fluor Daniel Hanford, Inc., Richland, Washington, Internet address: */docs.rl.gov/phpp/procedures/disply.asp>doc_number= HNF-PRO-1997.*

FDH, 1998b, *Safety Basis Planning, Documentation, Review, and Approval*, HNF-PRO-705, Rev.1, Fluor Daniel Hanford, Inc., Richland, Washington, Internet address: */docs.rl.gov/phpp/procedures/disply.asp>doc_number= HNF-PRO-705.*

Guimond, R. J. and T. J. O'Toole, *Revised Interim Policy on Regulatory Structure for Low-Level Radioactive Waste Management and Disposal*, memorandum to U.S. Department of Energy, Department EM-30, dated July 31, 1996, U.S. Public Health Service, Washington, D.C.

Hanlon, B. M., 1999, *Waste Tank Summary Report for Month Ending April 30, 1999*, HNF-EP-0182-133, Lockheed Martin Hanford Company, Richland, Washington.

Kincaid, C. T., J. W. Shade, G. A. Whyatt, M. G. Peipho, K. Rhoads, J. A. Voogd, J. H. Westsik, M. D. Freshley, K. A. Blanchard, and B. G. Lauzon, 1994, *Performance Assessment of Grouted Double-Shell Tank Waste Disposal at Hanford*, WHC-SD-WM-EE-004, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Kincaid, C. T. , M. P. Bergeron, C. R. Cole, M. D. Freshley, D. L. Strenge, P. D. Thorne, L. W. Vail, and S. K. Wurtner, 1998, *Composite Analysis for the Low-Level Waste Disposal in the 200 Area Plateau of the Hanford Site*, PNNL-11800, Pacific Northwest National Laboratory, Richland, Washington.

Kirkbride, R. A., 1999, *Tank Waste Remediation System Operations and Utilization Plan*, HNF-SD-WM-SP-012, Rev. 1, Lockheed Martin Hanford Company, Richland, Washington.

Kupfer, M. J., A. L. Boldt, B. A. Higley, S. L. Lambert, R. M. Orme, D. E. Place, L. W. Shelton, R. A. Watsons, G. L. Borsheim, R. T. Winward, D. C. Hedengren, W. W. Schulz, M. D. LeClair, and N. G. Colton, 1997, *Standard Inventories of Chemicals and Radionuclides in Hanford Site Waste Tanks*, WHC-SD-WM-TI-740, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

LMHC, 1998, *Tank Waste Remediation System Fiscal Year 1999 Work Plan-WBS 1.1*, HNF-SP-1230, Rev. 0, Lockheed Martin Hanford Corp., Richland, Washington.

LMHC, 1999, *TWRS Administration*, HNF-IP-0842, prepared by Lockheed Martin Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

Mann, F. M., C. R. Eiholzer, A. H. Lu, P. D. Rittman, G. F. Williamson, N. K. Kline, Y. Chen, P. M. McGrail, and N. R. Brown, 1996, *Hanford Low-Level Tank Waste Interim Performance Assessment*, WHC-EP-0884, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Mann, F. M., R. J. Puigh, II, P. D. Rittmann, N. W. Kine, J. A. Voogd, Y. Chen, C. R. Eibolzer, C. T. Kincaid, B. P. McGrail, A. H. Lu, G. F. Williamson, N. R. Brown, and P. E. Lamont, 1998a, *Hanford Immobilized Low-Activity Tank Waste Performance Assessment*, DOE/RL-97-69, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Mann, F. M., 1998b, *Statement of Work for FY 1999 to 2004 for the Hanford Low-Level Tank Waste Performance Assessment Project*, HNF-SD-WM-PAP-062, Rev. 3, prepared by Lockheed Martin Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

Mouette, P., 1997, *Preliminary Safety Evaluation for Project W-465, Immobilized Low-Activity Waste Interim Storage*, HD-SD-W465-PSE-001, Rev. 0, Numatec Hanford Company, Richland, Washington.

Murkowski, R. J., 1995, "Storage and Disposal Project Risk Management Plan," Letter 73300-95-011, to J. D. Thomson, December 29, 1995.

National Environmental Policy Act of 1969, 42 USC 4321, et seq.

Orme, 1996, *TWRS Privatization Process Technical Baseline*, WHC-SD-WM-TI-774, Rev. 0 , Westinghouse Hanford Company, Richland, Washington.

Paperiello, C. J., *Classification of Hanford Low-Activity Tank Waste Fraction*, letter to J. J. Kinzer, Lockheed Martin Hanford Company, dated June 9, 1997, U.S. Nuclear Regulatory Commission, Washington, D.C.

Peck, L. G., 1998, *Tank Waste Remediation System Systems Engineering Management Plan*, HNF-SD-WM-SEMP-002, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Penwell, D. L., 1996, Initial Retrieval Sequence and Blending Strategy, WHC-SD-WM-RPT-229, Rev 0, Westinghouse Hanford Company, Richland, Washington.

Petersen, C. A., 1996, *Technical Basis for Classification of Low-Activity Waste Fraction from Hanford Site Tanks*, WHC-SD-WM-TI-699, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Reidel, S. P., A. M. Tallman, V. G. Johnson, C. J. Chou, S. M. Narbutovskih, and J. P. Kiesler, 1995, *Characterization Plan for the Proposed TWRS Treatment Complex*, WHC-SD-WM-PLN-109, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.

RL, 1987, *Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes, Final Environmental Impact Statement*, DOE/EIS-0113, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

RL, 1996a, TWRS Privatization Contract No. DE-RP06-96RL13308, contract with British Nuclear Fuels Ltd., U.S. Department of Energy, Richland Operations Office, Richland, Washington.

RL, 1996b, TWRS Privatization Contract No. DE-RP06-96RL13309, contract with Lockheed Martin Advanced Environmental Systems, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

RL, 1998a, TWRS Privatization Contract No. DE-RP06-96RL13308, Modification 0006, contract with British Nuclear Fuels Ltd., U.S. Department of Energy, Richland Operations Office, Richland, Washington.

RL, 1998b, "Report to Congress: Treatment & Immobilization of Hanford Radioactive Tank Waste," http://www.hanford.gov/docs/twrs-atp-twrs-atp.html, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Rutherford, W. A., "Approval of Tank Waste Remediation System Complex Site Evaluation Report," Letter 97-SID-285 to H. J. Hatch of Fluor Daniel Hanford, Inc., dated July 10, 1997, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Shade, J. W., 1997, *TWRS Retrieval and Disposal Mission Immobilized Low-Activity Waste Disposal Plan*, HNF-1517, Rev. 0, prepared by Numatec Hanford Company for Fluor Daniel Hanford, Inc., Richland, Washington.

Shord, A. L., 1995, *Tank Waste Remediation System Complex Site Evaluation Report*, WHC-SD-WM-SE-021, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

State Environmental Policy Act of 1971, Revised Code of Washington 43.21c, Olympia, Washington.

Taylor, W. J., "Milestone Completion Issue Low-Level Waste Engineering Evaluation," Letter 96-WDD-149 to the president, Westinghouse Hanford Company dated September 27, 1996, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Taylor, W. J., 1998, *Contract Number DE-AC06-96-RL13200 - Waste Disposal Division (WDD) Multi-Year Work Plan (MYWP) Update Guidance for Fiscal Year 1999 (FY 99)* (Letter 98-WDD-103 to R. D. Hanson, Fluor Daniel Hanford, Inc., September 21), U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Treat, R. L., R. D. Potter, and W. L. Willis, 1998, *TWRS Retrieval and Disposal Mission Technical Baseline Summary Description*, HNF-1901, Rev. 1, prepared by Lockheed Martin Hanford Corporation and Numatec Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

Vann, J. M., 1998, *Tank Waste Remediation Systems Configuration Management Plan*, HNF-1900, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington.

Wagoner, J. D., 1996, *TWRS Privatization Request for Proposals,* Solicitation Number DE-RPO6-96RL13308, (February 1996) U.S. Department of Energy, Richland Operations Office, Richland, Washington.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

Wagoner, J. D., 1996a, *Tri-Party Agreement Change Package*, letter to C. Clark, U.S. Environmental Protection Agency, and M. Riveland, Washington State Department of Ecology, Correspondence Number 96-EAP-116 dated December 16, 1996, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Wagoner, J. D., 1996b, Letter to Prospective Offerers (Feb. 20, 1996) Letter Number 96-RTI-029 for RFP DE-RP06-96RL13308).

Zimmerman, B. D., 1998, *Tank Waste Remediation System Risk Management Plan*, HNF-SD-WM-PMP-018, Rev. 2, prepared by Lockheed Martin Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

This page intentionally left blank.

APPENDIX A

CROSS-CHECK MATRIX OF PLAN ELEMENTS

This page intentionally left blank.

APPENDIX A

CROSS-CHECK MATRIX OF PLAN ELEMENTS

ITable A-1 is the road map showing where the elements of Revision 0 of this document are located in Revision 1 of this document.

Table A-1. Cross-Check Road Map between the Fiscal Year 1998 and Fiscal Year 1999 Project Plans for the Immobilized Low-Activity Waste Subproject. (3 Sheets)

Location in Rev. 0 (section)	Location in Rev. 1 (section)
2.0 Hanford Mission/Objectives	2.0 Hanford Site Mission
3.0 ILAW Project Mission/Objectives	2.3 ILAW Disposal Misison and Objectives
4.0 Scope of ILAW Subproject	3.0 Scope of Immobilized Low-Activity Waste Storage and Disposal Subproject
4.1 Facility Description	4.5 Disposal Facilities Description
4.2 Phase I and Phase II Privatization Impacts	11.0 Management Approach
4.3 Interfacing Organizations and Approval Authorities	14.0 Interface Management
4.4 Product Acceptance Process	5.1 Performance Assessment Requirements
4.5 Top-Level Work Breakdown Structure	6.0 Top-Level Work Breakdown Structure
4.6 Scope of ILAW Subproject Plan	3.1 Scope of Immobilized Low-Activity Waste Storage and Disposal Plan
5.0 Project Background	4.0 Project Background and Technical Approach
5.1 Summary of Treatment/Disposal Options	4.1 General Characteristics of Tank Waste and Vitrification Feeds to be Processed
5.2 Waste Stream Components/Projections	4.2 Projected Inventories for ILAW Products
5.3 S&D System Capacity	4.5 Disposal Facilities Description
5.4 Regulatory Requirements	5.2 Regulatory Requirements
5.5 Current Disposal Activities	4.4 Current Government/Commercial Low-Level Waste Disposal Activities
5.6 Performance Assessment	5.1 Performance Assessment Requirements
6.0 Line-Item Project Management Approach	
7.0 Project Controlling Milestones and Critical Activities Schedule	8.0 River Protection Project Immobilized Low-Activity Waste Storage and Disposal Schedule 12.0 Risk Management
7.1 Tri-Party Agreement Controlling Milestones	8.1 Tri-Party Agreement Controlling Milestones
7.2 Other Requirements	8.2 Other Requirements
7.3 Schedule Requirements	8.3 Schedule Requirements

Table A-1. Cross-Check Road Map between the Fiscal Year 1998 and Fiscal Year 1999 Project Plans for the Immobilized Low-Activity Waste Subproject. (3 Sheets)

Location in Rev. 0 (section)	Location in Rev. 1 (section)
8.0 Project Cost	9.0 Project Cost
9.0 Programmatic Risk Assessment	12.0 Risk Management
10.0 Project Organization, Roles, and Responsibilities	10.0 Project Organization, Roles, and Responsibilities
11.0 Project Management and Control	11.0 Management Approach
11.1 Project Planning	11.1.1 Project Execution Plans
11.2 Baseline Management	11.2.2 Technical Baseline Control
11.3 Work Authorization	11.1.6 Work Authorization
11.4 Funds Management	11.1.7 Funds Management
11.5 Contingency Management	11.1.8 Contingency Management
11.6 Performance Measurement and Reporting	11.1.5 Performance Measuring and Reporting
11.7 Meetings and Reviews	11.1.9 Meetings and Reviews
11.8 Project Validations	11.1.10 Project Validations
11.9 Critical Decisions	11.1.11 Critical Decisions
11.10 External Interface Control	14.0 Interface Managemenet
12/0 Acquisition Strategy	11.1.2 Acquisition Strategy
13.0 Quality, Safety and Environmental Protection	11.3 Quality, Safety and Environmental Protection
13.1 Quality Assurance	11.3 Quality, Safety and Environmental Protection
13.2 Nuclear Safety Activities and Authorization Basis Process	11.3.3 Nuclear Safety Activities and Authorization Basis Process
13.3 Environmental Management	11.3.1 Environmental Management
13.4 Regulatory Compliance with Disposal Facility Requirements	11.3.2 Regulatory Compliance with Disposal Facility Requirements
14.0 Test and Evaluation Plan	11.2.3 Test and Evaluation Plan
15.0 References	16.0 References
App. A Cross-Check Matrix of Plan Elements	App. A Cross-Check Matrix of Plan Elements
App. B Applicable Documents	App. B Applicable Documents
App. C Summary of *Hanford Low-Level Tank Waste Interim Performance Assessment,* HNF-EP-0844, Rev. 1	App. C Summary of *Hanford Low-Level Tank Waste Performance Assessment,* DOE/RL-97-69, Rev. 0
App. D Key Deliverables and Performance Measurements	App. D Key Deliverables and Performance Measurements

Table A-1. Cross-Check Road Map between the Fiscal Year 1998 and Fiscal Year 1999 Project Plans for the Immobilized Low-Activity Waste Subproject. (3 Sheets)

Location in Rev. 0 (section)	Location in Rev. 1 (section)
App. E Division of Responsibility Matrix - Immobilized Low-Activity Waste Storage/Disposal Subproject	App. E Division of Responsibility Matrix - Immobilized Low-Activity Waste Storage/Disposal Subproject
App. F Immobilized Low-Activity Waste Subproject Schedule	App. F Immobilized Low-Activity Waste Subproject Schedule

ILAW = immobilized low-activity waste
S&D = storage and disposal
Tri-Party Agreement = *Hanford Federal Facility Agreement and Consent Order*
TSD = treatment, storage, and disposal
WBS = work breakdown structure

This page intentionally left blank.

APPENDIX B

APPLICABLE DOCUMENTS

This page intentionally left blank.

APPENDIX B

APPLICABLE DOCUMENTS

The following tables list sources for specifications and requirements. The listing and specific requirements will evolve with project maturity. In the event of conflict between the documents referenced in the tables and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

B1.0 GOVERNMENT DOCUMENTS

Federal government and Washington State regulations along with U.S. Department of Energy (DOE) orders have been reviewed to determine constraints applicable to the design, construction, and operation of the immobilized low-activity waste (ILAW) Storage to the extent specified. To the extent specified, the documents listed in Table B-1 represent requirements imposed on the ILAW Storage Project by sources external to the Tank Waste Remediation System (TWRS) program.

Table B-1. Applicable Constraint Documents. (2 Sheets)

Document Identifier	Title
10 CFR 61	Licensing Requirements for Land Disposal of Radioactive Waste
10 CFR 830	Nuclear Safety Management, Subpart A, General Provisions, Section 830.120, Quality Assurance Requirements
10 CFR 835	Occupational Radiation Protection
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 50	EPA Regulations on National Primary and Secondary Air Quality Standards
40 CFR 52	Approval and Promulgation of Implementation Plans
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
49 CFR 172	Hazardous Materials Designations
49 CFR 173	Hazardous Materials Packaging Requirements
Bernero 1993	Bernero, NRC letter dated March 2, 1993
DOE Order 430.1	Life-Cycle Asset Management
DOE Order 460.1	Packaging and Transportation Safety
DOE Order 460.2	Departmental Materials Transportation and Packaging Management
DOE Order 4330.4B	Maintenance Management Program

Table B-1. Applicable Constraint Documents. (2 Sheets)

Document Identifier	Title
DOE Order 4700.1	Project Management System
DOE Order 1540.2	Hazardous Material Packaging for Transportation - Administrative Procedures
DOE Order 5400.1	General Environmental Protection Program
DOE Order 5400.5 (1993)	Radiation Protection of the Public and the Environment
DOE Order 5480.3	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Waste
DOE Order 5480.4 (1993)	Environmental Protection, Safety, and Health Protection Standards
DOE Order 5480.7A	Fire Protection
RL ID 5480.7	Fire Protection
DOE Order 5480.10	Contractor Industrial Hygiene Program
DOE Order 5480.11 (1988)	Radiation Protection for Occupational Workers
DOE Order 5480.19	Conduct of Operations Requirements for DOE Facilities
DOE Order 5480.20A (1994)	Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities
DOE Order 5480.21	Unreviewed Safety Questions
DOE Order 5480.22	Technical Safety Requirements
DOE Order 5480.23	Nuclear Safety Analysis Reports
DOE Order 5480.28	Natural Phenomena Hazards Mitigation
DOE Order 5483.1A (1983)	Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities
DOE Order 5500.7B	Emergency Operations Records Protection Program
DOE Order 5700.6C	Quality Assurance
DOE Order 5820.2A (1993)	Radioactive Waste Management
DOE Order 6430.1A (1989)	General Design Criteria
NFPA 70 (1996)	National Electrical Code
NFPA 101 (1994)	Code for Safety of Life from Fire in Buildings and Structures, Vol. 5
UBC (1994)	Uniform Building Code
Tri-Party Agreement (1996)	*Hanford Federal Facility Agreement and Consent Order* (Amendment 6)
WAC 173-303	Dangerous Waste Regulations
WAC 173-400	General Air Regulations
WAC 173-401	Operating Permit Regulation
WAC 173-460	Toxic Air Pollutants
WAC 173-480	Ambient Air Quality Standards and Emission Limits for Radionuclides
WAC 246-220	Radiation Protection - General Provisions
WAC 246-247	Radiation Protection - Air Emissions
WAS 246-272	On-Site Sewage Systems
WAC 246-290	Public Water Supplies

CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
NFPA = National Fire Protection Association
NRC = U.S. Nuclear Regulatory Agency
UBC = Uniform Building Code
WAC = *Washington Administrative Code*

APPENDIX C

SUMMARY OF *HANFORD LOW-LEVEL TANK WASTE PERFORMANCE ASSESSMENT*, DOE/RL-97-69, Rev. 0

This page intentionally left blank.

APPENDIX C

SUMMARY OF *HANFORD LOW-LEVEL TANK WASTE PERFORMANCE ASSESSMENT,* DOE/RL-97-69, Rev. 0[1]

The *Hanford Immobilized Low-Activity Tank Waste Performance Assessment* examines the long-term environmental and human health effects associated with the planned disposal of the vitrified low-level fraction of waste presently contained in Hanford Site tanks. The tank waste is the by-product of separating special nuclear materials from irradiated nuclear fuels over the past 50 years. This waste has been stored in underground single- and double-shell tanks. The tank waste is to be retrieved, separated into low- and high-activity fractions, and then immobilized by private vendors. The U.S. Department of Energy (DOE) will receive the vitrified waste from private vendors and plans to dispose of the low-activity fraction in the Hanford Site 200 East Area. The high-level fraction will be stored at Hanford until a national repository is approved.

This report provides the site-specific long-term environmental information needed by the DOE to issue a Disposal Authorization Statement that would allow the

- Modification of the four existing concrete disposal vaults to provide better access for emplacement of the immobilized low-activity waste (ILAW) containers,

- Filling of the modified vaults with the approximately 5,000 ILAW containers and filler material with the intent to dispose of the containers,

- Construction of the first set of next-generation disposal facilities

- Filling of the first set of next-generation facilities.

The performance assessment activity will continue beyond this assessment. The activity will collect additional data on the geotechnical features of the disposal sites, the disposal facility design and construction, and the long-term performance of the waste form. This activity also will perform analyses to determine the impact of these new data or information collected from other programs. Better estimates of long-term performance will be produced and reviewed on a regular basis. Performance assessments supporting closure of filled facilities will be issued seeking approval of those actions necessary to conclude active disposal facility operations.

This report also analyzes the long-term performance of the currently planned disposal system as a basis to

[1] DOE/RL-97-69, Rev. 0, 1998, *Hanford Immobilized Low-Activity Tank Waste Performance Assessment*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

- Set requirements on the waste form and the facility design that will protect the long-term public health and safety and protect the environment

- Demonstrate that such requirements can be met.

The calculations in this performance assessment show that a "reasonable expectation" exists that the disposal of the immobilized low-activity fraction of tank waste from the Hanford Site can meet environmental and health performance objectives.

C1.0 BACKGROUND

The Hanford Site in south-central Washington State has been used extensively as a location for defense materials production by DOE and its predecessor agencies. Over the last 50 years, radioactive and mixed waste from materials production and related activities have been stored on the Hanford Site, primarily in underground single- and double-shell tanks in 18 tank farms.

As part of the Hanford Site's environmental restoration and waste management mission, DOE is proceeding with plans to retrieve the waste from the tanks, some of which have already leaked part of their contents, to accomplish the following:

- Separate the waste into a small quantity of high-level waste and a much larger quantity of low-activity waste

- Immobilize both waste streams

- Store the immobilized high-level waste until it can be sent to a federal geologic repository

- Dispose of the immobilized low-activity waste on-site in near-surface low-activity waste disposal facilities.

This plan is based on Revision 6 of the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement)[2] and on the *Record of Decision for the Tank Waste Remediation Systems, Hanford Site, Richland, Washington*[3]. More than 200,000 m^3 (7,000,000 ft^3) of immobilized low-activity waste will be disposed of under this plan. This large volume will contain one of the largest inventories of long-lived radionuclides in the DOE complex to be disposed of in a near-surface, low-activity waste facility.

---

2 Ecology, DOE, and EPA, 1996, *Hanford Facility Agreement and Consent Order*, Sixth Amendment, Washington State Department of Ecology, United States Environmental Protection Agency, United States Department of Energy. The document is available from any of the parties.

3 62 FR 8693. "Record of Decision for the Tank Waste Remediation System, Hanford Site, Richland Washington", Federal Register, Volume 62, page 8693, February 26, 1997.

By source definition, most of the waste in the Hanford Site tanks is considered high-level radioactive waste. The staff of the U.S. Nuclear Regulatory Commission (NRC) has indicated[4] that the low-activity waste would be considered "incidental waste" if DOE follows its program plan for separating and immobilizing the waste to the maximum extent possible that is technically and economically practical, if the wastes meet the Class C standards of 10 CFR 61[5], and if the performance assessments continue to indicate that public health and safety would be protected to standards comparable to those established by the NRC for the disposal of low-level waste. Disposal of DOE's incidental waste does not fall under the licensing authority of the NRC.

The current program plan is to use existing disposal vaults and construct additional facilities for ILAW disposal. An earlier program to dispose of the tank waste built four large concrete subsurface vaults with a total usable volume of about 15,000 m^3. These vaults will be modified to accept the first waste to be immobilized in the second half of the year 2002. Based on planned ILAW production schedules, additional disposal facilities will be needed in 2005. The new disposal facilities will be of a different design from the existing facilities. ILAW production is scheduled to continue until 2024, with closure later in the decade. Closing the tanks is a separate program that will occur between 2010 and 2030.

DOE and its contractors are currently obligated to meet DOE Order on radioactive waste management, currently DOE Order 5820.2A[6]. It is anticipated that DOE Order 435.1[7] will become the primary regulation governing management and disposal of radioactive waste at DOE facilities. Before low-level radioactive waste can be disposed of, DOE-Headquarters must issue a Disposal Authorization Statement to the Richland Operations Office. Draft DOE Order 435.1 also requires that the Disposal Authorization Statement be issued before the construction of a new disposal facility. The issuance of this Disposal Authorization Statement is predicated on many analyses, including the performance assessment, which investigates the ability of the disposal system to provide long-term environmental, public health, and safety protection. DOE and its contractors will also meet the requirements of the State of Washington in its regulation of dangerous waste.

---

4 C.J. Paperiello, *Classification of Hanford Low-Activity Tank Waste Fraction*, letter to Jackson Kinzer, Assistant Manager, Office of Tank Waste Remediation System, dated June 9, 1997. Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C.

5 10 CFR 61, Section 55, "Licensing Requirements for the Land Disposal of Radioactive Waste," *Code of Federal Regulations*, as amended.

6 DOE Order 5820.2A, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C., September 26, 1988.

7 DOE Order 435.1, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C. This order is expected to become effective in 1999.

C2.0 APPROACH

Because of the duration of the production program, the variability of the ILAW produced over those many years, and the likelihood of different disposal facility designs, this performance assessment takes a three-step approach:

- Understand the important principles, data, and requirements
- Set requirements based on long-term environmental and human health impacts
- Demonstrate that such requirements can be reasonably expected to be met.

The first step is to understand the important principles, data, and requirements that affect the impact of this disposal action on the public and the environment. Based on applicable regulations and earlier performance assessments, performance objectives were established[8] to protect the following:

- The general public
- The inadvertent intruder
- Groundwater resources
- Surface water resources
- Air resources.

Protection of Hanford Site workers is assumed to be the same as that for the general public. The performance objectives included not only the peak impact that would be acceptable but also the time period ("time of compliance") over which the impacts would be determined. Data and models were selected based on previous Hanford studies. The data are summarized and the assumptions are listed in Table C-1. Analyses of likely conditions as well as sensitivity scenarios provide the range of impacts to be expected.

The second step involved using this understanding to set requirements on the disposal facility design and the ILAW product quality. Finally, to show that public health and the environment will be protected with reasonable expectation, this document shows that the requirements are likely to be met.

As more data are collected through performance assessment activity data collection, tank retrieval sampling, ILAW production experience, disposal facility operation history, and other research, this performance assessment will be modified. Because of the requirements of the DOE Order and to follow good business practices, this performance assessment will be revised to reflect our growing knowledge and understanding.

This commitment to iterative analysis is demonstrated by noting that this performance assessment is actually the third set of environmental analyses performed for the program. The

8 F.M. Mann, *Performance Objectives of the Tank Waste Remediation Systems Low-Level Waste Disposal Program*, WHC-EP-0826, Revision 0, Westinghouse Hanford Company, Richland, Washington, December 1994.

first set[9] provided the background for disposal facility conceptual design and waste form quality. The second set of documents, the *Hanford Low-Level Tank Waste Interim Performance Assessment*[10], which provided a set of analyses based on DOE Order 5820.2A showed that the disposal of ILAW would likely meet its performance objectives based on DOE's current plans and on current knowledge. The present document builds on the analyses presented in the interim performance assessment.

Table C-1. Major Source of Information for the Base Analysis Case.

Data Type	Major Source
Location	The existing four disposal vaults at the eastern edge of the Hanford Site 200 East Area will be used first, followed by the new facilities just southwest of the PUREX Facility (also in the 200 East Area).
Waste	Immobilized low-activity contents of Hanford Site single- and double-shell tanks in the 200 East and 200 West Areas.
Inventory	**ASSUMED** to be average values calculated from modeling Hanford Site production reactors corrected for off-site transfers, discharges to the ground, separations into high- and low-activity fractions, and off-gas generation.
Long-term waste form performance	**ASSUMED** to be equal in value to the short-term performance required in the request for proposals for all non-Tc radionuclides. Tc release in the RFP is smaller.
Disposal facility design:	**ASSUMED** from preconceptual ideas.
Recharge	For the first 1,000 years, taken from specifications of the Hanford Site Surface Barrier. Thereafter, taken from the analysis of current natural conditions.
Geotechnical	Taken from geotechnical measurements studies of other locations in the Hanford Site 200 East Area.
Exposure	Taken from past Hanford Site documents and experience.

9 F.M. Mann, C.R. Eiholzer, N.W. Kline, B.P. McGrail, and M.G. Piepho, *Impacts of Disposal System Design Options on Low-Level Glass Waste Disposal System Performance*, WHC-EP-0810, Rev. 1, Westinghouse Hanford Company, Richland, Washington, September 1995.

10 F.M. Mann, C.R. Eiholzer, A.H. Lu, P.D. Rittmann, N.W. Kline, Y. Chen, B.P. McGrail, G.F. Williamson, J.A. Voogd, N.R. Brown, and P.E. LaMont, *Hanford Low-Level Tank Waste Interim Performance Assessment*, HNF-EP-0884, Rev. 1, Lockheed Martin Hanford Company, Richland, Washington, September 1997.

C3.0 RESULTS OF COMPUTER SIMULATIONS

C3.1 Introduction

The data used in this performance assessment are documented in *Data Packages for the Hanford Low-Level Tank Waste Interim Performance Assessment*[11]. The base analysis and sensitivity cases are provided in *Definition of the Base Analysis Case of the Interim Performance Assessment*[12].
Disposal will occur at two facility locations approximately 2 kilometers (1.5 miles) apart. The first facility to be used consists of four existing concrete vaults located just east of the Hanford Site 200 East Area. These vaults, which have an outer layer of asphalt approximately 1 meter thick, were constructed around 1990 as the first of 34 vaults for the disposal of double-shell tank waste in a grouted waste form. The other disposal facility is to the southwest in a previously unused area. This disposal facility is expected also to consist of concrete vaults, but without the asphalt layer. Current planning for the disposal facilities include a surface cover to minimize the flow of water or other potential intrusions into the facility and a sand-gravel capillary barrier to divert water around the waste form.

Geologic, hydraulic, geochemical, and water infiltration data obtained for the 200 Area plateau were used in this analysis and are considered to be representative of the disposal areas. Additional site-specific data are being collected.

The inventory of contaminants in the waste form is based on estimates for the tank waste inventory and uses a conservative estimate to project the low-activity fraction of radionuclides immobilized in the waste form after the separation and immobilization processes. The tank waste inventory estimate is based on computer simulations of the production reactor history and the known reprocessing histories.

The release rate of contaminants from the waste form used in the base analysis case, 4.4 parts per million per year, is based on the request for proposal[13] issued by the Richland Operations Office for the separation and immobilization of tank waste. Sensitivity cases also were performed for an extensively studied low-level waste glass using a computer simulation code to estimate the rate at which this glass would release the contaminants over time.

---

11 F. M. Mann, *Data Packages for the Hanford Low-Level Tank Waste Interim Performance Assessment*, HNF-SD-WM-RPT-166, Revision 0, Westinghouse Hanford Company, Richland, Washington, July 1995.

12 F. M. Mann, C. R. Eiholzer, R. Khaleel, N. W. Kline, A. H. Lu, B. P. McGrail, P. D. Rittmann, and F. Schmittroth, *Definition of the Base Analysis Case of the Interim Performance Assessment*, WHC-SD-WM-RPT-200, Revision 0, Westinghouse Hanford Company, Richland, Washington, December 1995.

13 *Request for Proposals (RFP) No. DE-RP06-96RL13308*, letter from J. D. Wagoner to Prospective Offerors, U.S. Department of Energy, Richland Operations Office, Richland, Washington, February 20, 1996. These conditions have now been incorporated into contracts with British Nuclear Fuels Limited and with Lockheed Martin Advanced Environmental Services, Incorporated.

A three-dimensional computer code was used to simulate moisture flow and the transport of contaminants from the waste form through the vadose zone to the groundwater. Another three-dimensional computer code simulated the flow and transport in the groundwater. The results from these two codes were combined with inventory and dosimetry data to provide radionuclide concentrations in groundwater and dose rates. Explicit calculations were conducted to 100,000 years after disposal with extrapolations used to extend the results to longer times. For inadvertent intruder analyses, a spreadsheet was used with calculations extending from 100 to 1,000 years.

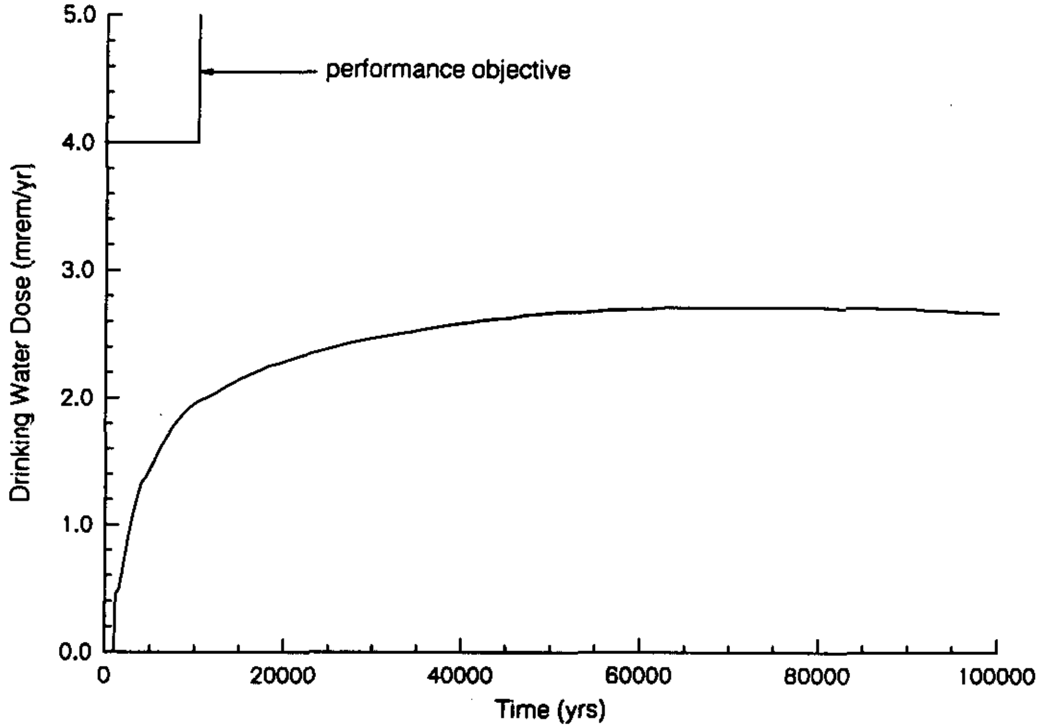
Because of the very slow predicted release of contaminants from the waste form (hundreds of thousands of years), the estimated concentration of radionuclides in the groundwater does not show a peak, but rather a broad plateau (see, for example, the beta/photon drinking water dose rate shown in Figure C-1). This contrasts with most other environmental assessments, where the contaminant release time is short compared to the contaminant travel time, resulting in a peaked response.

C3.2 Protection of the General Public

Table C-2 compares the performance objectives for protecting the general public with the results from the base analysis case calculations over the time of compliance (10,000 years). The estimated all-pathways doses are significantly lower than the performance objectives. The sensitivity cases show that the all-pathways performance objective would be exceeded if one or more of the following conditions exist for the actual waste disposal action:

- A waste form having a long-term release rate significantly larger than the short-term release rate specified in the Request for Proposal[12]
- A high infiltration rate and a disposal facility design without a sand-gravel diverter
- A significantly larger inventory of selenium, technetium, or uranium.

Figure C-1. Beta/photon drinking water dose rates for the base analysis case at a well 100 meters downgradient from the disposal facility. The performance objective is less than 4.0 mrem in a year for the first 10,000 years.



During the first 10,000 years (the period of compliance), the estimated doses are at most one-third of the performance objective (25 mrem in a year as stated in the DOE order). A time of compliance of 10,000 years was chosen instead of the DOE recommended value of 1,000 years because the NRC[3] has indicated for the ILAW product to be ruled "incidental waste" that the performance assessment must also meet their requirements. Technetium-99 is estimated to contribute 58 percent of this dose. The peak all-pathways dose (23 mrem in a year) is estimated to occur at about 50,000 years. At the peak, uranium and its daughters are the main contributors.

The other two performance measures (all-pathways including other actions at the Hanford Site and a design that produces doses as low as reasonably achievable [ALARA]) are not expected to exceed 100 mrem in a year or 500 persons-rem per year at any time.

Table C-2. Comparison of estimated impacts with performance objectives for protecting the public. The time of compliance is 10,000 years. The place of compliance is a well 100 meters downgradient of the facility.

Performance Measure	Performance Objective	Estimated Impact
All-pathways [mrem in a year]	25.0	6.4
All-pathways, including other Hanford Site sources [mrem in a year]	100.0	<19.0
As low as reasonably achievable (ALARA) (all-pathways) [persons-rem/y]	500.0	5.0

C3.3 Protection of Inadvertent Intruders

Table C-3 compares the estimated impacts to the performance objectives for protecting the inadvertent intruder. A one-time dose (an acute exposure) scenario as well as a continuous exposure scenario (a chronic exposure) are defined. Both performance objectives are met.

The acute dose, estimated by assuming that a person drills a well through the disposal facility, is much less than the performance objective. The continuous dose, which includes the ingestion of contaminated food and water, the inhalation of air, and direct radiation exposure, is over a factor of 3 lower than the performance objective. At the time of compliance, 500 years, ^{126}Sn contributes more than 95 percent of the dose.

Table C-3. Comparison of estimated impacts with performance objectives for protecting the inadvertent intruder. The time of compliance is 500 years.

Performance Measure	Performance Objective	Estimated Impact
Acute exposure [mrem]	500.0	5.5
Continuous exposure [mrem in a year]	100.0	27.5

C3.4. Protection of Groundwater Resources

Table C-4 compares the estimated impacts to the performance objectives for protecting the groundwater resources. These performance objectives are based on the federal drinking water standards. The time of compliance is 10,000 years and the point of compliance is at a well 100 meters down gradient of the disposal facility. The estimated impact from beta emitters is a factor of 2 less than the performance objective and the estimated impact from alpha emitters is a factor of 5 less than the performance objective. The concentration of radium is insignificant.

The most important drivers for determining peak groundwater concentrations are the inventory of technetium for beta/photon emitters and uranium for alpha emitters, the release rate from the waste form, the amount of mixing in the aquifer, and the geometry of the disposal facility relative to the direction of groundwater flow.

For the most part, other geotechnical data (water infiltration rate, hydraulic parameters, and geochemical factors) are less important because they mainly affect the time at which the plateau is reached. The two exceptions are as follows. First, if the water infiltration rate is 0.1 mm/year (a factor of 5 lower than assumed), the most mobile radionuclides do not reach the groundwater in significant quantities during the compliance period. Second, if both the infiltration rate is 100 mm/year and no capillary barrier is in place to divert the infiltration, the uranium group arrives in significant amounts at the water table during the compliance period, causing the drinking water and all-pathways performance objectives to be exceeded. Similarly, if the uranium group is unretarded, significant amounts will reach the point of compliance.

The beta/gamma drinking water dose rate is not estimated to exceed 4 mrem in a year for 750,000 years, reaching a maximum value of 14 mrem in a year at the end of the simulation period (65 million years). The concentration of alpha emitters is estimated never to exceed 15.0 pCi/ℓ, reaching a maximum of 8.2 pCi/ℓ at 50,000 years.

Table C-4. Comparison of estimated impacts with performance objectives for protecting groundwater resources. The time of compliance is 10,000 years. The place of compliance is a well 100 meters downgradient of the facility.

Performance Measure	Performance Objective	Estimated Impact
Beta/photon emitters [mrem in a year]	4.0	2.0
Alpha emitters [pCi/ℓ]	15.0	1.7
Radon [pCi/ℓ]	3.0	<0.001

C3.5 Protection of Surface Water Resources

Table C-5 compares the estimated impacts to the performance objectives for protecting the surface water resources. The time of compliance is 10,000 years and the point of compliance is at a well intersecting the groundwater just before the groundwater mixes with the Columbia River. The estimated impacts are over an order of magnitude lower than the performance objectives. The calculations indicate that the impacts never reach the values given as performance objectives. Because of the large flow of the Columbia River, mixing occurs in the river and the predicted impacts actually would be far lower.

Table C-5. Comparison of estimated impacts with performance objectives for protecting surface water resources. The time of compliance is 10,000 years. The point of compliance is a well located just before the groundwater mixes with the Columbia River.

Performance Measure	Performance Objective	Estimated Impact
Beta/photon emitters [mrem in a year]	1.0	0.070
Alpha emitters [pCi/ℓ]	15.0	0.058
Radon [pCi/ℓ]	3.0	<0.001

C3.6 Protection of Air Resources

Table C-6 compares the estimated impacts to the performance objectives for protecting air resources (the values for which are given in federal clean air regulations). The time of compliance is 10,000 years and the point of compliance is just above the disposal facility. The estimated impacts are significantly lower than the values prescribed in the performance objectives.

Table C-6. Comparison of estimated impacts with performance objectives for protecting air resources. The time of compliance is 10,000 years. The place of compliance is just above the disposal facility.

Performance Measure	Performance Objective	Estimated Impact
Radon [pCi m^{-2} s^{-1}]	20.0	<0.001
Other radionuclides [mrem in a year]	10.0	$<10^{-8}$

C4.0 SETTING REQUIREMENTS

Based on the computer simulations, relatively simple requirements on disposal facility design and operation and on waste form characteristics can be set. The requirements are more complex than those normally set, but they are similar.

C4.1 Intruder Protection

For the protection of the homesteader, the following equations were used to establish waste concentration and stacking height limits for the disposal facilities:

$$\Sigma\Sigma\ [I_{ij} / V_j]\ d_i^h\ k_i^h\ H_j < D^h \tag{C.1}$$

or

$$\Sigma\Sigma\,[I_{ij} / V_j]\, H_j / Y_i < 1.0 \quad (C.2)$$

where the first sum is over contaminants i, the second sum is over containers j in a vertical column emplaced within the disposal facility, and where

I_{ij} = the inventory of contaminant i in container j (Ci)
V_j = the volume of container j (m^3)
d_i^h = the dosimetry factor relating response to concentration of contaminant i in the homesteader scenario [(mrem/yr)/(Ci/m^3)]
k_i^h = the factor that accounts for the fraction of waste exhumed during drilling, the mixing of the waste in the soil, then transport to point of exposure (1/m)

H_j = the height of container j (m)
D^h = the maximum dose allowable in the homesteader scenario (100 mrem in a year)
Y_i = $[D^h / (d_i^h\, k_i^h)]$ (Ci/m^2).

The parameters d_i^h and D^h can be specified and the parameters k_i^h can be calculated from data presented in this performance assessment. The TWRS Immobilized Waste Program will place restrictions on the concentration of contaminants (I_{ij} / V_j). Although the height of an individual container is known, the number of containers in a stack has not been determined. Therefore, the program also will restrict the total amount of key radionuclides in a vertical column.

The TWRS Immobilized Waste Program also has decided to place additional restrictions on waste concentrations. To satisfy the NRC[3] in their determination that the immobilized low-activity waste is not high-level waste, the concentration of all radionuclides will be below the Class C limits set in Title 10 Code of Federal Regulations (CFR) Part 61[4].

The DOE has mandated[12] concentration limits for ^{90}Sr, ^{99}Tc, and ^{137}Cs for the first phase of waste form production. All waste slated to be placed in the existing disposal vaults will be produced under this contract. Therefore, these contract requirements also will be imposed on the waste to be placed in the existing disposal vaults. Although most of the waste in the first set of units in the new disposal facilities also is expected to be produced under this contract, overall, most of the waste that will be contained in the new disposal facilities will be produced under a different contract. Therefore, to provide maximum flexibility in future decisions, these contract limitations are not placed on this analysis of waste disposed in the new disposal facilities.

The waste to be disposed of must meet both the NRC Class C limits and the requirements set by this analysis. For the nominal stacking heights of six containers (about 7.2 meters), the NRC Class C limits will be more restrictive for most of the isotopes. This is because the glass waste form makes the radioisotopes very difficult to ingest or inhale even after they are brought to the surface. A few isotopes (mainly actinides) may be more restricted by this analysis than by the NRC restriction.

- ^{137}Cs, if the stack of containers is higher than 15 meters (unlikely)
- ^{226}Ra, if the stack of containers is higher than 1 meter (very likely)
- ^{229}Th, if the stack of containers is higher than 5 meters (likely)
- ^{232}Th, if the stack of containers is higher than 0.6 meter (very likely)

- ^{231}Pa, if the stack of containers is higher than 3 meters (very likely)
- ^{235}U, if the stack is higher than 9.9 meters (possible)
- ^{237}Np, if the stack is higher than 7.2 meters (likely)
- ^{243}Am, if the stack is higher than 10.9 meters (unlikely).

Note that the radioisotope of greatest concern for intruder protection (^{126}Sn) is not addressed by the NRC regulation.

C4.2 Groundwater Protection

The computer analysis shows that for groundwater protection the main factors in meeting the requirement are the contaminant flux leaving the disposal facility and the amount of groundwater into which the flux eventually flows. Unlike most environmental analyses where the rate of release is a relatively minor concern, in this analysis it is a driving concern. The groundwater scenario places the restriction that

$$\Sigma\, I_i\, R_i\, d_i^{gw}\, k_i^{gw} / L < D^{gw} \qquad (C.3)$$

or

$$\Sigma\, (I_i\, R_i /L\,) / X_i \; < 1.0 \qquad (C.4)$$

where the sum is over all contaminations i and where

I_i = the inventory of contaminant i (Ci)
R_i = the fractional release rate of contaminant i from the waste form (1/yr)
d_i^{gw} = the dosimetry factor relating response to concentration of contaminant i in the groundwater scenario [(mrem/yr)/(Ci/m^3)]
k_i^{gw} = the factor that accounts for vadose zone and aquifer transport for contaminant i (m^2/yr)
L = the effective length of the disposal facility perpendicular to groundwater flow (m). L is obtained by dividing the volume of the waste by the product of the waste column height and of the disposal facility extent parallel to the path of groundwater flow. When the groundwater flow is parallel to an edge of the facility (which it is in this instance), then L is the length of the disposal facility perpendicular to groundwater flow
D^{gw} = the maximum dose allowable in the groundwater scenario (mrem/yr)
X_i = $[D^{gw} / (d_i^{gw}\, k_i^{gw})]$ [Ci / (yr m)]

The parameter I_i accounts for radioactive decay. The parameters d_i^{gw} and D^{gw} can be specified and the parameters k_i^{gw} can be calculated from data presented in this performance assessment. The drinking water scenario and the all-pathways scenario are considered in establishing the requirements. Also, the plume overlap caused by the upgradient facility is taken into account. The TWRS Immobilized Waste Program will place restrictions on the inventory (I_i) and the release rate (R_i). The effective disposal facility length (L) is a special case. For the existing disposal vaults, L can be calculated. Because the new disposal facilities have not been designed, the program will use the results of this analysis for the design of new facilities.

The isotopes facing the greatest restrictions relative to the expected performance are ^{99}Tc and ^{79}Se. This is not surprising because these are the most mobile, because most of the uranium and transuranic elements have been separated from the low-activity waste form, and because other fission products (e.g. ^{14}C and ^{129}I) found to be important in other wastes are volatile and are not captured in this waste form. The values for required long-term release limits found here are larger than the values for short-term release limits found in the privatization request for proposal.[12]

C4.3 Requirements on the Disposal Facility

The major requirements on the disposal facility deal with subsidence, recharge rate, layout, interactions with the waste form, and intruder protection.

The performance assessment assumes that subsidence is small based on the slow degradation of the waste form and the lack of voids in the disposal facility. Thus, the facility must be constructed without significant void space. In addition, after waste is placed inside the facility, the spaces between the waste containers must be filled with a dry material that limits subsidence.

Because the waste form releases contaminants so slowly (on the order of 1 part per million per year), the time dependence of the exposures show more of a plateau structure than a peaked shaped. Therefore, the major effect of the recharge rate is to delay the arrival of contaminants to the groundwater. If the slightly retarded contaminants (for example, uranium) were to arrive before 10,000 years, the all-pathways dose performance objective would be violated and restrictions would have to be placed on the recharge rate. Based on the sensitivity analyses, the recharge rate must be limited to about 3.0 mm/year (i.e., the natural rate) if no hydraulic diverter is included in the design. If a hydraulic diverter is included, a recharge rate of 100 mm/year would not violate performance objectives. Gravel-rich and vegetation-free surfaces such as those used in the Hanford Site tank farms would not be suitable. The surface barrier also must deter the inadvertent intruder.

The requirement for groundwater protection [Σ (I_i R_i /L) / X_i < 1] is actually on the disposal system. The designers of the disposal structures must ensure that materials are not used that would accelerate waste form degradation and that the vault layout in relationship to groundwater flow has a sufficient effective length (L). Alternatively, the designers can add components such as hydraulic diverters and getters to minimize the requirements on the waste form.

Designers of the engineered system also may decide to add components to provide greater defense-in-depth. The major components would be a surface barrier to reduce recharge, a hydraulic barrier to divert moisture away from the waste, concrete pads to trap uranium, and other getter materials to trap important radionuclides such as technetium. The recharge rate is the main driving function for the system. With a surface barrier that could reduce this rate, the contaminants would take even longer to reach the groundwater. Diverting water away from the waste by including a sand-gravel capillary barrier would likely reduce the contaminant release rate from the waste form and also would create a greater moisture shadow under the disposal system, which would delay contaminant travel. Concrete is known to highly retard uranium isotopes and so would reduce its impact during the time of compliance. If an inexpensive getter could be found for technetium, the material also could have important impacts.

C5.0 COMPLIANCE

Not only must the performance assessment establish the basis for controls to provide a reasonable expectation that the environment and the public health and safety will be protected, but the document also must show that these restrictions can be expected to be met. The major restrictions deal with inventory concentrations, long-term waste form release rates, and disposal facility design.

If the waste packages have the maximum concentrations estimated from the best basis tank by tank inventories[14] and anticipated separation efficiencies[15], then almost all the radionuclides will meet the requirements imposed by equations C.1 through C.4. However, the producers of the immobilized waste packages are required to meet NRC Class C limits[4], which for the remaining radionuclides are more restrictive than the limits found here. Thus, the immobilized waste accepted by DOE will meet the requirements set here.

The only other radionuclide of concern in meeting the acceptance requirements based on inadvertent intruder protection is ^{126}Sn. This radionuclide does not have a Class C limit, so its waste acceptance limit is based on this performance assessment. If the ILAW containers having only wastes from the three tanks believed to have large ^{126}Sn concentrations (tanks A-105, A-106, or AX-104) were stacked on top of each other, then the intruder dose would exceed the 100 mrem in a year limit. However, a number of alternatives exist. This performance assessment conservatively assumes that all of the tin would go to the ILAW product. However, a significant fraction may be diverted to the high-level waste stream during separations and treatment. The three tanks of concern have small volumes of waste (19,000 gallons, 125,000 gallons, and 7,000 gallons, respectively). During retrieval the tank contents are likely to be blended with the contents of other tanks that have significantly lower ^{126}Sn concentrations. In addition, the operators of the disposal facility have the option of placing containers with low concentrations of ^{126}Sn on top of a container with a high concentration which would make the stack compliant with the disposal requirements. Finally, because these tanks are likely to be processed during the second phase of immobilization, the DOE could, by contract, have the ILAW producers separate the ^{126}Sn from the low-activity waste and ensure that the ^{126}Sn is below the acceptance limits.

When the restrictions arising from the protection of groundwater are considered, the analyses suggest that compliance will be achievable. Even if the entire ILAW inventory were placed in each set of disposal facilities, for each radionuclide, the (I_i R_i / L) product is less than the

14 "Contract Number DE-AC06-96RL13200; Completion of Milestone T24-97-158, Contractor Letter to Department of Energy, Richland Operations Office, Reporting Completion of Standard Inventory Estimates for all Tanks" letter FDH-9757750 from D.J. Washenfelder to J.K. McClusky, dated August 29, 1997.

15 L.W. Shelton, *DSI to F. Schmittroth and A.L. Boldt*, Westinghouse Hanford Company, Richland, Washington, May 22, 1995.

requirement. The sum for the new disposal facility is 0.34 of the limit. Using the fact that the amount of Tc to be placed in the existing disposal vaults is limited (by concentrations specified in the RFP and by the volume of the vaults), the sum for the existing disposal vaults is 0.54 of the limit.

Given these conservative assumptions, expecting groundwater to be protected is reasonable. In particular, the analysis is based on the conservative assumption of a constant release rate from the disposal facility whose value is the maximum observed in detailed waste form calculations. However, these calculated maximum rates do not occur until 8,000 to 16,000 years after closure. Therefore, since it takes many thousands of years for the contaminants to go from the disposal facility to the groundwater, the contamination level in the groundwater will be lower than presented here.

The information in this performance assessment also can be used to back out the maximum allowable contaminant release rate from each facility. For the new disposal facility, the maximum allowable release rate is 2.4 ppm/year assuming that all the inventory of ^{99}Tc is placed in that facility. For the existing disposal vaults, the maximum allowable contaminant release rate is higher, being 3.8 ppm/year assuming that the maximum amount of ^{99}Tc is placed in this facility.

The restrictions on the disposal facility design are relatively few and can be easily met. The major facility requirements deal with subsidence, recharge rate, layouts, interactions with the waste form, and intruder protection. Whether a sand-gravel hydraulic moisture diverter actually is used will depend on engineering and cost tradeoffs.

C6.0 CONCLUSIONS

Because this project is in its early stages, conservative assumptions have been used. Given such assumptions, it is gratifying that all the estimated impacts meet the performance objectives. Restrictions placed on the waste product and the disposal facility design will not require heroic efforts to produce a compliant waste form or design a compliant facility.

The numerous sensitivity cases that were run show that the results presented in this assessment are quite robust. The computer simulations of long-term dissolution rates for low-level glass (LD6-5412) show that the rate of 4.4 parts per million per year can be met. The calculations are most sensitive to the total inventory of technetium and to the peak concentration of ^{126}Sn. For the base analysis case no credit is taken for enhanced chemical separation or separation occurring during immobilization. Computer simulations of flow and transport under a wide variety of conditions show that slightly increased impacts may occur, but that most expected changes would result in larger decreases in estimated impacts.

Future performance assessments, which are required by DOE policy and draft DOE Order 435.1, will benefit from increased knowledge of the waste inventory, the waste form, and the disposal facility design as well as from an extensive data collection activity for the generation of site-specific estimates for geochemical data, hydraulic parameters, and water infiltration and waste form release rates. These performance assessments are expected to confirm this analysis that the on-site disposal of the low-activity waste from Hanford Site tanks can meet the performance objectives with a high degree of assurance.

This page intentionally left blank.

APPENDIX D

KEY DELIVERABLES AND PERFORMANCE MEASUREMENTS

This page intentionally left blank.

APPENDIX D

KEY DELIVERABLES AND PERFORMANCE MEASUREMENTS

Table D-1 summarizes the key milestones (Level 5 or above) for the immobilized low-activity waste (ILAW) Disposal Project and indicates due dates and Work Breakdown Structure (WBS) element associations. A brief description of milestone activity and completion criteria is also given.

Table D-1. ILAW Disposal Project Deliverables and Performance Measures. (4 Sheets)

Milestone Title	Due Date	Activity Description
Issue DRD for ILAW Interim Storage Facility	31Jan97 Complete	Prepare, review, incorporate comments, and transmit PHMC-approved DRD for ILAW interim storage facilities to RL for approval.
Issue SOW - for ILAW ISF Conceptual Design	31Jan97 Complete	Prepare the SOW for ILAW storage conceptual design. Obtain contractor approval and transmit to RL for review and approval.
Submit final PBS to RL	30May97 Complete	PBS for this subproject will be prepared in final form for submittal to RL and forwarded as the subproject budget request to Congress. The submittal will incorporate RL comments and those from stakeholders and DOE-HQ.
Issue draft AGA-ILAW Add'l S&D Fac for review	30May97 Complete	Develop and issue a draft engineering study that evaluates options for safe disposal of packaged ILAW. Draft report to be issued to RL for information.
Issue SOW - FY 1998 to FY 2003	13Jun97 Complete	Revise SOW for Hanford Low-Level Tank Waste PA Project to reflect current direction. This report will be an update of the FY 1995 document. Project office acceptance will reflect RL and PHMC guidance.
Submit Final MYWP to RL for Approval	26Sep97 Complete	Prepare MYWP baseline documentation including resource loaded schedules, WBS dictionary sheets, Activity Planning Forms, Estimating Worksheets and Milestone Description Sheets. Completion dependent of resolution of RL and stakeholder comments and resubmittal as part of TWRS MYWP.
Reissue Hanford Low-Level Tank Waste Interim PA	30Sep97 Complete	Reissue the "Hanford Low-Level Waste Interim Performance Assessment" after incorporation of comments of external review board and other Hanford reviewers. Project office accepts report as addressing all comments received.
Issue 90% Conceptual Design for Review - ILAW ISF	30Sep97 Complete	Submittal of conceptual design and cost estimate for ILAW storage by A-E to contractor for formal 90% design review. Complete submittal includes conceptual design, cost estimate, and narrative.
(M-90-01) Submit Project Management Plans to Ecology	31Dec97 complete	Submit ILAW additional storage/disposal facility and interim storage IHLW Project Management Plans to Ecology pursuant to Tri-Party Agreement section 11.5. Completion includes PMP approval by PHMC and RL and submittal to Ecology.
Issue 1998 PA	31Mar98 complete	Issue PA for both grout vaults (W-465) and ILAW disposal complex (W-520) disposal systems for review.

Table D-1. ILAW Disposal Project Deliverables and Performance Measures. (4 Sheets)

Milestone Title	Due Date	Activity Description
Submit final PBS to RL	31Aug98 complete	Submit final subproject PBS to RL for forwarding as subproject budget request to congress. Describe subproject scope, budget scenarios, impacts of less-than-planned amounts. Incorporate comments from RL, stakeholders, and DOE-HQ.
Issue SOW - FY 1999 to FY 2004	15Jun98 complete	Revise the "Statement of Work for FY 1999 to 2004" for the Hanford LLW PA Project to reflect current direction. The report will be an update of the FY 1997 document.
(M-90-02T) Compl Conceptual Design - ILAW ISF	30Jun98 complete	A CDR prepared for ILAW ISF project scope and cost estimate. A-E Services in place by April 1997 to complete CDR needed for project validation in March 1998. CDR will be submitted by A-E, approved by PHMC and A-E, issued to RL.
Submit Final MYWP to RL for approval	24Sep98 complete	Prepare MYWP baseline documentation. Include resource loaded schedules, WBS dictionary sheets, APF's, Estimating Worksheets, and Milestone Description Sheets. Completion includes RL and stakeholder comment resolution and resubmittal as part of TWRS MYWP.
Submit final PBS to RL	31Aug99	Prepare ADS for Storage and Disposal and Subprojects in final form for submittal to RL for forwarding as subproject budget request to Congress. Describe scope of subprojects, budget scenarios, impact of less than planning amount. Incorporate RL, stakeholder, and DOE-HQ comments.
Issue SOW - FY 2000 to FY 2005	15Jun99 complete	Revise "Statement of Work for FY 2000 - 2005" for the Hanford LLW PA Project to reflect current directions. This is an update of the document published in FY 1998.
Submit final MYWP to RL for approval	24Sep99	Prepare MYWP baseline including resource loaded schedules and supporting documentation (Dictionary Sheets, APF, MDS, etc.) and submit to RL for approval. Resolve comments from RL and stakeholders; resubmit to RL for approval.
Key Decision ½ Initiate Design - ILAW ISF	04Jan00	A CDR will be prepared by an A-E firm meeting requirements of RLIP 4700.1A "Project Management System". The CDR will be approved by the PHMC and RL and provide a basis for RL decision to start preliminary and detailed design. Acceptance criteria includes PHMC revised baseline and request for directive authorization to spend capital funds.
ISS Data Pkgs - for 2001 PA	31Jan00	A document with all data to be used in the PA analysis of the long-term environmental and safety impacts on disposal of ILAW in the existing disposal facility (Grout Vaults) and ILAW Disposal Complex will be prepared. This will supersede existing data packages (WHC-SD-WM-RPT-166, Rev 0).
(M-90-07T) Compl Conceptual Design - ILAW Add'l S&D Fac	30Jun00	A CDR will be prepared to develop the ILAW additional storage/disposal facility project scope, schedule, and budget cost estimate. A-E services ready to work by June 1997 to complete CDR needed for project validation and PA support. Submitted CDR requires approval by PHMC/A-E and issued to RL.

Table D-1. ILAW Disposal Project Deliverables and Performance Measures. (4 Sheets)

Milestone Title	Due Date	Activity Description
CD ½-Initiate Prelim Design - ILAW Add'l S&D Fac	02Oct00	A CDR will be prepared by an A-E firm that meets requirements of RLIP 4700.1A, *Project Management System*. The CDR requires approval by PHMC and RL and provides a basis for RL decision to commence preliminary and detail design. A PHMC revised baseline and request for authorization to spend capital funds will be submitted to RL.
(M-90-04T) Compl Detailed Design - ILAW ISF	30Mar01	A-E completes detail design (Title II) of the LAW Interim Storage Facility. Detailed design approved by PHMC through a series of design review meetings.
Issue final PA for existing TWRS Disposal Vaults and ILAW Disposal Complex	30Mar01	Issue final PA for existing TWRS disposal vaults and ILAW disposal complex describing long-term environmental and health impacts of disposal of ILAW TWRS disposal complex. Project office accepts report as suitable for transmittal to DOE-HQ for PRP review, and approval by DOE-HQ.
(M-90-03) KD 3 - Initiate Construction - ILAW ISF	29Jun01	Activities include completion of: definitive design, preliminary SAR, environmental documentation, and project management documentation per DOE Order 4700.1. Acceptance includes dated project plan for DOE Acquisition Executive approval of key decision 3. Initiate construction is defined as award of contract.
(M-90-06) Initiate hot ops - ILAW ISF Phase I	31Dec02	Complete all construction, startup, permitting, and preoperational activities necessary to begin radioactive operations for the first portion of the ILAW interim storage facility. DOE approval of ORE and authorization to operating contractor to receive radioactive materials at facility.
(M-90-09T) Compl Detailed Design – ILAW Add'l S&D	31Mar03	A-E completes detailed design (Title II) of the LLW Disposal Facility. Detailed design approval by PHMC through a series of design review meetings throughout the design phase.
(M-90-08) KD 3 - Init Construction ILAW Add'l S&D	30Jun03	Activities include completion of definitive design, preliminary SAR, environmental documentation, and project management documentation per DOE Order 4700.1. Prepare dated project plan for DOE Acquisition Executive approval of key decision 3. Initiate construction defined as award of contract for modification or installation of structural components.
(M-90-10) Init hot ops - ILAW Disposal - Module 1	30Dec05	Complete all construction, startup, permitting, preop activities necessary to begin radioactive operations of the first module of the ILAW Disposal Facility. DOE approval of ORR and authorization to operating contractor to begin receiving radioactive materials.
Complete hot ops - ILAW S&D Phase I facilities	30Dec11	Perform activities to operate ILAW ISF systems during ILAW production;. system operations, maintenance, production and maintenance planning, materials and parts procurement, training, safety and QA, engineering support, scheduling, budgeting. Receipt and storage of ILAW from production facilities in accordance with DOE contractual obligations.

Table D-1. ILAW Disposal Project Deliverables and Performance Measures. (4 Sheets)

Milestone Title	Due Date	Activity Description
Init hot ops - ILAW S&D Phase II facilities	03Jan12	Complete activities needed to begin hot operations of ILAW Disposal Facility; procedure prep., training prep., personnel qualifications, ops and maintenance planning, materials and parts, and ORA complete preop testing of system. Approval of pre-op test results by ILAW disposal facility operations mgr., approval of ORA by RL.
Comp Deactivation - ILAW S&D Phase I facilities	31Dec12	Perform activities needed to deactivate facility. Remove process and hazardous materials, housekeeping, establish minimum system condition. Comply with approved deactivation plan.
Comp hot ops - ILAW S&D Phase II facilities	31Jul25	Perform activities needed to operate ILAW Disposal Facilities during ILAW production; system operations, maintenance, materials and spare parts procurement, training, safety and QA support, engineering support, scheduling and budgeting. Receive/dispose ILAW from production facility in accordance with DOE contractual obligations.
Comp long-term monitoring - ILAW S&D facilities	01Feb35	Perform activities needed for long-term monitoring of the ILAW disposal facility; monitor system operations, preventive/corrective maintenance, documentation. Comply with long-term monitoring plan.

A-E = architect-engineer
ADS = activity data sheet
AGA = American Gas Association
APF = assigned protection factor
CDR = critical design review
DOE = U.S. Department of Energy
DOE-HQ = U.S. Department of Energy, Headquarters
DRD = design requirements document
Ecology = Washington State Department of Ecology
FY = fiscal year
IHLW = immobilized high-level wate
ILAW = immobilized low-activity waste
ISF = intermediate-scale facility
ISS = interim-status standards
KD = key decision
LAW = low-activity waste
LLW = low-level waste
MDS = material data sheet
MYPP = multi-year program plan
MYWP = multi-year work plan
ORA = operational readiness assessment
ORE = operational readiness evaluation
ORR = operational readiness review
PA = performance assessment
PBS = Project Baseline Summary
PHMC = Project Hanford Management Contract
PMP = program management plan
PRP = potentially responsible party
QA = quality assurance
RL = Richland Operations Office
RLIP = RL Implementing Procedure
S&D = storage and disposal
SAR = safety analysis report
SOW = statement of work
TWRS = Tank Waste Retrieval System
WBS = work breakdown structure

APPENDIX E

DIVISION OF RESPONSIBILITY MATRIX—IMMOBILIZED LOW-ACTIVITY WASTE STORAGE/DISPOSAL SUBPROJECT

This page intentionally left blank.

APPENDIX E

DIVISION OF RESPONSIBILITY MATRIX— IMMOBILIZED LOW-ACTIVITY WASTE STORAGE/DISPOSAL SUBPROJECT

Table E-1. Division of Responsibility Matrix - ILAW Storage/Disposal Subproject. (2 Sheets)

Organization Activity	ILAW Storage/ Disposal Project Office (DOE WDD)	PHMC ILAW Storage/Disposal Project	Phase I ILAW Storage/Disposal Subproject (PHMC/ subcontractors)	Design Agent
Preconceptual Phase Activities				
Program functions and requirements (DOE approval)	A	PI/C	R	R
Design authority during Subproject definition		P		
Engineering trade studies (Subproject definition)	I	A	R	P
Integrated flowsheet	I	P/A	R	
Subproject design requirements document (DOE approval)	A	P/C	C	R
Justification of mission need	A	P/A	PI	
Multi-year program plan	A	P/A	PI	
Conceptual Phase Activities				
Subproject-specific budget documentation	I	I	P/A	PI
Status reporting	I		P(1)	PI
Define program and Subproject changes	A	P/A	PI/C(4), A(1)	PI
Subproject budget validation	A	R	P	PI
Subproject Level 1 schedule	R	R	P/A	PI
Design authority during Subproject (after CD 1)		PI	P	PI
Design statement of work and letter of instruction	I	PI/R	P/A	R
Design agent during Subproject				P
Conceptual design	A	R	PI	P
Performance Assessment	A	P	P	
Subproject-specific technology development needs and dates	C	P/A	PI/A(1)	PI
Subproject-specific engineering development needs and dates	I	PI	P/A(1)	PI

Table E-1. Division of Responsibility Matrix - ILAW Storage/Disposal Subproject. (2 Sheets)

Organization Activity	ILAW Storage/ Disposal Project Office (DOE WDD)	PHMC ILAW Storage/Disposal Project	Phase I ILAW Storage/Disposal Subproject (PHMC/ subcontractors)	Design Agent
Subproject supplemental design requirements, design specification	I	PI/R	P/A	PI
Total project cost estimate details	I		P/A	PI
Project management plan (PHMC)	A	R	P/A	PI
Execution Phase Activities				
Definitive design	R		A	P
Design reviews (design agent)	R	(6)(2)	A	P
Construction (contracted constructor)			P/A	PI
Operating and maintenance procedures	R	PI	PI, P/A(3)	PI
Technical safety requirements	R	PI/R	P	
Acceptance Phase Activities				
System startup testing (cold)	R	PI	P/A(5) (3)	
Operational testing	R	PI	P/A(5) (3)	PI
Readiness review for hot operations	P/A	PI	PI	PI

Key:
- A - Responsibility and authority to commit contractor (or the government for DOE "A")
- C - Concur with adequacy; documents cannot be issued or actions taken without concurrence (formal resolution of comments required)
- R - Review to assure vested interest is addressed (formal resolution of comments is **not** required)
- P - Responsibility to prepare product or perform action
- PI - Provide specific (or specialized) support to preparer (may include majority of preparation activities)
- I - Receive for information or implementation

Notes:
(1) For Subproject-specific activities only.
(2) Perform reviews of selected design items in Title II; drawing-by-drawing reviews are **not** intended.
(3) Could be scope of turnkey contractor, if contracted in that manner.
(4) For assigned responsibilities/milestones.
(5) Startup testing will be performed using personnel who are assumed to transition to plant operations.
(6) Process engineers and operations personnel are assumed to be members of the project team. Specific responsibilities will be detailed in project documents.

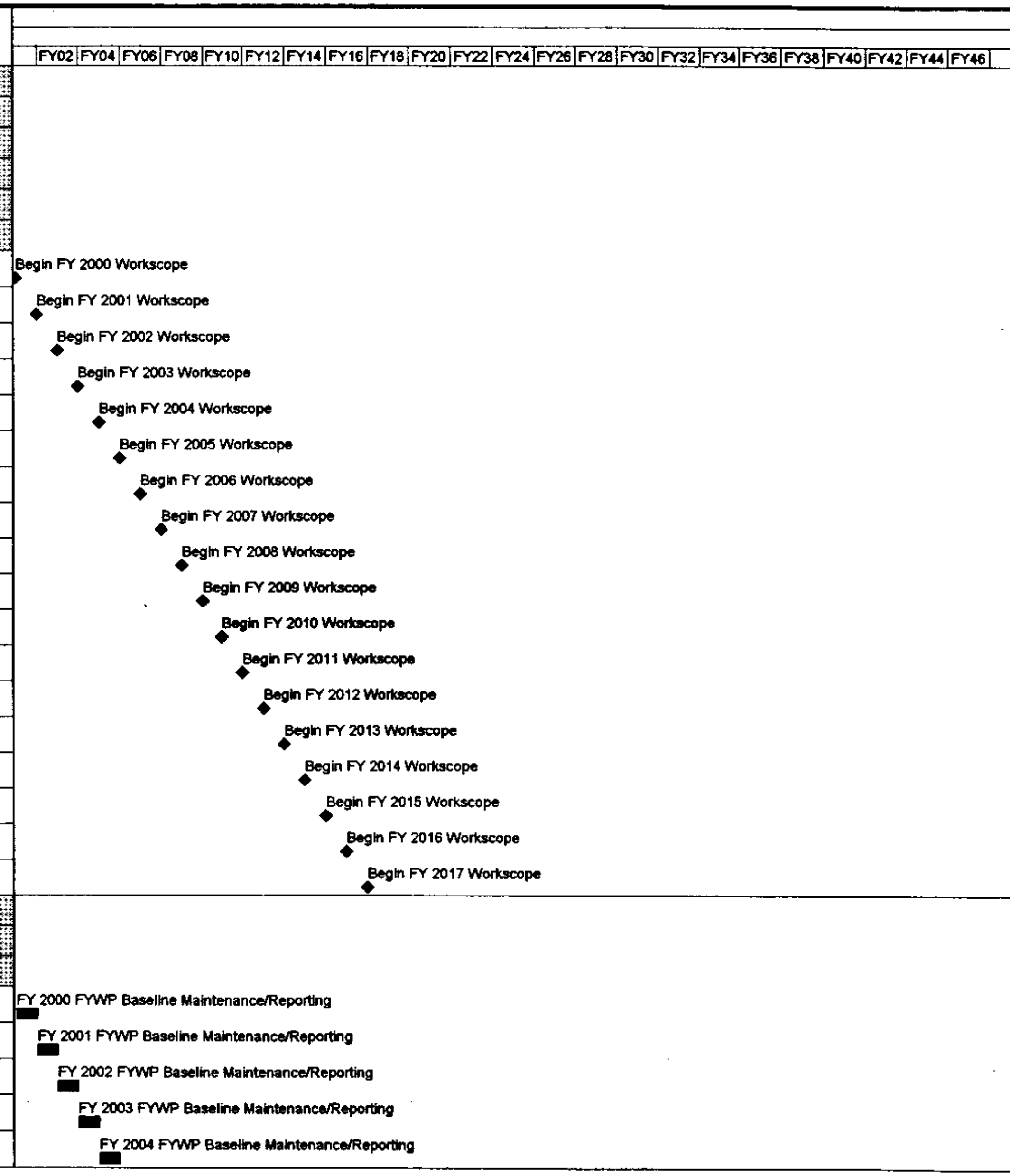
CD = critical decision
DOE = U.S. Department of Energy
LAW = low-activity waste
ILAW = immobilized low-activity waste
PHMC = Project Hanford Management Contractor
WDD = Waste Disposal Division

APPENDIX F

IMMOBILIZED LOW-ACTIVITY WASTE SUBPROJECT SCHEDULE

This page intentionally left blank.

Activity ID	Activity Description	Early Start	Early Finish
1 Hanford Site			
1.01 Tank Waste Remediation System			
1.01.09 Immobilized Waste (TW09)			
1.01.09.01 Immobilized LAW Disposal Facility			
1.01.09.01.01 Dispose Immobilized LAW On-Site			
1.01.09.01.01.01 ILAW Project Management			
T946005Z1	Begin FY 2000 Workscope	01OCT99	
T946005Z2	Begin FY 2001 Workscope	02OCT00	
T946005Z3	Begin FY 2002 Workscope	01OCT01	
T946005Z4	Begin FY 2003 Workscope	01OCT02	
T946005Z5	Begin FY 2004 Workscope	01OCT03	
T946005Z6	Begin FY 2005 Workscope	01OCT04	
T946005Z7	Begin FY 2006 Workscope	03OCT05	
T946005Z8	Begin FY 2007 Workscope	02OCT06	
T946005Z9	Begin FY 2008 Workscope	01OCT07	
T946005ZA	Begin FY 2009 Workscope	01OCT08	
T946005ZB	Begin FY 2010 Workscope	01OCT09	
T946005ZC	Begin FY 2011 Workscope	01OCT10	
T946005ZD	Begin FY 2012 Workscope	03OCT11	
T946005ZE	Begin FY 2013 Workscope	01OCT12	
T946005ZF	Begin FY 2014 Workscope	01OCT13	
T946005ZG	Begin FY 2015 Workscope	01OCT14	
T946005ZH	Begin FY 2016 Workscope	01OCT15	
T946005ZI	Begin FY 2017 Workscope	03OCT16	
1.01.09.01.01.01.01 ILAW Project Management (460.005)			
1.01.09.01.01.01.01.01 ILAW Baseline Maintenance/Reporting			
1.01.09.01.01.01.01.01.01 FY 1999 FYWP Baseline Maintenance/Reporting			
T946005A2	FY 2000 FYWP Baseline Maintenance/Reporting	01OCT99	29SEP00
T946005A3	FY 2001 FYWP Baseline Maintenance/Reporting	02OCT00	28SEP01
T946005A4	FY 2002 FYWP Baseline Maintenance/Reporting	01OCT01	30SEP02
T946005A5	FY 2003 FYWP Baseline Maintenance/Reporting	01OCT02	30SEP03
T946005A6	FY 2004 FYWP Baseline Maintenance/Reporting	01OCT03	30SEP04



Project Start	01OCT98		Early Bar
Project Finish	30SEP48		Progress Bar
Data Date	01OCT98		Critical Activity
Run Date	31AUG99		

© Primavera Systems, Inc.

T908

Sheet 1 of 24

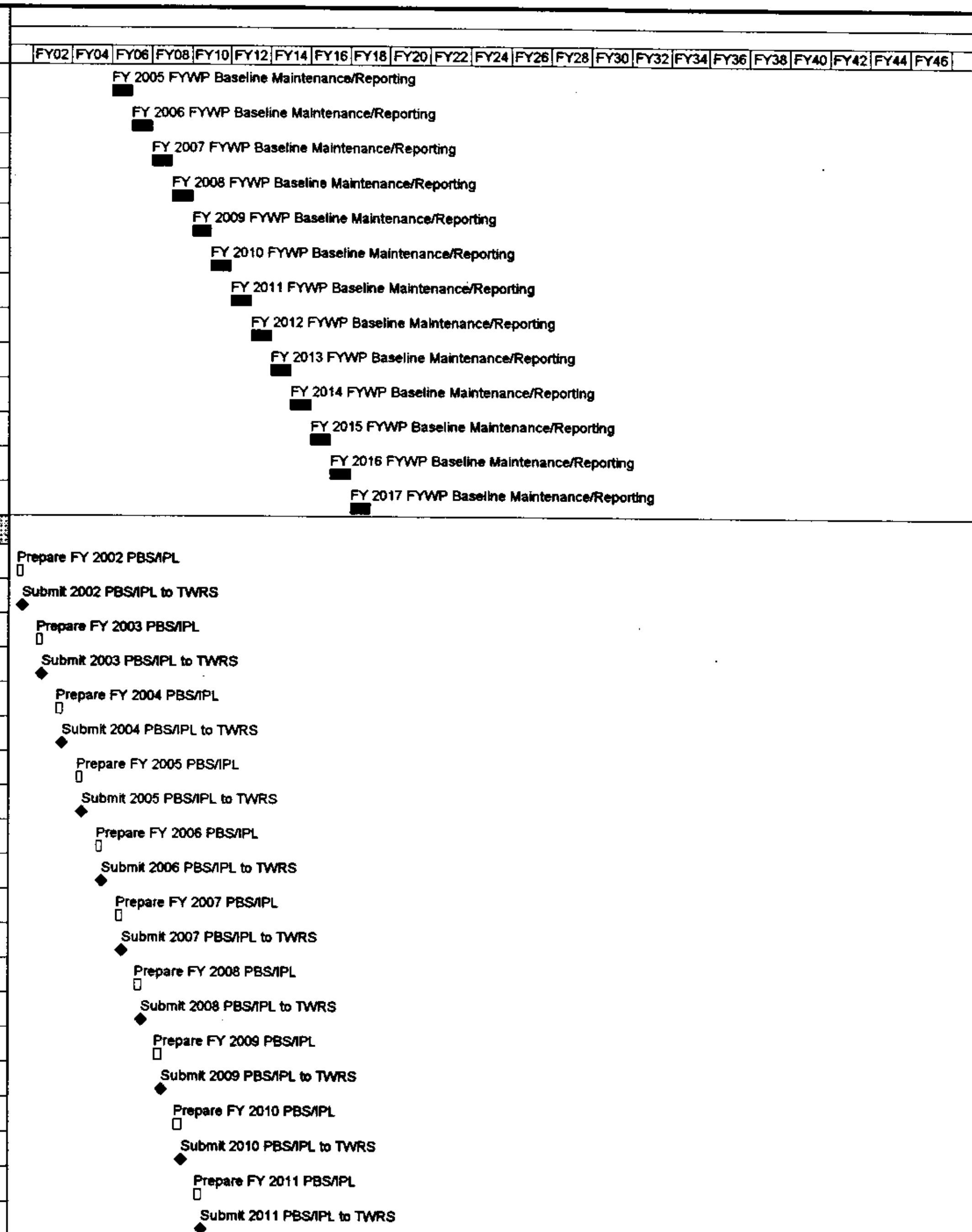
Immobilized Waste - MYWP

IHLW 90% Case - T908

July 14, 1999

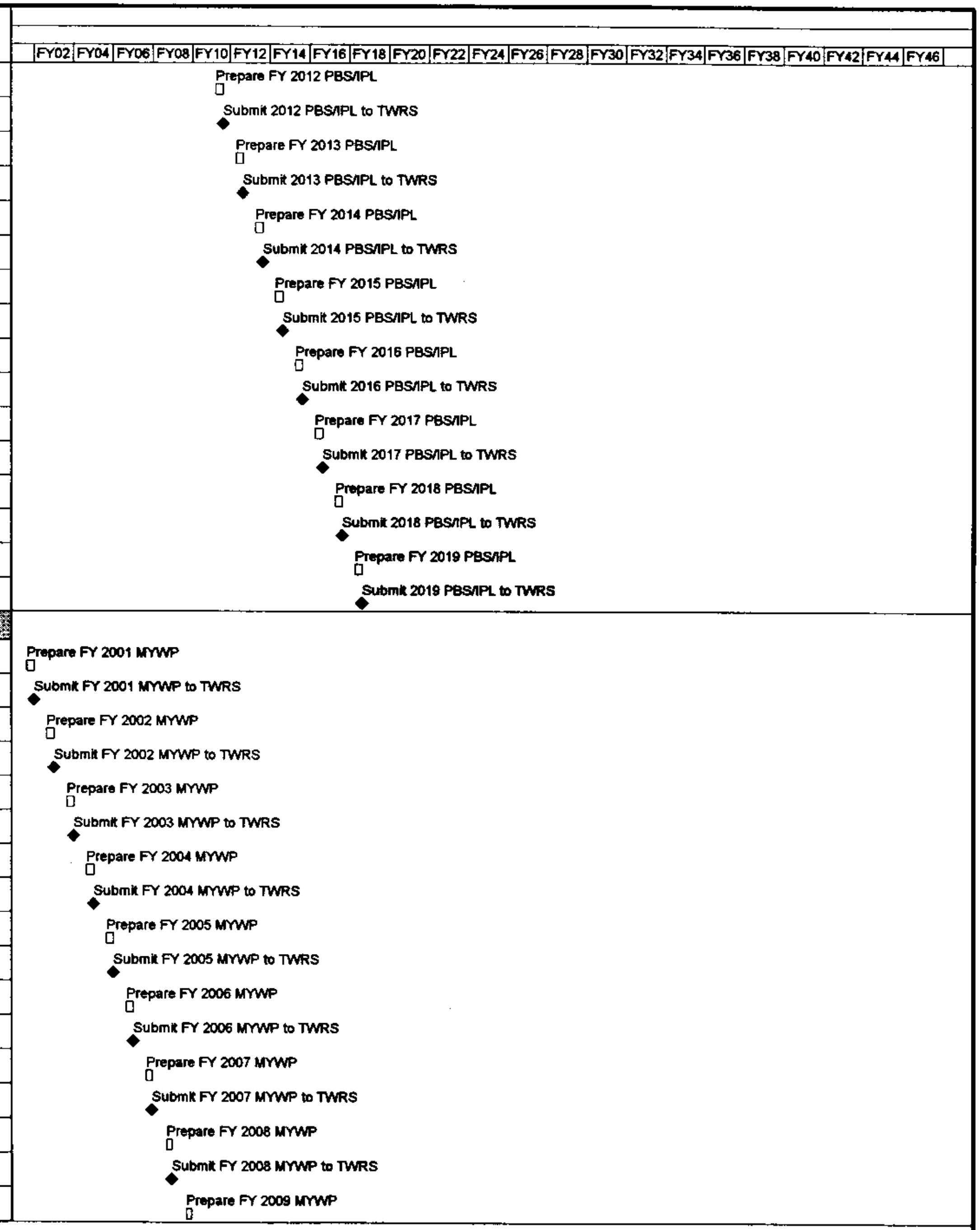
Date	Revision	Checked	Approved

Activity ID	Activity Description	Early Start	Early Finish
T946005A7	FY 2005 FYWP Baseline Maintenance/Reporting	01OCT04	30SEP05
T946005A8	FY 2006 FYWP Baseline Maintenance/Reporting	03OCT05	29SEP06
T946005A9	FY 2007 FYWP Baseline Maintenance/Reporting	02OCT06	28SEP07
T946005AA	FY 2008 FYWP Baseline Maintenance/Reporting	01OCT07	30SEP08
T946005AB	FY 2009 FYWP Baseline Maintenance/Reporting	01OCT08	30SEP09
T946005AC	FY 2010 FYWP Baseline Maintenance/Reporting	01OCT09	30SEP10
T946005AD	FY 2011 FYWP Baseline Maintenance/Reporting	01OCT10	30SEP11
T946005AE	FY 2012 FYWP Baseline Maintenance/Reporting	03OCT11	28SEP12
T946005AF	FY 2013 FYWP Baseline Maintenance/Reporting	01OCT12	30SEP13
T946005AG	FY 2014 FYWP Baseline Maintenance/Reporting	01OCT13	30SEP14
T946005AH	FY 2015 FYWP Baseline Maintenance/Reporting	01OCT14	30SEP15
T946005AI	FY 2016 FYWP Baseline Maintenance/Reporting	01OCT15	30SEP16
T946005AJ	FY 2017 FYWP Baseline Maintenance/Reporting	03OCT16	29SEP17
1.01.09.01.01.01.01.01.02 FY 2001 PBS/IPL			
T946005B2	Prepare FY 2002 PBS/IPL	04JAN00	28APR00
T946005B2A	Submit 2002 PBS/IPL to TWRS		28APR00
T946005B3	Prepare FY 2003 PBS/IPL	02JAN01	30APR01
T946005B3A	Submit 2003 PBS/IPL to TWRS		30APR01
T946005B4	Prepare FY 2004 PBS/IPL	02JAN02	30APR02
T946005B4A	Submit 2004 PBS/IPL to TWRS		30APR02
T946005B5	Prepare FY 2005 PBS/IPL	02JAN03	30APR03
T946005B5A	Submit 2005 PBS/IPL to TWRS		30APR03
T946005B6	Prepare FY 2006 PBS/IPL	02JAN04	30APR04
T946005B6A	Submit 2006 PBS/IPL to TWRS		30APR04
T946005B7	Prepare FY 2007 PBS/IPL	04JAN05	29APR05
T946005B7A	Submit 2007 PBS/IPL to TWRS		29APR05
T946005B8	Prepare FY 2008 PBS/IPL	03JAN06	28APR06
T946005B8A	Submit 2008 PBS/IPL to TWRS		28APR06
T946005B9	Prepare FY 2009 PBS/IPL	02JAN07	30APR07
T946005B9A	Submit 2009 PBS/IPL to TWRS		30APR07
T946005BA	Prepare FY 2010 PBS/IPL	02JAN08	30APR08
T946005BAA	Submit 2010 PBS/IPL to TWRS		30APR08
T946005BB	Prepare FY 2011 PBS/IPL	02JAN09	30APR09
T946005BBA	Submit 2011 PBS/IPL to TWRS		30APR09



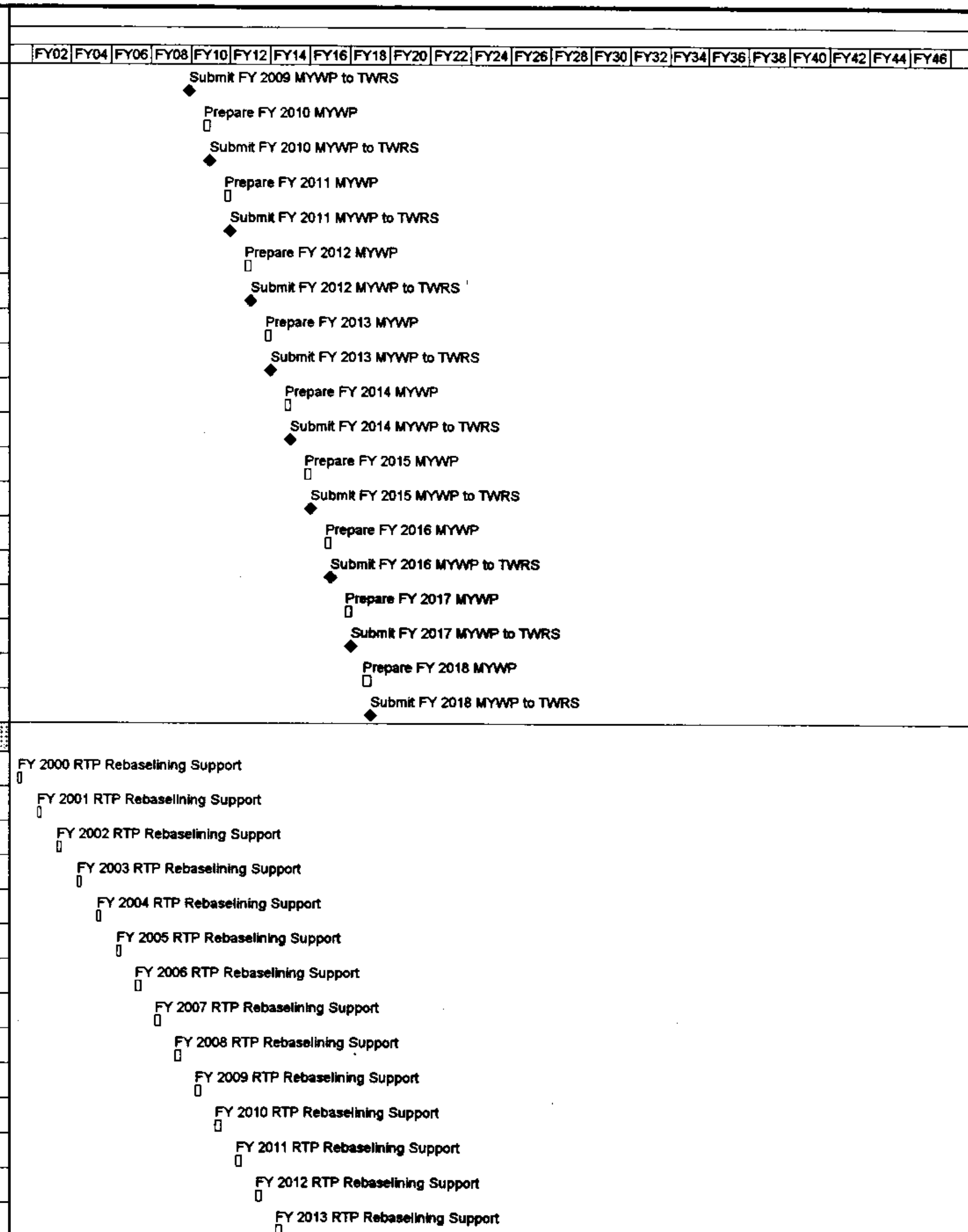
Sheet 2 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946005BC	Prepare FY 2012 PBS/IPL	04JAN10	30APR10
T946005BCA	Submit 2012 PBS/IPL to TWRS		30APR10
T946005BD	Prepare FY 2013 PBS/IPL	04JAN11	29APR11
T946005BDA	Submit 2013 PBS/IPL to TWRS		29APR11
T946005BE	Prepare FY 2014 PBS/IPL	03JAN12	30APR12
T946005BEA	Submit 2014 PBS/IPL to TWRS		30APR12
T946005BF	Prepare FY 2015 PBS/IPL	02JAN13	30APR13
T946005BFA	Submit 2015 PBS/IPL to TWRS		30APR13
T946005BG	Prepare FY 2016 PBS/IPL	02JAN14	30APR14
T946005BGA	Submit 2016 PBS/IPL to TWRS		30APR14
T946005BH	Prepare FY 2017 PBS/IPL	02JAN15	30APR15
T946005BHA	Submit 2017 PBS/IPL to TWRS		30APR15
T946005BI	Prepare FY 2018 PBS/IPL	04JAN16	29APR16
T946005BIA	Submit 2018 PBS/IPL to TWRS		29APR16
T946005BJ	Prepare FY 2019 PBS/IPL	03JAN17	28APR17
T946005BJA	Submit 2019 PBS/IPL to TWRS		28APR17
1.01.09.01.01.01.01.01.04 FY 2000 MYWP			
T946005D2	Prepare FY 2001 MYWP	01JUN00	26SEP00
T946005D2A	Submit FY 2001 MYWP to TWRS		26SEP00
T946005D3	Prepare FY 2002 MYWP	01JUN01	26SEP01
T946005D3A	Submit FY 2002 MYWP to TWRS		26SEP01
T946005D4	Prepare FY 2003 MYWP	03JUN02	26SEP02
T946005D4A	Submit FY 2003 MYWP to TWRS		26SEP02
T946005D5	Prepare FY 2004 MYWP	02JUN03	26SEP03
T946005D5A	Submit FY 2004 MYWP to TWRS		26SEP03
T946005D6	Prepare FY 2005 MYWP	01JUN04	24SEP04
T946005D6A	Submit FY 2005 MYWP to TWRS		24SEP04
T946005D7	Prepare FY 2006 MYWP	01JUN05	26SEP05
T946005D7A	Submit FY 2006 MYWP to TWRS		26SEP05
T946005D8	Prepare FY 2007 MYWP	01JUN06	26SEP06
T946005D8A	Submit FY 2007 MYWP to TWRS		26SEP06
T946005D9	Prepare FY 2008 MYWP	01JUN07	26SEP07
T946005D9A	Submit FY 2008 MYWP to TWRS		26SEP07
T946005DA	Prepare FY 2009 MYWP	02JUN08	26SEP08



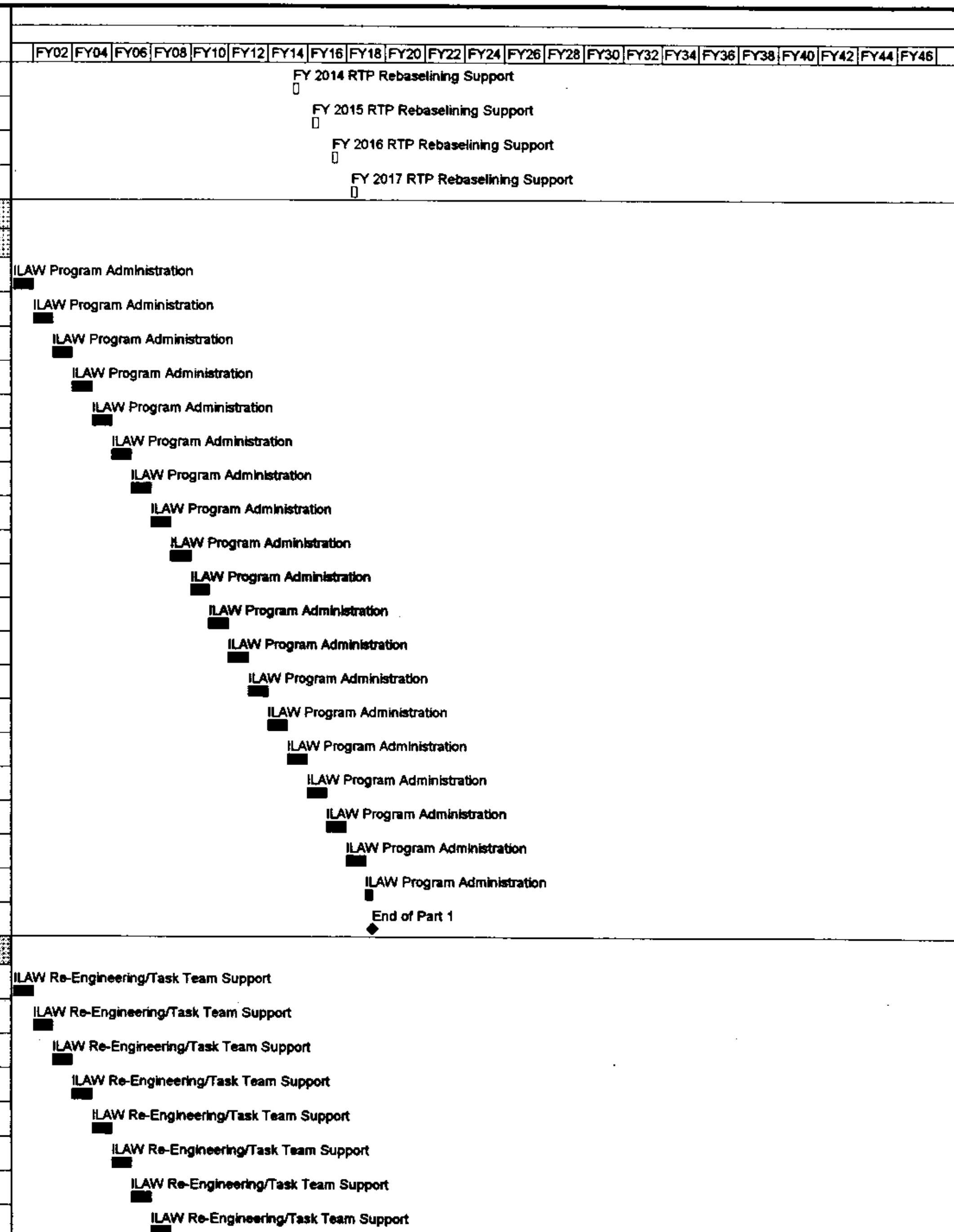
Sheet 3 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946005DAA	Submit FY 2009 MYWP to TWRS		26SEP08
T946005DB	Prepare FY 2010 MYWP	01JUN09	25SEP09
T946005DBA	Submit FY 2010 MYWP to TWRS		25SEP09
T946005DC	Prepare FY 2011 MYWP	01JUN10	27SEP10
T946005DCA	Submit FY 2011 MYWP to TWRS		27SEP10
T946005DD	Prepare FY 2012 MYWP	01JUN11	26SEP11
T946005DDA	Submit FY 2012 MYWP to TWRS		26SEP11
T946005DE	Prepare FY 2013 MYWP	01JUN12	26SEP12
T946005DEA	Submit FY 2013 MYWP to TWRS		26SEP12
T946005DF	Prepare FY 2014 MYWP	03JUN13	26SEP13
T946005DFA	Submit FY 2014 MYWP to TWRS		26SEP13
T946005DG	Prepare FY 2015 MYWP	02JUN14	26SEP14
T946005DGA	Submit FY 2015 MYWP to TWRS		26SEP14
T946005DH	Prepare FY 2016 MYWP	01JUN15	25SEP15
T946005DHA	Submit FY 2016 MYWP to TWRS		25SEP15
T946005DI	Prepare FY 2017 MYWP	01JUN16	26SEP16
T946005DIA	Submit FY 2017 MYWP to TWRS		26SEP16
T946005DJ	Prepare FY 2018 MYWP	01JUN17	26SEP17
T946005DJA	Submit FY 2018 MYWP to TWRS		26SEP17
1.01.09.01.01.01.01.01.05 FY 1999 RTP Rebaselining Support			
T946005K2	FY 2000 RTP Rebaselining Support	04JAN00	31MAR00
T946005K3	FY 2001 RTP Rebaselining Support	02JAN01	30MAR01
T946005K4	FY 2002 RTP Rebaselining Support	02JAN02	29MAR02
T946005K5	FY 2003 RTP Rebaselining Support	02JAN03	31MAR03
T946005K6	FY 2004 RTP Rebaselining Support	02JAN04	31MAR04
T946005K7	FY 2005 RTP Rebaselining Support	04JAN05	31MAR05
T946005K8	FY 2006 RTP Rebaselining Support	03JAN06	31MAR06
T946005K9	FY 2007 RTP Rebaselining Support	02JAN07	30MAR07
T946005KA	FY 2008 RTP Rebaselining Support	02JAN08	31MAR08
T946005KB	FY 2009 RTP Rebaselining Support	02JAN09	31MAR09
T946005KC	FY 2010 RTP Rebaselining Support	04JAN10	31MAR10
T946005KD	FY 2011 RTP Rebaselining Support	04JAN11	31MAR11
T946005KE	FY 2012 RTP Rebaselining Support	03JAN12	30MAR12
T946005KF	FY 2013 RTP Rebaselining Support	02JAN13	29MAR13



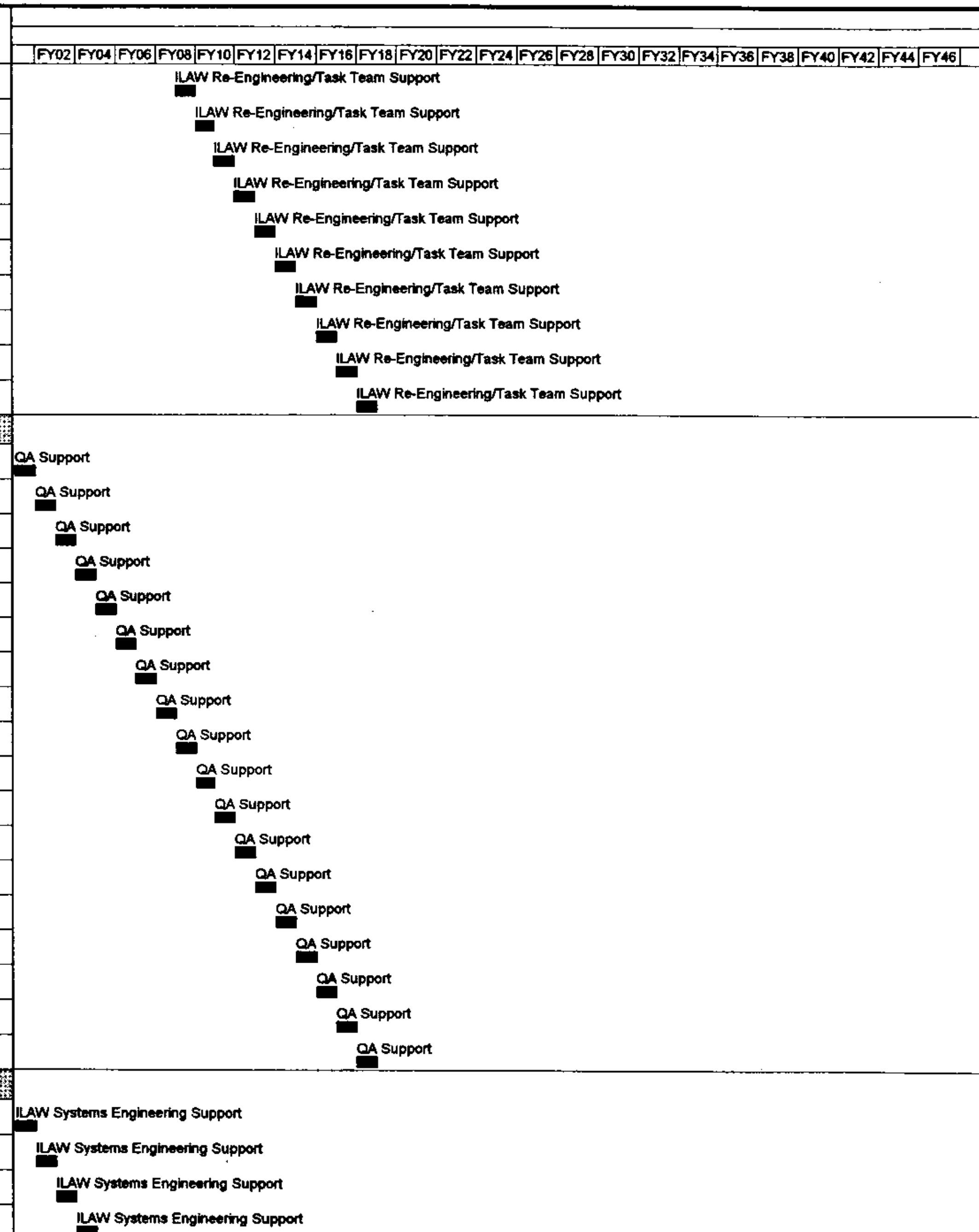
Sheet 4 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946005KG	FY 2014 RTP Rebaselining Support	02JAN14	31MAR14
T946005KH	FY 2015 RTP Rebaselining Support	02JAN15	31MAR15
T946005KI	FY 2016 RTP Rebaselining Support	04JAN16	31MAR16
T946005KJ	FY 2017 RTP Rebaselining Support	03JAN17	31MAR17
1.01.09.01.01.01.01.02 ILAW Program Office Support			
1.01.09.01.01.01.01.02.01 ILAW Program Administration			
T946005F2	ILAW Program Administration	01OCT99	29SEP00
T946005F3	ILAW Program Administration	02OCT00	28SEP01
T946005F4	ILAW Program Administration	01OCT01	30SEP02
T946005F5	ILAW Program Administration	01OCT02	30SEP03
T946005F6	ILAW Program Administration	01OCT03	30SEP04
T946005F7	ILAW Program Administration	01OCT04	30SEP05
T946005F8	ILAW Program Administration	03OCT05	29SEP06
T946005F9	ILAW Program Administration	02OCT06	28SEP07
T946005FA	ILAW Program Administration	01OCT07	30SEP08
T946005FB	ILAW Program Administration	01OCT08	30SEP09
T946005FC	ILAW Program Administration	01OCT09	30SEP10
T946005FD	ILAW Program Administration	01OCT10	30SEP11
T946005FE	ILAW Program Administration	03OCT11	28SEP12
T946005FF	ILAW Program Administration	01OCT12	30SEP13
T946005FG	ILAW Program Administration	01OCT13	30SEP14
T946005FH	ILAW Program Administration	01OCT14	30SEP15
T946005FI	ILAW Program Administration	01OCT15	30SEP16
T946005FJ	ILAW Program Administration	03OCT16	29SEP17
T946005FK	ILAW Program Administration	02OCT17	31JAN18
T946005Z	End of Part 1		31JAN18
1.01.09.01.01.01.01.02.02 ILAW Re-Engineering/Task Team Support			
T946005G2	ILAW Re-Engineering/Task Team Support	01OCT99	29SEP00
T946005G3	ILAW Re-Engineering/Task Team Support	02OCT00	28SEP01
T946005G4	ILAW Re-Engineering/Task Team Support	01OCT01	30SEP02
T946005G5	ILAW Re-Engineering/Task Team Support	01OCT02	30SEP03
T946005G6	ILAW Re-Engineering/Task Team Support	01OCT03	30SEP04
T946005G7	ILAW Re-Engineering/Task Team Support	01OCT04	30SEP05
T946005G8	ILAW Re-Engineering/Task Team Support	03OCT05	29SEP06
T946005G9	ILAW Re-Engineering/Task Team Support	02OCT06	28SEP07



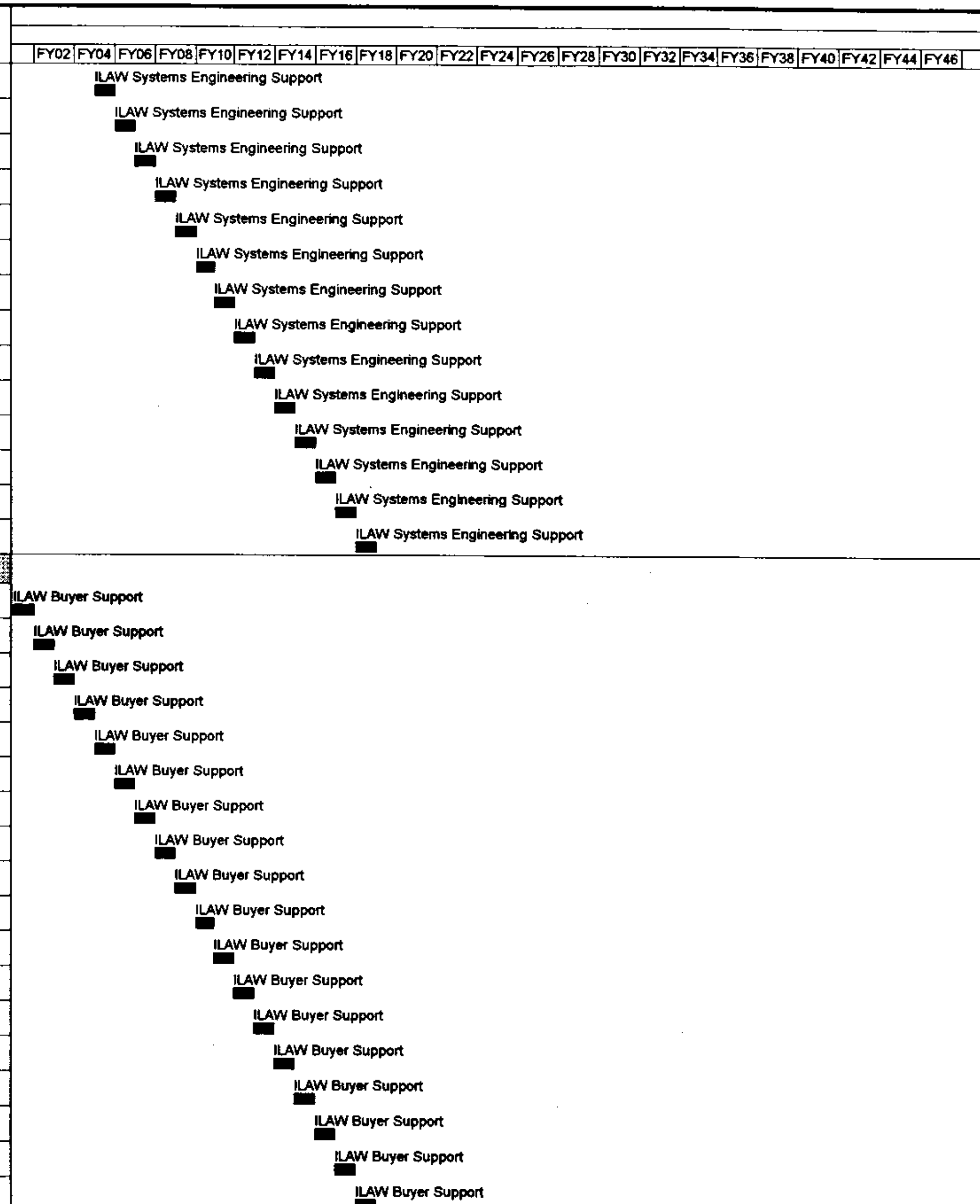
Sheet 5 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946005GA	ILAW Re-Engineering/Task Team Support	01OCT07	30SEP08
T946005GB	ILAW Re-Engineering/Task Team Support	01OCT08	30SEP09
T946005GC	ILAW Re-Engineering/Task Team Support	01OCT09	30SEP10
T946005GD	ILAW Re-Engineering/Task Team Support	01OCT10	30SEP11
T946005GE	ILAW Re-Engineering/Task Team Support	03OCT11	28SEP12
T946005GF	ILAW Re-Engineering/Task Team Support	01OCT12	30SEP13
T946005GG	ILAW Re-Engineering/Task Team Support	01OCT13	30SEP14
T946005GH	ILAW Re-Engineering/Task Team Support	01OCT14	30SEP15
T946005GI	ILAW Re-Engineering/Task Team Support	01OCT15	30SEP16
T946005GJ	ILAW Re-Engineering/Task Team Support	03OCT16	29SEP17
1.01.09.01.01.01.01.02.03 ILAW Quality Assurance Support			
T946005L2	QA Support	01OCT99	29SEP00
T946005L3	QA Support	02OCT00	28SEP01
T946005L4	QA Support	01OCT01	30SEP02
T946005L5	QA Support	01OCT02	30SEP03
T946005L6	QA Support	01OCT03	30SEP04
T946005L7	QA Support	01OCT04	30SEP05
T946005L8	QA Support	03OCT05	29SEP06
T946005L9	QA Support	02OCT06	28SEP07
T946005LA	QA Support	01OCT07	30SEP08
T946005LB	QA Support	01OCT08	30SEP09
T946005LC	QA Support	01OCT09	30SEP10
T946005LD	QA Support	01OCT10	30SEP11
T946005LE	QA Support	03OCT11	28SEP12
T946005LF	QA Support	01OCT12	30SEP13
T946005LG	QA Support	01OCT13	30SEP14
T946005LH	QA Support	01OCT14	30SEP15
T946005LI	QA Support	01OCT15	30SEP16
T946005LJ	QA Support	03OCT16	29SEP17
1.01.09.01.01.01.01.02.04 ILAW Systems Engineering Support			
T946005I2	ILAW Systems Engineering Support	01OCT99	29SEP00
T946005I3	ILAW Systems Engineering Support	02OCT00	28SEP01
T946005I4	ILAW Systems Engineering Support	01OCT01	30SEP02
T946005I5	ILAW Systems Engineering Support	01OCT02	30SEP03



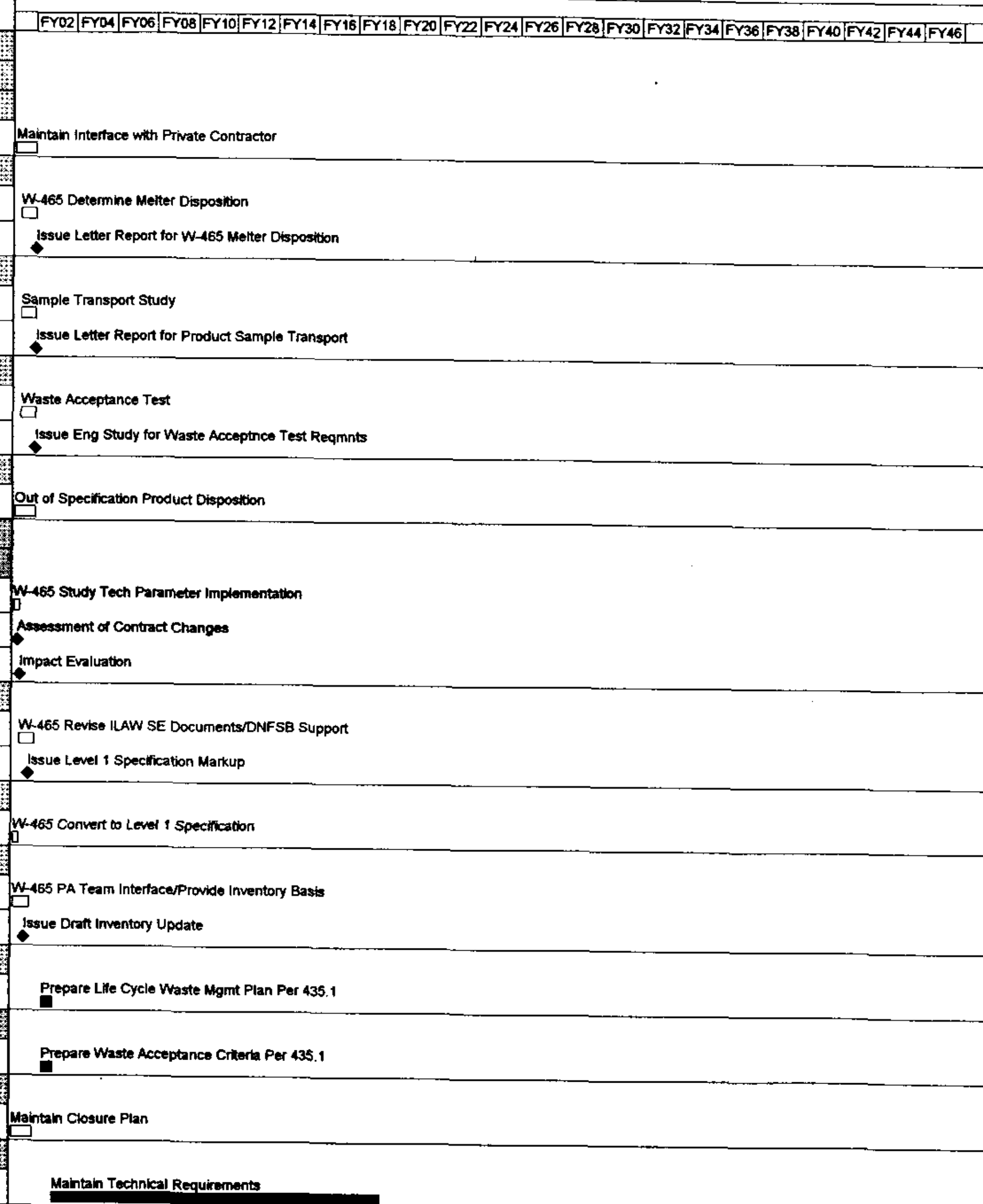
Sheet 6 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946005I6	ILAW Systems Engineering Support	01OCT03	30SEP04
T946005I7	ILAW Systems Engineering Support	01OCT04	30SEP05
T946005I8	ILAW Systems Engineering Support	03OCT05	29SEP06
T946005I9	ILAW Systems Engineering Support	02OCT06	28SEP07
T946005IA	ILAW Systems Engineering Support	01OCT07	30SEP08
T946005IB	ILAW Systems Engineering Support	01OCT08	30SEP09
T946005IC	ILAW Systems Engineering Support	01OCT09	30SEP10
T946005ID	ILAW Systems Engineering Support	01OCT10	30SEP11
T946005IE	ILAW Systems Engineering Support	03OCT11	28SEP12
T946005IF	ILAW Systems Engineering Support	01OCT12	30SEP13
T946005IG	ILAW Systems Engineering Support	01OCT13	30SEP14
T946005IH	ILAW Systems Engineering Support	01OCT14	30SEP15
T946005II	ILAW Systems Engineering Support	01OCT15	30SEP16
T946005IJ	ILAW Systems Engineering Support	03OCT16	29SEP17
1.01.09.01.01.01.01.02.05 ILAW Buyer Support for TW09			
T946005J2	ILAW Buyer Support	01OCT99	29SEP00
T946005J3	ILAW Buyer Support	02OCT00	28SEP01
T946005J4	ILAW Buyer Support	01OCT01	30SEP02
T946005J5	ILAW Buyer Support	01OCT02	30SEP03
T946005J6	ILAW Buyer Support	01OCT03	30SEP04
T946005J7	ILAW Buyer Support	01OCT04	30SEP05
T946005J8	ILAW Buyer Support	03OCT05	29SEP06
T946005J9	ILAW Buyer Support	02OCT06	28SEP07
T946005JA	ILAW Buyer Support	01OCT07	30SEP08
T946005JB	ILAW Buyer Support	01OCT08	30SEP09
T946005JC	ILAW Buyer Support	01OCT09	30SEP10
T946005JD	ILAW Buyer Support	01OCT10	30SEP11
T946005JE	ILAW Buyer Support	03OCT11	28SEP12
T946005JF	ILAW Buyer Support	01OCT12	30SEP13
T946005JG	ILAW Buyer Support	01OCT13	30SEP14
T946005JH	ILAW Buyer Support	01OCT14	30SEP15
T946005JI	ILAW Buyer Support	01OCT15	30SEP16
T946005JJ	ILAW Buyer Support	03OCT16	29SEP17



Sheet 7 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.01.02 ILAW Systems Definition			
1.01.09.01.01.02.01 Maintain Interface w/Priv. Contractor (460.015)			
1.01.09.01.01.02.01.01 Maintain Interface with Private Contractor			
T946015A1	Maintain Interface with Private Contractor	01OCT99	29SEP00
1.01.09.01.01.02.01.02 W-465 Determine Melter Disposition			
T946015A2	W-465 Determine Melter Disposition	04JAN00	29SEP00
T946015A2A	Issue Letter Report for W-465 Melter Disposition		29SEP00
1.01.09.01.01.02.01.04 Sample Transport Study			
T946015A4	Sample Transport Study	04JAN00	29SEP00
T946015A4A	Issue Letter Report for Product Sample Transport		29SEP00
1.01.09.01.01.02.01.05 Waste Acceptance Test			
T946015A5	Waste Acceptance Test	04JAN00	29SEP00
T946015A5A	Issue Eng Study for Waste Acceptnce Test Reqmnts		29SEP00
1.01.09.01.01.02.01.06 Out of Specification Product Disposition			
T946015A6	Out of Specification Product Disposition	01OCT99	29SEP00
1.01.09.01.01.02.02 Main Technical Reqmnts for Stor/Disp (460.030)			
1.01.09.01.01.02.02.02 W-465 Study Tech Parameter Implementation			
T946030A2	W-465 Study Tech Parameter Implementation	01OCT99	31DEC99
T946030A2A	Assessment of Contract Changes	30NOV99	
T946030A2B	Impact Evaluation		31DEC99
1.01.09.01.01.02.02.03 W-465 Revise ILAW SE Documents/DNFSB Support			
T946030A3	W-465 Revise ILAW SE Documents/DNFSB Support	04JAN00	29SEP00
T946030A3A	Issue Level 1 Specification Markup	27JUN00	
1.01.09.01.01.02.02.04 W-465 Convert to Level 1 Specification			
T946030A4	W-465 Convert to Level 1 Specification	01OCT99	31DEC99
1.01.09.01.01.02.02.05 W-465 PA Team Interface/Provide Inventory Basis			
T946030A5	W-465 PA Team Interface/Provide Inventory Basis	01OCT99	14JUL00
T946030A5A	Issue Draft Inventory Update	01MAY00	
1.01.09.01.01.02.02.06 Life Cycle Waste Management Plan Per 435.1			
T946030A6	Prepare Life Cycle Waste Mgmt Plan Per 435.1	02APR01	28SEP01
1.01.09.01.01.02.02.07 Waste Acceptance Criteria Per 435.1			
T946030A7	Prepare Waste Acceptance Criteria Per 435.1	02APR01	28SEP01
1.01.09.01.01.02.02.08 Maintain Closure Plan			
T946030A8	Maintain Closure Plan	01OCT99	29SEP00
1.01.09.01.01.02.02.09 Maintain Technical Requirements			
T946030A9	Maintain Technical Requirements	01OCT01	31JAN18

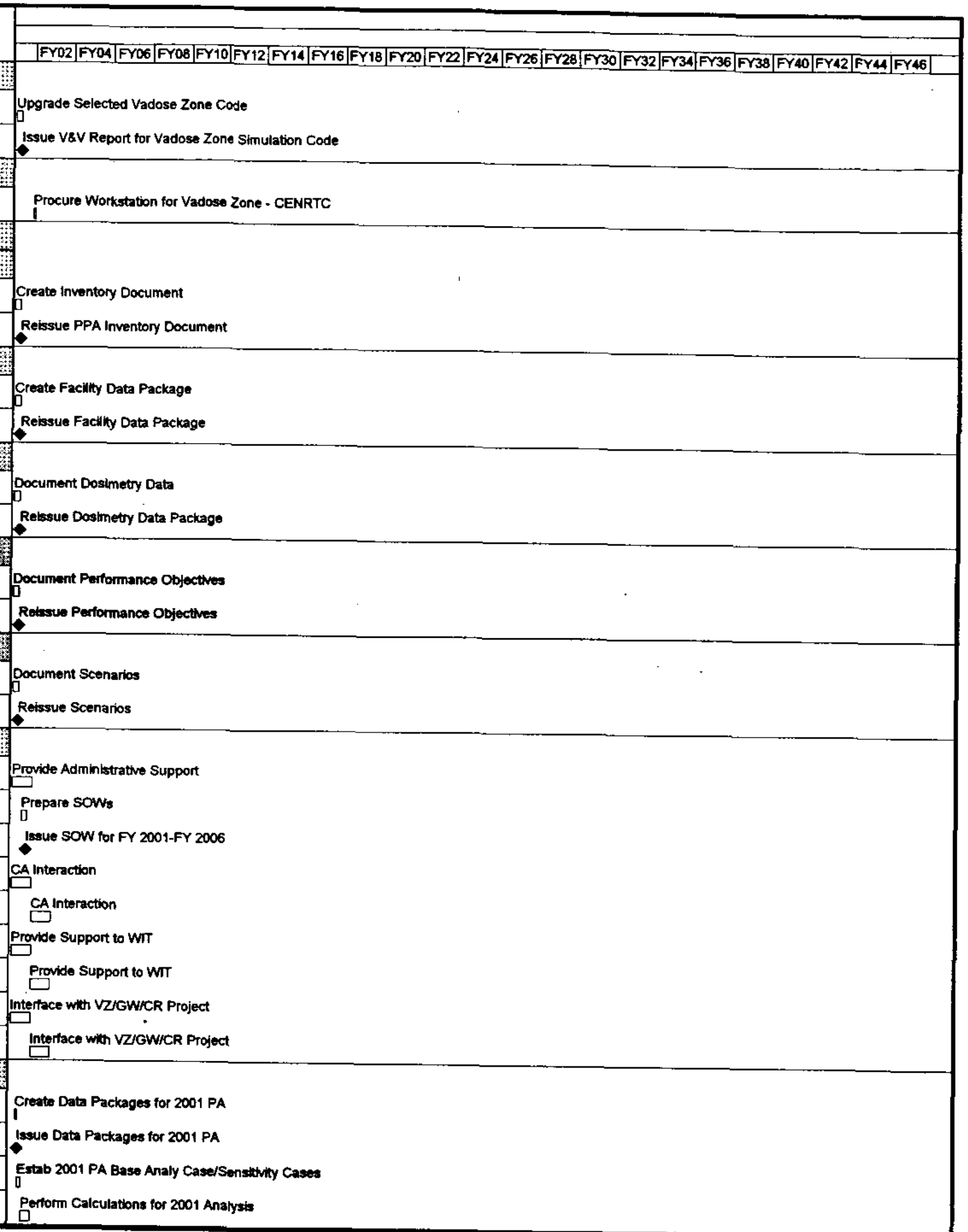


Sheet 8 of 24

Activity ID	Activity Description	Early Start	Early Finish	FY02–FY46
1.01.09.01.01.02.04 Prep/Maint Tech Reqmnts for Disposal (460.095)				
1.01.09.01.01.02.04.01 W-520 TWRS-P Contract Technical Implications				
T946095A1	W-520 TWRS-P Contract Technical Implications	02OCT00	28SEP01	W-520 TWRS-P Contract Technical Implications
1.01.09.01.01.02.04.02 W-520 Revise Systems Engineering Documents				
T946095A2	W-520 Revise Systems Engineering Documents	02OCT00	28SEP01	W-520 Revise Systems Engineering Documents
1.01.09.01.01.02.04.03 W-520 Convert to Level 1 Specification				
T946095A3	W-520 Convert to Level 1 Specification	02OCT00	28SEP01	W-520 Convert to Level 1 Specification
1.01.09.01.01.02.04.04 W-520 PA Team Interface/Design Impacts Assessmnt				
T946095A4	W-520 PA Team Interface/Design Impacts Assessmnt	02OCT00	28SEP01	W-520 PA Team Interface/Design Impacts Assessmnt
1.01.09.01.01.03 ILAW Performance Assessment				
1.01.09.01.01.03.02 Data Collectn for 2001 Perf Assessmnt (460.145)				
1.01.09.01.01.03.02.01 Waste Form Data for 2001 Performance Assessment				
1.01.09.01.01.03.02.01.05 Document Preparation				
T946145G1	Prepare Waste Form Data Package	01OCT99	31DEC99	Prepare Waste Form Data Package
T946145G1A	Issue Waste Form Data Package for 2001 PA		31DEC99	Issue Waste Form Data Package for 2001 PA
1.01.09.01.01.03.02.01.20 Procure Workstation for Glass Calcs (CENRTC)				
T946145F6	Procure Workstation for Glass Calcls-CENRTC	01SEP00	29SEP00	Procure Workstation for Glass Calcls-CENRTC
1.01.09.01.01.03.02.02 Create Geotechnical Data Packages				
1.01.09.01.01.03.02.02.02 Provide Geology Information				
T946145J3	Prepare Geology Data Package	01OCT99	31DEC99	Prepare Geology Data Package
T946145J3A	Reissue Geology Data Package		31DEC99	Reissue Geology Data Package
1.01.09.01.01.03.02.02.03 Provide Recharge Rate Information				
T946145K7	Write Recharge Data Package	01OCT99	31DEC99	Write Recharge Data Package
T946145K7A	Reissue Recharge Data Package		31DEC99	Reissue Recharge Data Package
1.01.09.01.01.03.02.02.04 Provide Far-Field Hydraulic Information				
T946145L5	Prepare Far-Field Hydraulic Data Package	01OCT99	31DEC99	Prepare Far-Field Hydraulic Data Package
T946145L5A	Reissue Far-Field Hydraulic Data Package		31DEC99	Reissue Far-Field Hydraulic Data Package
1.01.09.01.01.03.02.02.05 Provide Near-Field Hydraulic Information				
T946145M3	Document Near-Field Hydraulic Data Package	01OCT99*	31DEC99	Document Near-Field Hydraulic Data Package
T946145M3A	Reissue Near-Field Hydraulic Data Document		31DEC99	Reissue Near-Field Hydraulic Data Document
1.01.09.01.01.03.02.02.06 Provide Far-Field Geochemical Information				
T946145N5	Document Far-Field Chemical Data Package	01OCT99	31DEC99	Document Far-Field Chemical Data Package
T946145N5A	Reissue Far-Field Chemical Data Document		31DEC99	Reissue Far-Field Chemical Data Document
1.01.09.01.01.03.02.02.07 Provide Near-Field Geochemical Information				
T946145O3	Document Near-Field Chemical Data Package	01OCT99	31DEC99	Document Near-Field Chemical Data Package
T946145O3A	Reissue Near-Field Chemical Data Package		31DEC99	Reissue Near-Field Chemical Data Package

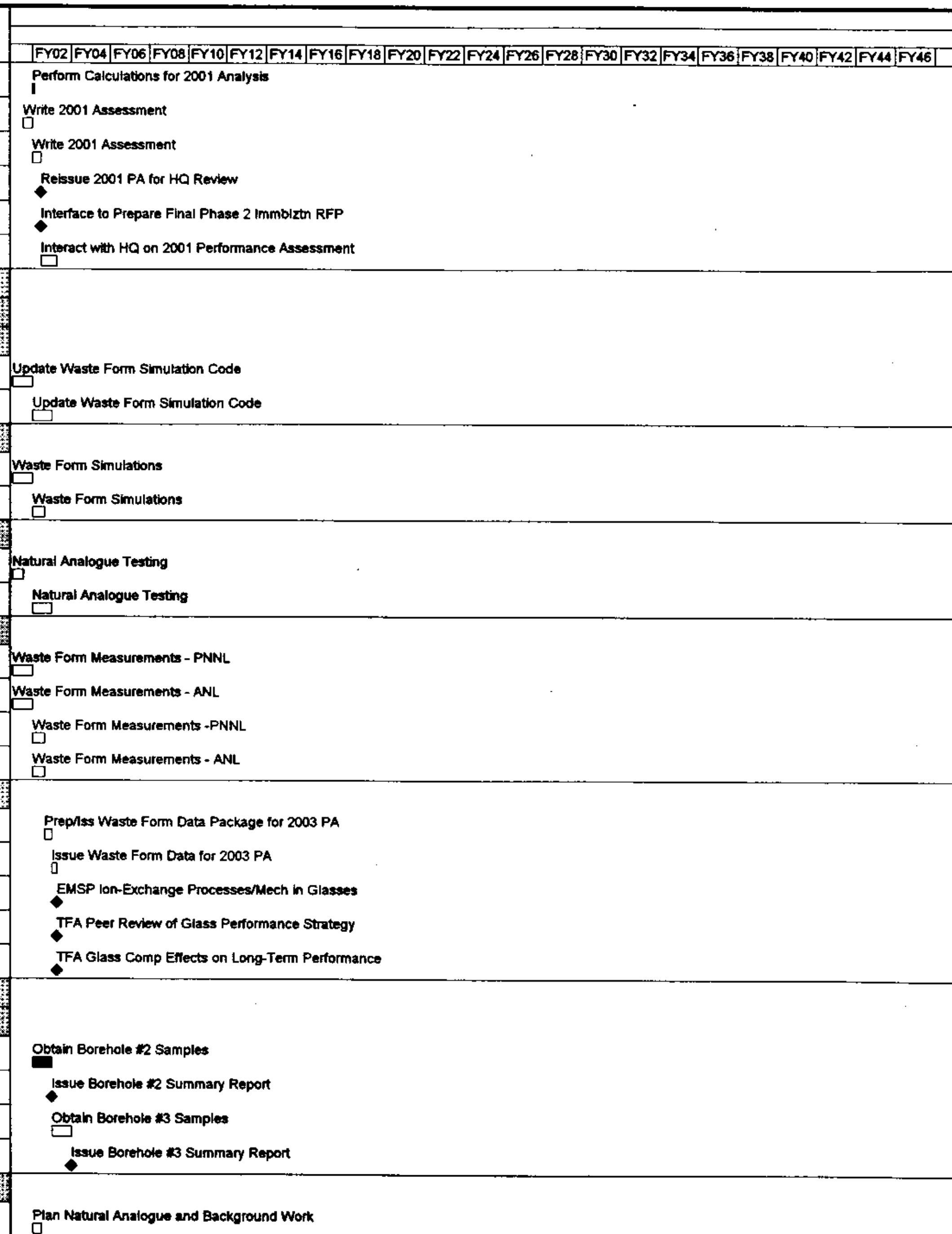
Sheet 9 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.01.03.02.02.08 Obtain Contaminant Transport Codes			
T946145P2	Upgrade Selected Vadose Zone Code	01OCT99	31DEC99
T946145P2A	Issue V&V Report for Vadose Zone Simulation Code		31DEC99
1.01.09.01.01.03.02.02.20 Procure Workstation for Vadose Zone - CENRTC			
T946145P5	Procure Workstation for Vadose Zone - CENRTC	01SEP00	29SEP00
1.01.09.01.01.03.02.03 Obtain Other Data			
1.01.09.01.01.03.02.03.01 Obtain Inventory Information			
T946145Q2	Create Inventory Document	01OCT99	31DEC99
T946145Q2A	Reissue PPA Inventory Document		31DEC99
1.01.09.01.01.03.02.03.02 Create Conceptual Model			
T946145R2	Create Facility Data Package	01OCT99	31DEC99
T946145R2A	Reissue Facility Data Package		31DEC99
1.01.09.01.01.03.02.03.03 Obtain Dosimetry Information			
T946145S2	Document Dosimetry Data	01OCT99	31DEC99
T946145S2A	Reissue Dosimetry Data Package		31DEC99
1.01.09.01.01.03.02.03.04 Determine Performance Objectives			
T946145T1	Document Performance Objectives	01OCT98	31DEC99
T946145T1A	Reissue Performance Objectives		31DEC99
1.01.09.01.01.03.02.03.05 Determine Scenarios			
T946145U1	Document Scenarios	01OCT99	31DEC99
T946145U1A	Reissue Scenarios		31DEC99
1.01.09.01.01.03.02.04 Coordination and Support			
T946145V1	Provide Administrative Support	01OCT99	29SEP00
T946145W2	Prepare SOWs	03APR00	15JUN00
T946145W2C	Issue SOW for FY 2001-FY 2006		15JUN00
T946145X3	CA Interaction	01OCT99	29SEP00
T946145X4	CA Interaction	02OCT00	28SEP01
T946145Y2	Provide Support to WIT	01OCT99	29SEP00
T946145Y3	Provide Support to WIT	02OCT00	28SEP01
T946145Z2	Interface with VZ/GW/CR Project	01OCT99	29SEP00
T946145Z3	Interface with VZ/GW/CR Project	02OCT00	28SEP01
1.01.09.01.01.03.03 2001 Performance Assessment (460.155)			
T946155A0	Create Data Packages for 2001 PA	04JAN00	31JAN00
T946155A0B	Issue Data Packages for 2001 PA		31JAN00
T946155A1	Estab 2001 PA Base Analy Case/Sensitivity Cases	01FEB00	28APR00
T946155B0	Perform Calculations for 2001 Analysis	01MAY00	29SEP00



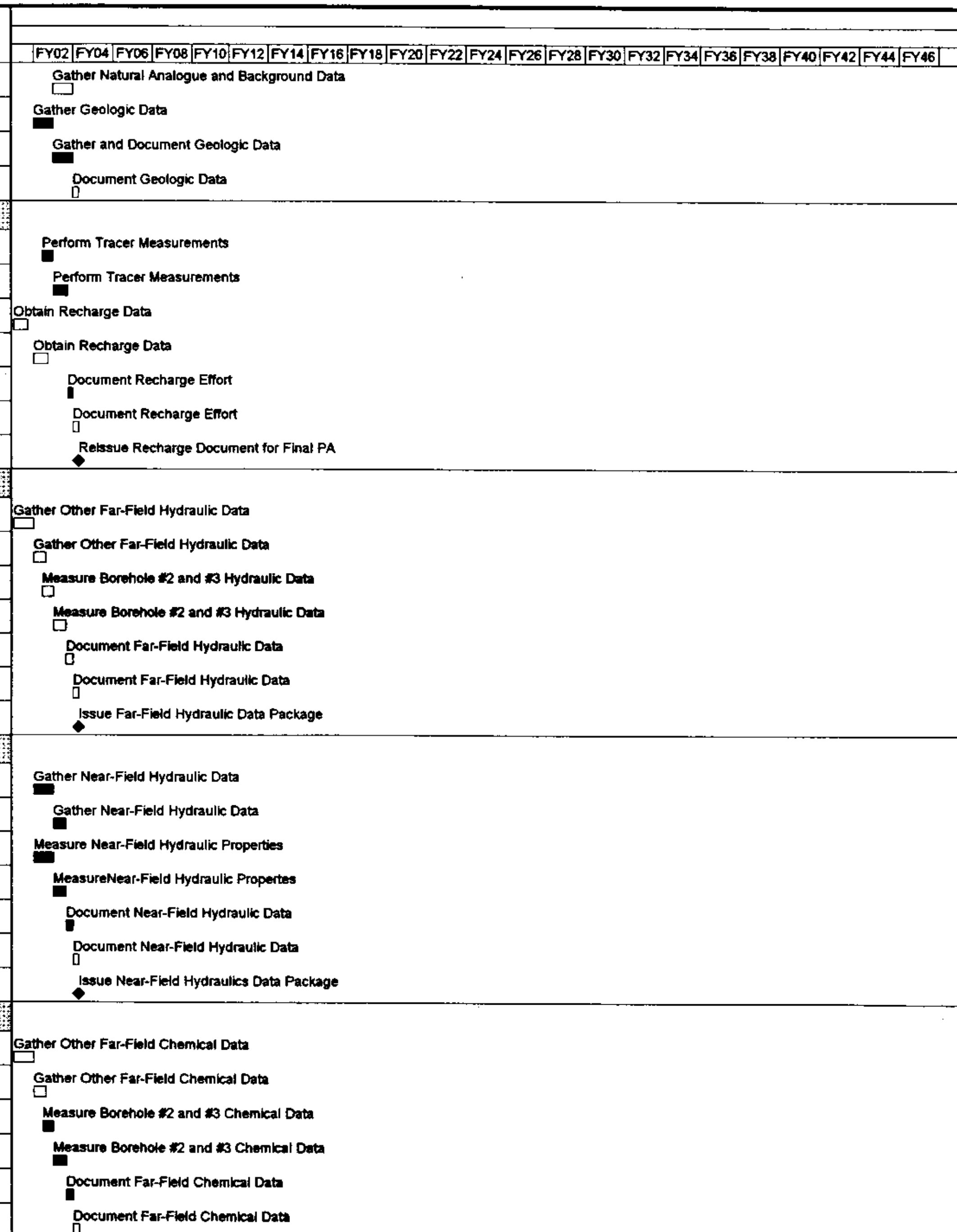
Sheet 10 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946155B1	Perform Calculations for 2001 Analysis	02OCT00	31OCT00
T946155C0	Write 2001 Assessment	01MAY00	29SEP00
T946155C1	Write 2001 Assessment	02OCT00	30MAR01
T946155C1A	Reissue 2001 PA for HQ Review		30MAR01
T946155CFM	Interface to Prepare Final Phase 2 Immblztn RFP		30MAR01
T946155D0	Interact with HQ on 2001 Performance Assessment	02APR01	31DEC01
1.01.09.01.01.03.04 Data Collectn for Perf Assessment (460.160)			
1.01.09.01.01.03.04.01 Waste Form Data for Performance Assessment			
1.01.09.01.01.03.04.01.01 Obtain Waste Form Simulations			
T946160B1	Update Waste Form Simulation Code	01OCT99	29SEP00
T946160B2	Update Waste Form Simulation Code	02OCT00	28SEP01
1.01.09.01.01.03.04.01.02 Perform Waste Form Simulations			
T946160C1	Waste Form Simulations	01OCT99	29SEP00
T946160C2	Waste Form Simulations	02OCT00	31MAY01
1.01.09.01.01.03.04.01.03 Perform Natural Analogue Testing			
T946160D0	Natural Analogue Testing	01OCT99	28APR00
T946160D2	Natural Analogue Testing	02OCT00	28SEP01
1.01.09.01.01.03.04.01.04 Waste Form Testing			
T946160F2	Waste Form Measurements - PNNL	01OCT99	29SEP00
T946160F3	Waste Form Measurements - ANL	01OCT99	29SEP00
T946160F4	Waste Form Measurements -PNNL	02OCT00	31MAY01
T946160F5	Waste Form Measurements - ANL	02OCT00	31MAY01
1.01.09.01.01.03.04.01.05 Document Preparation			
T946160G0	Prep/Iss Waste Form Data Package for 2003 PA	01JUN01	28SEP01
T946160G1	Issue Waste Form Data for 2003 PA	01OCT01	31DEC01
T946160G1A	EMSP Ion-Exchange Processes/Mech in Glasses		31DEC01
T946160G1B	TFA Peer Review of Glass Performance Strategy		31DEC01
T946160G1C	TFA Glass Comp Effects on Long-Term Performance		31DEC01
1.01.09.01.01.03.04.02 Create Geotechnical Data Packages			
1.01.09.01.01.03.04.02.01 Obtain Borehole Samples			
T946160H0	Obtain Borehole #2 Samples	02OCT00	28SEP01
T946160H0B	Issue Borehole #2 Summary Report		28SEP01
T946160H2	Obtain Borehole #3 Samples	01OCT01	30SEP02
T946160H2A	Issue Borehole #3 Summary Report		30SEP02
1.01.09.01.01.03.04.02.02 Provide Geology Information			
T946160J0	Plan Natural Analogue and Background Work	02OCT00	30MAR01



Sheet 11 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946160J1	Gather Natural Analogue and Background Data	01OCT01	30SEP02
T946160J2	Gather Geologic Data	02OCT00	28SEP01
T946160J3	Gather and Document Geologic Data	01OCT01	30SEP02
T946160J4	Document Geologic Data	01OCT02	31DEC02
1.01.09.01.01.03.04.02.03 Provide Recharge Rate Information			
T946160K0	Perform Tracer Measurements	02APR01	28SEP01
T946160K2	Perform Tracer Measurements	01OCT01	28JUN02
T946160K4	Obtain Recharge Data	01OCT99	30JUN00
T946160K5	Obtain Recharge Data	02OCT00	29JUN01
T946160K6	Document Recharge Effort	01JUL02	30SEP02
T946160K7	Document Recharge Effort	01OCT02	31DEC02
T946160K7A	Reissue Recharge Document for Final PA		31DEC02
1.01.09.01.01.03.04.02.04 Provide Far-Field Hydraulic Information			
T946160L1	Gather Other Far-Field Hydraulic Data	01OCT99	29SEP00
T946160L2	Gather Other Far-Field Hydraulic Data	02OCT00	31MAY01
T946160L3	Measure Borehole #2 and #3 Hydraulic Data	02APR01	28SEP01
T946160L4	Measure Borehole #2 and #3 Hydraulic Data	01OCT01	31MAY02
T946160L6	Document Far-Field Hydraulic Data	03JUN02	30SEP02
T946160L7	Document Far-Field Hydraulic Data	01OCT02	31DEC02
T946160L7A	Issue Far-Field Hydraulic Data Package		31DEC02
1.01.09.01.01.03.04.02.05 Provide Near-Field Hydraulic Information			
T946160M1	Gather Near-Field Hydraulic Data	02OCT00	28SEP01
T946160M2	Gather Near-Field Hydraulic Data	01OCT01	31MAY02
T946160M4	Measure Near-Field Hydraulic Properties	02OCT00	28SEP01
T946160M5	MeasureNear-Field Hydraulic Propertes	01OCT01	31MAY02
T946160M6	Document Near-Field Hydraulic Data	03JUN02	30SEP02
T946160M7	Document Near-Field Hydraulic Data	01OCT02	31DEC02
T946160M7A	Issue Near-Field Hydraulics Data Package		31DEC02
1.01.09.01.01.03.04.02.06 Provide Far-Field Geochemical Information			
T946160N1	Gather Other Far-Field Chemical Data	01OCT99	29SEP00
T946160N2	Gather Other Far-Field Chemical Data	02OCT00	31MAY01
T946160N3	Measure Borehole #2 and #3 Chemical Data	02APR01	28SEP01
T946160N4	Measure Borehole #2 and #3 Chemical Data	01OCT01	31MAY02
T946160N6	Document Far-Field Chemical Data	03JUN02	30SEP02
T946160N7	Document Far-Field Chemical Data	01OCT02	31DEC02

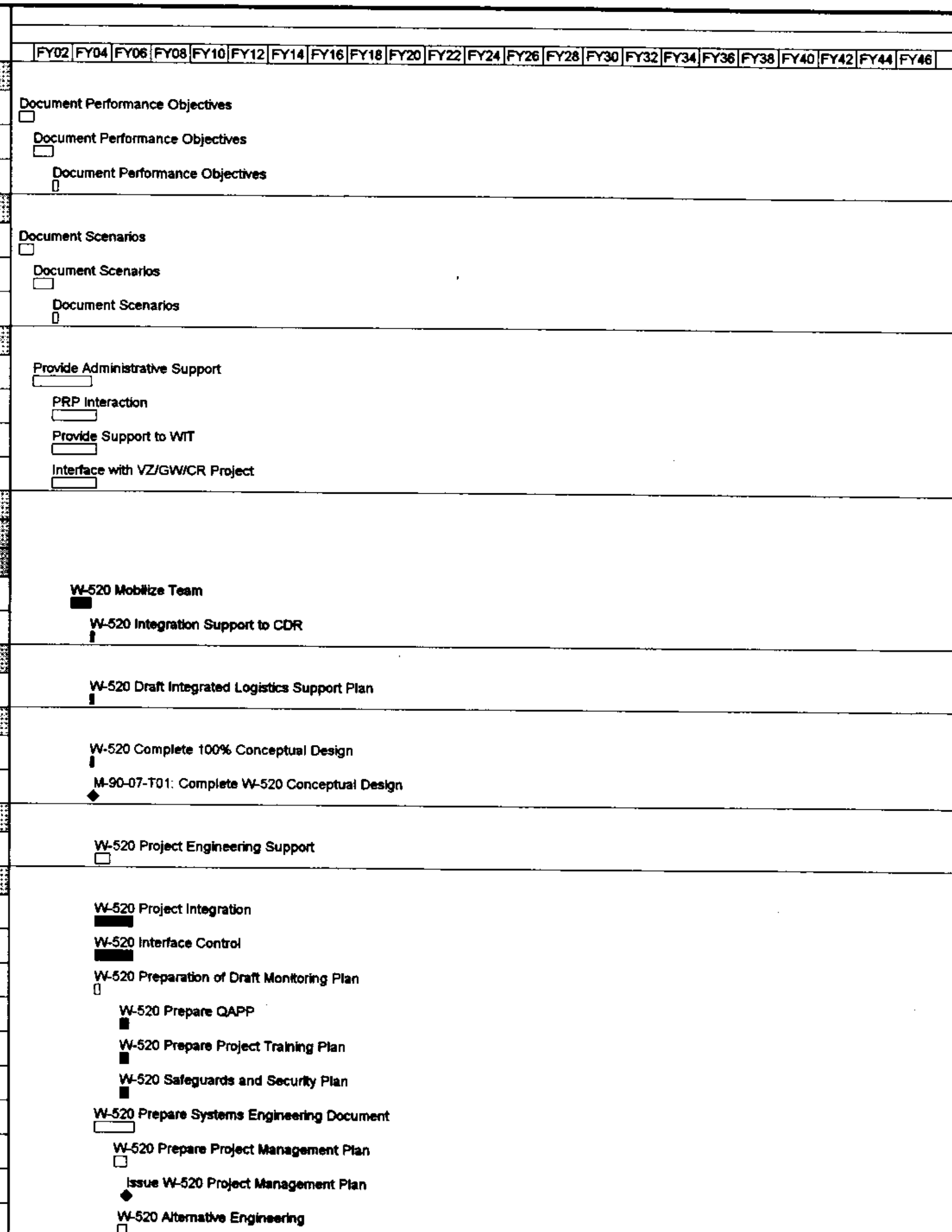


Sheet 12 of 24

Activity ID	Activity Description	Early Start	Early Finish	FY02 FY04 FY06 FY08 FY10 FY12 FY14 FY16 FY18 FY20 FY22 FY24 FY26 FY28 FY30 FY32 FY34 FY36 FY38 FY40 FY42 FY44 FY46
T946160N7A	Issue Far-Field Chemical Data Packages		31DEC02	Issue Far-Field Chemical Data Packages
1.01.09.01.01.03.04.02.07 Provide Near-Field Geochemical Information				
T946160O01	Gather Getter Chemical Data - PNNL	01OCT99	29SEP00	Gather Getter Chemical Data - PNNL
T946160O06	Gather Getter Chemical Data - SANDIA	01OCT99	29SEP00	Gather Getter Chemical Data - SANDIA
T946160O11	Gather Getter Chemical Data - PNNL	02OCT00	28SEP01	Gather Getter Chemical Data - PNNL
T946160O16	Gather Getter Chemical Data - SANDIA	02OCT00	28SEP01	Gather Getter Chemical Data - SANDIA
T946160O4	Other Near-Field Chemical Data	01OCT99	29SEP00	Other Near-Field Chemical Data
T946160O5	Other Near-Field Chemical Data	02OCT00	31MAY01	Other Near-Field Chemical Data
T946160O6	Document Near-Field Chemical Data	01JUN01	28SEP01	Document Near-Field Chemical Data
T946160O7	Document Near-Field Chemical Data	01OCT01	31DEC01	Document Near-Field Chemical Data
T946160O7A	Document Near-Field Chemical Data		31DEC01	Document Near-Field Chemical Data
1.01.09.01.01.03.04.02.08 Obtain Contaminant Transport Codes				
T946160P0	Vadose Zone Transport Code	04JAN00	29SEP00	Vadose Zone Transport Code
T946160P1	Vadose Zone Transport Code	02OCT00	28SEP01	Vadose Zone Transport Code
T946160P2	Vadose Zone Transport Code	01OCT01	31DEC01	Vadose Zone Transport Code
1.01.09.01.01.03.04.02.20 Obtain Borehole #2 Samples - CENRTC				
T946160H1	Obtain Borehole #2 Samples - CENRTC (BHI)	02OCT00	30MAR01	Obtain Borehole #2 Samples - CENRTC (BHI)
T946160H1H	Supply Samples - Borehole #2		30MAR01	Supply Samples - Borehole #2
1.01.09.01.01.03.04.02.21 Obtain Borehole #3 Samples - CENRTC				
T946160H3	Obtain Borehole #3 Samples - CENRTC (BHI)	01OCT01	29MAR02	Obtain Borehole #3 Samples - CENRTC (BHI)
T946160H3G	Supply Samples from Borehole #3		29MAR02	Supply Samples from Borehole #3
1.01.09.01.01.03.04.03 Obtain Other Data				
1.01.09.01.01.03.04.03.01 Obtain Inventory Information				
T946160Q0	Create Inventory Data Package	04JAN00	29SEP00	Create Inventory Data Package
T946160Q1	Create Inventory Data Package	02OCT00	28SEP01	Create Inventory Data Package
T946160Q2	Create Inventory Data Package	01OCT01	31DEC01	Create Inventory Data Package
1.01.09.01.01.03.04.03.02 Create Conceptual Model				
T946160R0	Create Disposal Facility Data Package	01OCT99	29SEP00	Create Disposal Facility Data Package
T946160R1	Create Disposal Facility Data Package	02OCT00	28SEP01	Create Disposal Facility Data Package
T946160R2	Create Disposal Facility Data Package	01OCT01	31DEC01	Create Disposal Facility Data Package
1.01.09.01.01.03.04.03.03 Obtain Dosimetry Information				
T946160S0	Document Dosimetry Data	04JAN00	29SEP00	Document Dosimetry Data
T946160S1	Document Dosimetry Data	02OCT00	28SEP01	Document Dosimetry Data
T946160S2	Document Dosimetry Data	01OCT01	31DEC01	Document Dosimetry Data

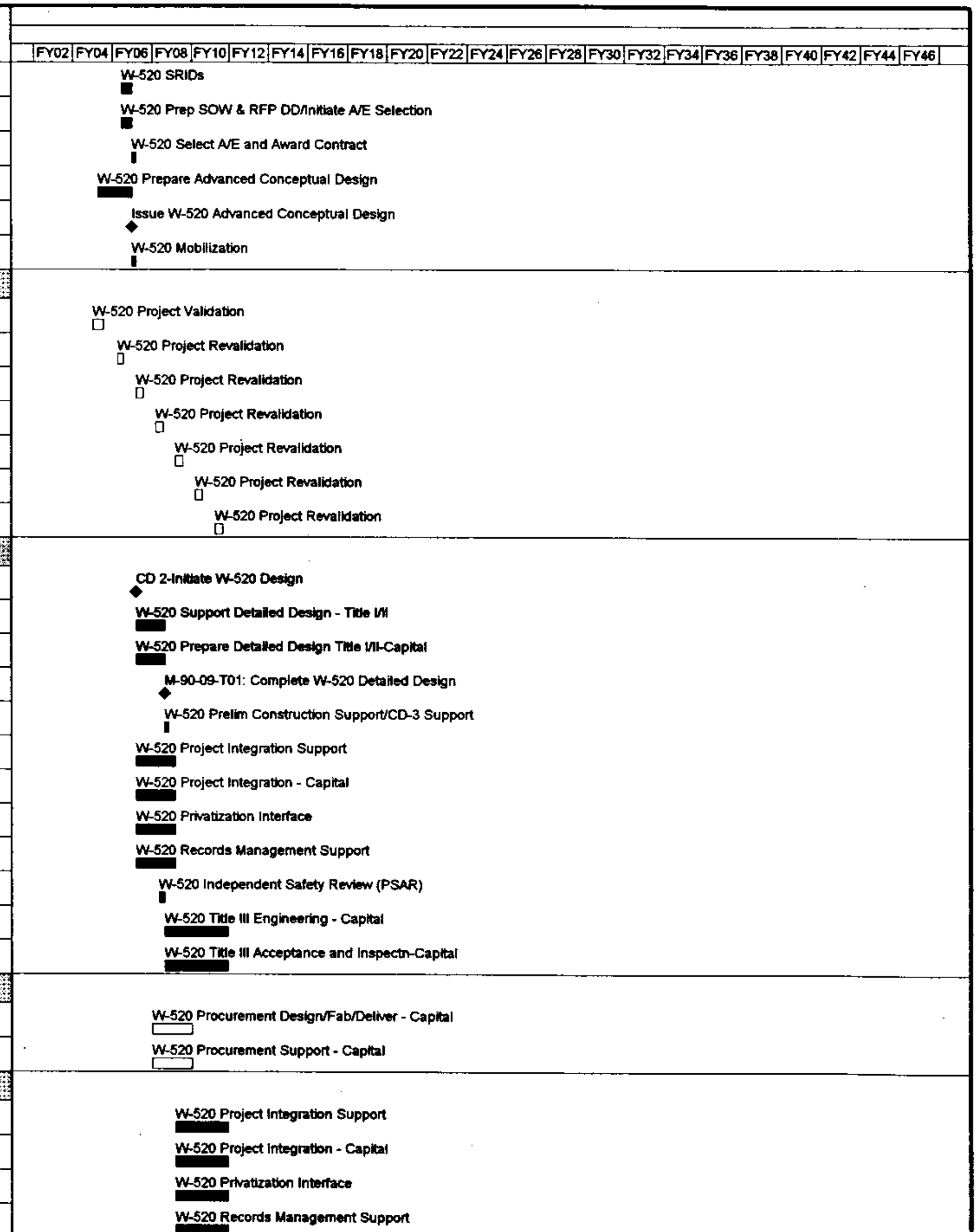
Sheet 13 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.01.03.04.03.04 Determine Performance Objectives			
T946160T0	Document Performance Objectives	04JAN00	29SEP00
T946160T1	Document Performance Objectives	02OCT00	28SEP01
T946160T2	Document Performance Objectives	01OCT01	31DEC01
1.01.09.01.01.03.04.03.05 Determine Scenarios			
T946160U0	Document Scenarios	04JAN00	29SEP00
T946160U1	Document Scenarios	02OCT00	28SEP01
T946160U2	Document Scenarios	01OCT01	31DEC01
1.01.09.01.01.03.04.04 Coordination and Support			
T946160V	Provide Administrative Support	02OCT00	30SEP03
T946160X	PRP Interaction	01OCT01	30JAN04
T946160Y	Provide Support to WIT	01OCT01	30JAN04
T946160Z	Interface with VZ/GW/CR Project	01OCT01	30JAN04
1.01.09.01.01.04 ILAW Project W-520, Immobilized LAW Dis. Complex			
1.01.09.01.01.04.01 W-520 Conceptual Design (460.105)			
1.01.09.01.01.04.01.01 W-520 Integration Support to CDR			
T946105A2	W-520 Mobilize Team	01OCT02	30SEP03
T946105A3	W-520 Integration Support to CDR	01OCT03	31DEC03
1.01.09.01.01.04.01.02 W-520 Draft Integrated Logistics Support Plan			
T946105A4	W-520 Draft Integrated Logistics Support Plan	01OCT03	31DEC03
1.01.09.01.01.04.01.03 W-520 Complete 95% Conceptual Design			
T946105A5	W-520 Complete 100% Conceptual Design	01OCT03	31DEC03
T946105A5A	M-90-07-T01: Complete W-520 Conceptual Design		31DEC03
1.01.09.01.01.04.01.04 W-520 Project Engineering Support			
T946105A6	W-520 Project Engineering Support	02JAN04	30SEP04
1.01.09.01.01.04.02 W-520 Advanced Conceptual Design (460.110)			
T946110A1	W-520 Project Integration	02JAN04	15DEC05
T946110A2	W-520 Interface Control	02JAN04	15DEC05
T946110A3	W-520 Preparation of Draft Monitoring Plan	02JAN04	30APR04
T946110A4	W-520 Prepare QAPP	02MAY05	30SEP05
T946110A5	W-520 Prepare Project Training Plan	02MAY05	30SEP05
T946110A6	W-520 Safeguards and Security Plan	02MAY05	30SEP05
T946110A7	W-520 Prepare Systems Engineering Document	02JAN04	31JAN06
T946110A8	W-520 Prepare Project Management Plan	04JAN05	31AUG05
T946110A8A	Issue W-520 Project Management Plan		31AUG05
T946110A9	W-520 Alternative Engineering	01APR05	31AUG05



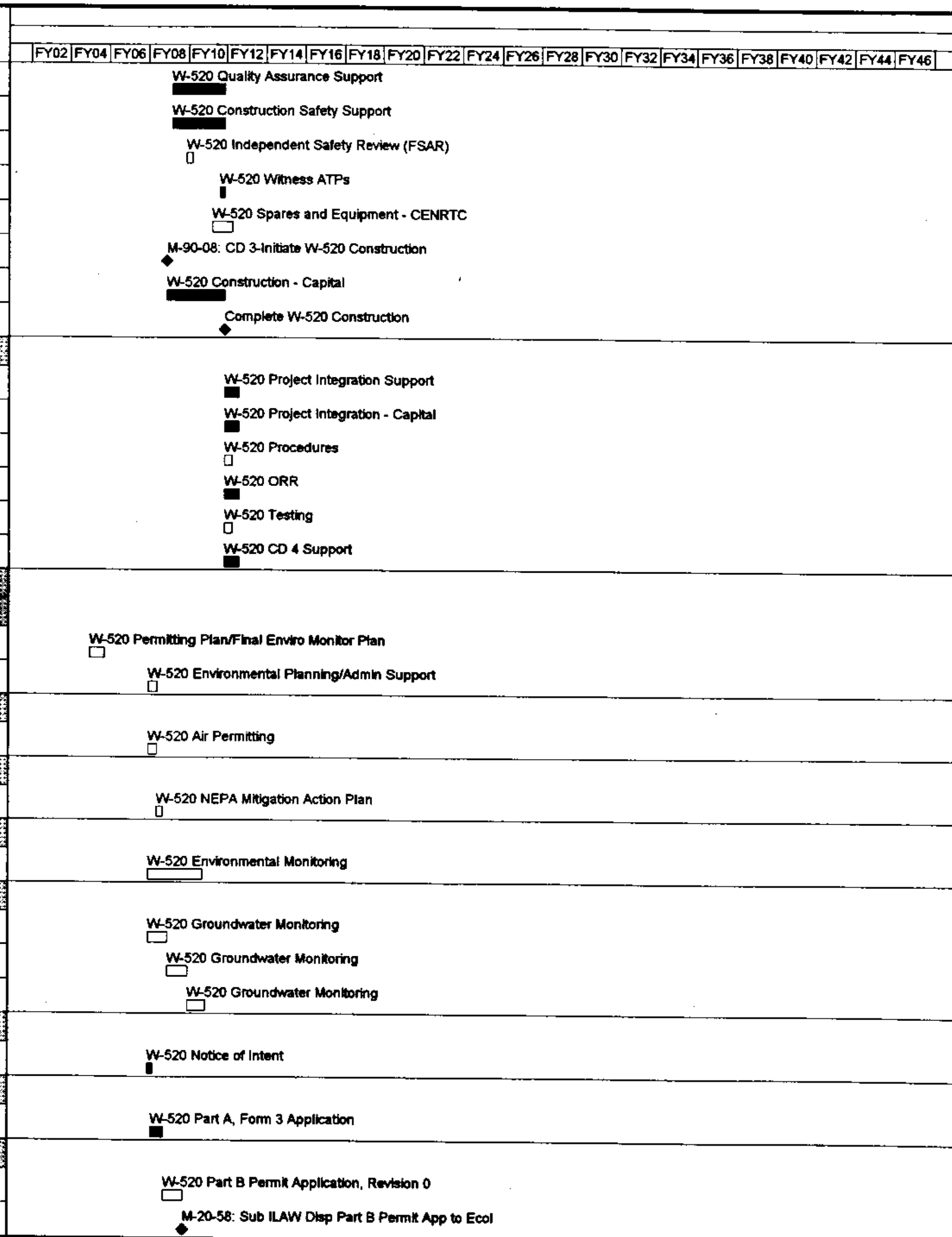
Sheet 14 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946110AA	W-520 SRIDs	01APR05	30SEP05
T946110AB	W-520 Prep SOW & RFP DD/Initiate A/E Selection	01APR05	30SEP05
T946110AC	W-520 Select A/E and Award Contract	03OCT05	15DEC05
T946110AD	W-520 Prepare Advanced Conceptual Design	02JAN04	30SEP05
T946110ADA	Issue W-520 Advanced Conceptual Design		30SEP05
T946110AE	W-520 Mobilization	03OCT05	15DEC05
1.01.09.01.01.04.03 W-520 Project Validation (460.112)			
T946112A1	W-520 Project Validation	02OCT03	30APR04
T946112A2	W-520 Project Revalidation	04JAN05	29APR05
T946112A3	W-520 Project Revalidation	03JAN06	28APR06
T946112A4	W-520 Project Revalidation	02JAN07	30APR07
T946112A5	W-520 Project Revalidation	02JAN08	30APR08
T946112A6	W-520 Project Revalidation	02JAN09	30APR09
T946112A7	W-520 Project Revalidation	04JAN10	30APR10
1.01.09.01.01.04.04 W-520 Design (460.115)			
T946115A1	CD 2-Initiate W-520 Design	16DEC05	
T946115A2	W-520 Support Detailed Design - Title I/II	16DEC05	15JUN07
T946115A3	W-520 Prepare Detailed Design Title I/II-Capital	16DEC05	15JUN07
T946115A3A	M-90-09-T01: Complete W-520 Detailed Design		15JUN07
T946115A4	W-520 Prelim Construction Support/CD-3 Support	18JUN07	24AUG07
T946115A5	W-520 Project Integration Support	16DEC05	31DEC07
T946115A6	W-520 Project Integration - Capital	16DEC05	31DEC07
T946115A7	W-520 Privatization Interface	16DEC05	31DEC07
T946115A8	W-520 Records Management Support	16DEC05	31DEC07
T946115A9	W-520 Independent Safety Review (PSAR)	23FEB07	15JUN07
T946115AA	W-520 Title III Engineering - Capital	18JUN07	09AUG10
T946115AB	W-520 Title III Acceptance and Inspectn-Capital	18JUN07	09AUG10
1.01.09.01.01.04.05 W-520 Equipment Procurement (460.118)			
T946118A1	W-520 Procurement Design/Fab/Deliver - Capital	02OCT06	29SEP08
T946118A2	W-520 Procurement Support - Capital	02OCT06	29SEP08
1.01.09.01.01.04.06 W-520 Construction (460.120)			
T946120A1	W-520 Project Integration Support	02JAN08	09AUG10
T946120A2	W-520 Project Integration - Capital	02JAN08	09AUG10
T946120A3	W-520 Privatization Interface	02JAN08	09AUG10
T946120A4	W-520 Records Management Support	02JAN08	09AUG10



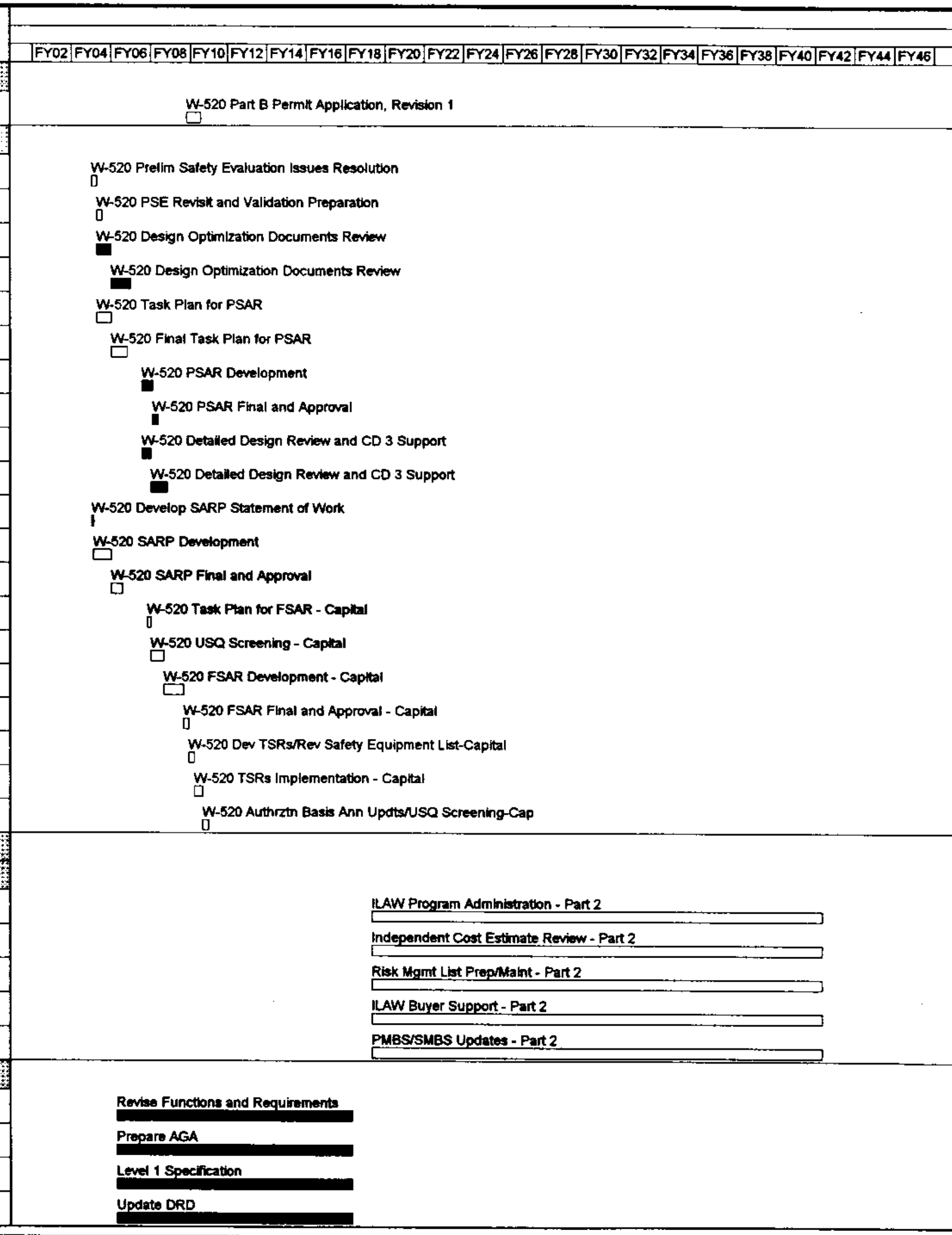
Sheet 15 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946120A5	W-520 Quality Assurance Support	02JAN08	09AUG10
T946120A6	W-520 Construction Safety Support	02JAN08	09AUG10
T946120A7	W-520 Independent Safety Review (FSAR)	16SEP08	16DEC08
T946120A8	W-520 Witness ATPs	17MAY10	09AUG10
T946120A9	W-520 Spares and Equipment - CENRTC	11DEC09	10DEC10
T946120AA	M-90-08: CD 3-Initiate W-520 Construction	27AUG07	
T946120AB	W-520 Construction - Capital	27AUG07	09AUG10
T946120ABA	Complete W-520 Construction		09AUG10
1.01.09.01.01.04.07 W-520 Proc/Train/OTP/ORR (Bal Part 1)(470,060)			
T947060A1	W-520 Project Integration Support	10AUG10	16MAY11
T947060A2	W-520 Project Integration - Capital	10AUG10	16MAY11
T947060A3	W-520 Procedures	10AUG10	28DEC10
T947060A4	W-520 ORR	10AUG10	16MAY11
T947060A5	W-520 Testing	10AUG10	28DEC10
T947060A6	W-520 CD 4 Support	10AUG10	16MAY11
1.01.09.01.01.04.08 W-520 Regulatory Requirements (460,125)			
1.01.09.01.01.04.08.01 W-520 Environmental Planning/Admin Support			
T946125A1	W-520 Permitting Plan/Final Enviro Monitor Plan	01OCT03	30JUN04
T946125A2	W-520 Environmental Planning/Admin Support	02OCT06	30MAR07
1.01.09.01.01.04.08.03 W-520 Air Permitting			
T946125B1	W-520 Air Permitting	02OCT06	30MAR07
1.01.09.01.01.04.08.05 W-520 NEPA Mitigation Action Plan			
T946125C1	W-520 NEPA Mitigation Action Plan	02APR07	29JUN07
1.01.09.01.01.04.08.06 W-520 Environmental Monitoring			
T946125D1	W-520 Environmental Monitoring	02OCT06	30JUN09
1.01.09.01.01.04.08.07 W-520 Groundwater Monitoring			
T946125E1	W-520 Groundwater Monitoring	02OCT06	28SEP07
T946125E2	W-520 Groundwater Monitoring	01OCT07	30SEP08
T946125E3	W-520 Groundwater Monitoring	01OCT08	30SEP09
1.01.09.01.01.04.08.08 W-520 Notice of Intent (NOI)			
T946125F1	W-520 Notice of Intent	02OCT06	31JAN07
1.01.09.01.01.04.08.09 W-520 Part A Permit Application			
T946125G1	W-520 Part A, Form 3 Application	27DEC06	23AUG07
1.01.09.01.01.04.08.10 W-520 Part B Permit Application, Rev. 0			
T946125H1	W-520 Part B Permit Application, Revision 0	24AUG07	25AUG08
T946125H1A	M-20-58: Sub ILAW Disp Part B Permit App to Ecol		25AUG08



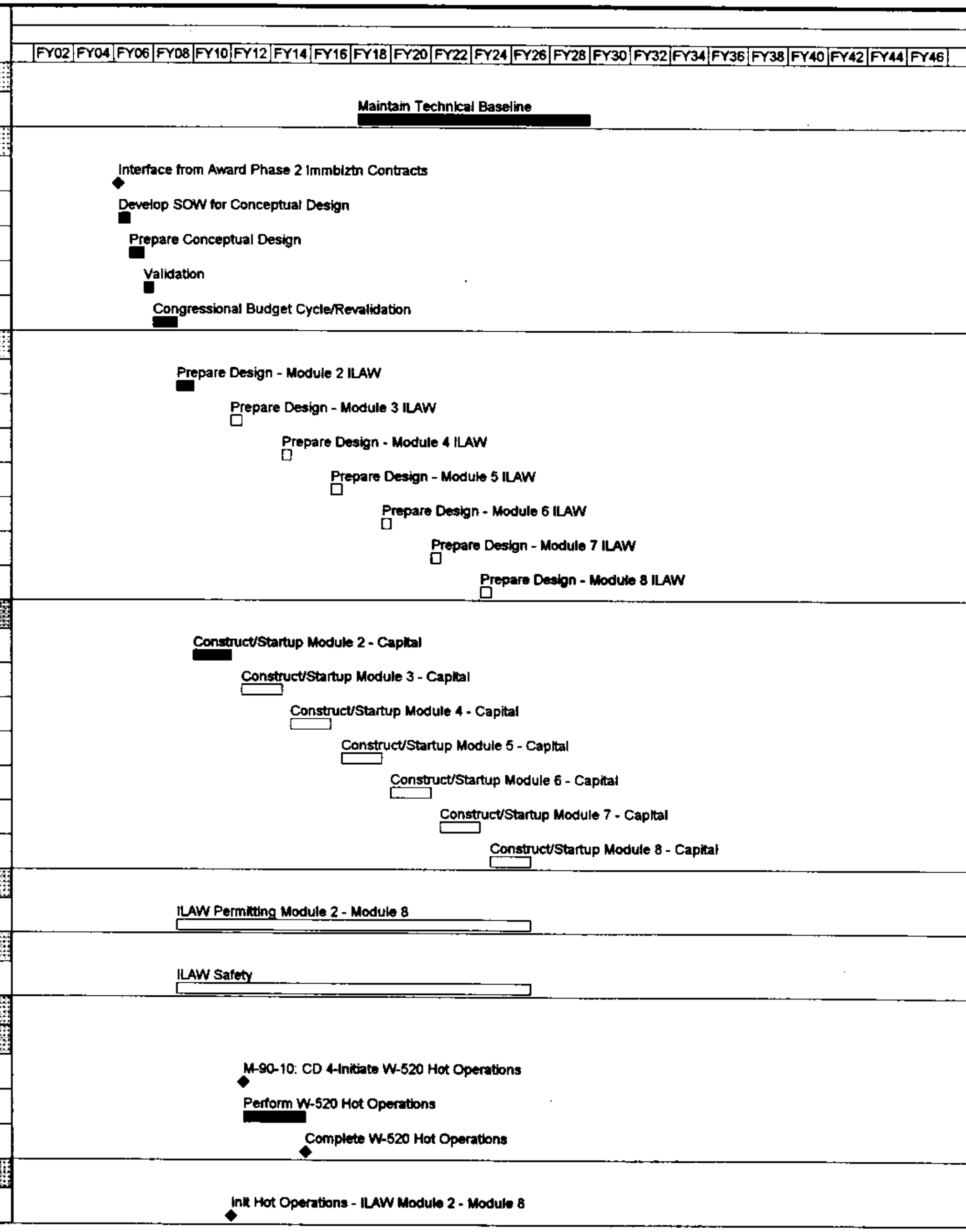
Sheet 16 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.01.04.08.11 W-520 Part B Permit Application, Rev. 1			
T946125J1	W-520 Part B Permit Application, Revision 1	26AUG08	23APR09
1.01.09.01.01.04.09 W-520 Authorization Basis Dev/Approval (460.130)			
T946130A1	W-520 Prelim Safety Evaluation Issues Resolution	01OCT03	30JAN04
T946130B1	W-520 PSE Revisit and Validation Preparation	02JAN04	30APR04
T946130C1	W-520 Design Optimization Documents Review	02JAN04	30SEP04
T946130C2	W-520 Design Optimization Documents Review	01OCT04	29SEP05
T946130D1	W-520 Task Plan for PSAR	02JAN04	30SEP04
T946130D2	W-520 Final Task Plan for PSAR	01OCT04	08AUG05
T946130D3	W-520 PSAR Development	09MAY06	07NOV06
T946130D4	W-520 PSAR Final and Approval	08NOV06	22FEB07
T946130E1	W-520 Detailed Design Review and CD 3 Support	10MAY06	29SEP06
T946130E2	W-520 Detailed Design Review and CD 3 Support	02OCT06	23AUG07
T946130F1	W-520 Develop SARP Statement of Work	01OCT03	31OCT03
T946130F2	W-520 SARP Development	03NOV03	30SEP04
T946130F3	W-520 SARP Final and Approval	01OCT04	29APR05
T946130G1	W-520 Task Plan for FSAR - Capital	02AUG06	29SEP06
T946130G2	W-520 USQ Screening - Capital	02OCT06	18JUN07
T946130G3	W-520 FSAR Development - Capital	19JUN07	16JUN08
T946130G4	W-520 FSAR Final and Approval - Capital	17JUN08	15SEP08
T946130H1	W-520 Dev TSRs/Rev Safety Equipment List-Capital	16SEP08	16DEC08
T946130J1	W-520 TSRs Implementation - Capital	17DEC08	29MAY09
T946130K1	W-520 Authrztn Basis Ann Updts/USQ Screening-Cap	01JUN09	30SEP09
1.01.09.01.01.05 ILAW Future Projects			
1.01.09.01.01.05.01 ILAW Project Management (600.005)			
T960005A0	ILAW Program Administration - Part 2	01FEB18	31JAN41
T960005A1	Independent Cost Estimate Review - Part 2	01FEB18	31JAN41
T960005A2	Risk Mgmt List Prep/Maint - Part 2	01FEB18	31JAN41
T960005A3	ILAW Buyer Support - Part 2	01FEB18	31JAN41
T960005A4	PMBS/SMBS Updates - Part 2	01FEB18	31JAN41
1.01.09.01.01.05.02 Update Technical Baseline (600.010)			
T960010A1	Revise Functions and Requirements	31JAN05	31JAN17
T960010A2	Prepare AGA	31JAN05	31JAN17
T960010A3	Level 1 Specification	31JAN05	31JAN17
T960010A4	Update DRD	31JAN05	31JAN17



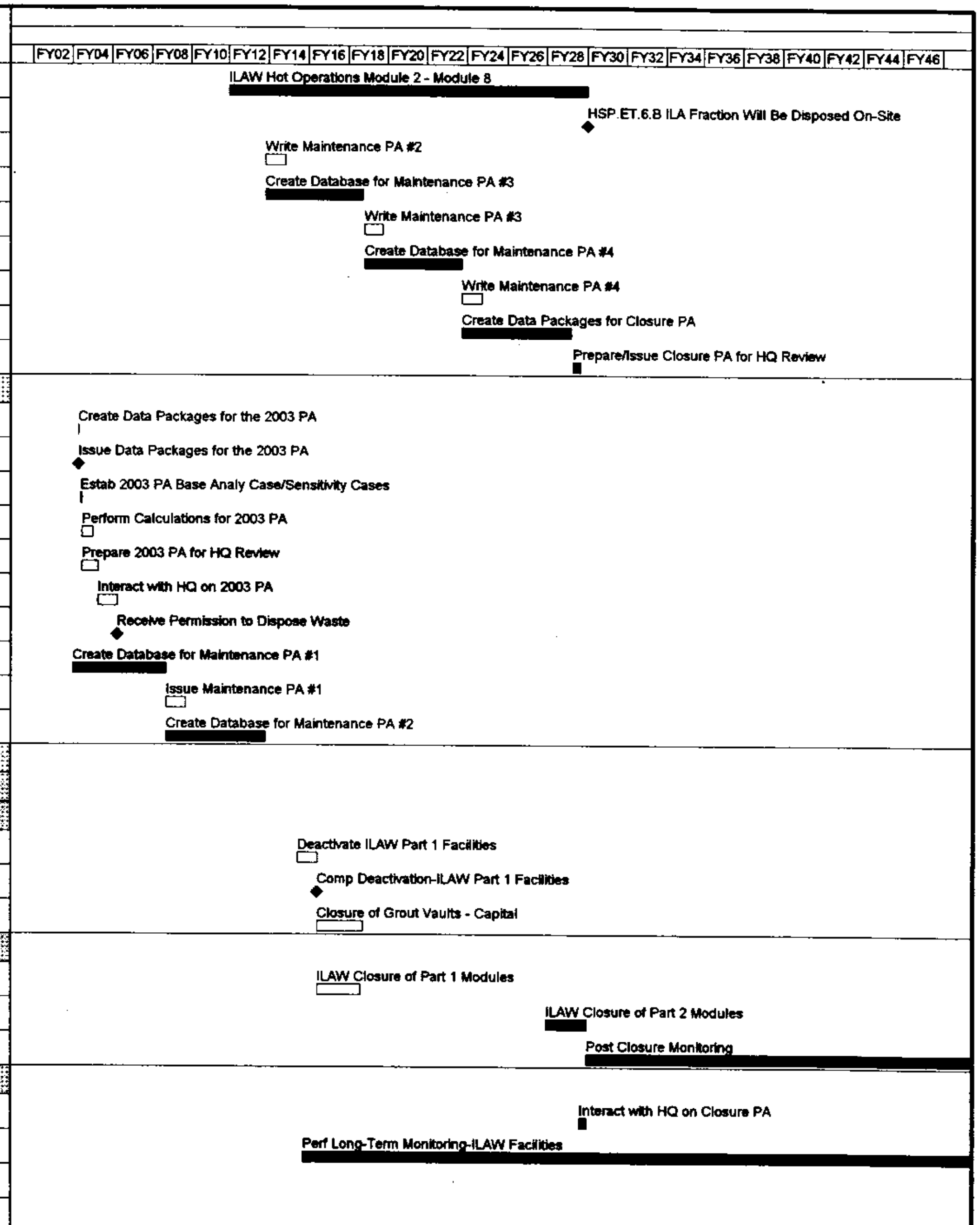
Sheet 17 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.01.05.03 Maintain Technical Baseline (600.015)			
T960015A1	Maintain Technical Baseline	01FEB17	29SEP28
1.01.09.01.01.05.04 CDR, ACDR, and Validation (600.020)			
T960020A1	Interface from Award Phase 2 Immblztn Contracts	31JAN05*	
T960020A2	Develop SOW for Conceptual Design	31JAN05	29JUL05
T960020A3	Prepare Conceptual Design	01AUG05	28APR06
T960020A4	Validation	01MAY06	29SEP06
T960020A5	Congressional Budget Cycle/Revalidation	02OCT06	31DEC07
1.01.09.01.01.05.05 Design (600.050)			
T960050A1	Prepare Design - Module 2 ILAW	02JAN08	30SEP08
T960050A2	Prepare Design - Module 3 ILAW	01OCT10	31MAR11
T960050A3	Prepare Design - Module 4 ILAW	01APR13	30SEP13
T960050A4	Prepare Design - Module 5 ILAW	01OCT15	31MAR16
T960050A5	Prepare Design - Module 6 ILAW	02APR18	28SEP18
T960050A6	Prepare Design - Module 7 ILAW	01OCT20	31MAR21
T960050A7	Prepare Design - Module 8 ILAW	03APR23	29SEP23
1.01.09.01.01.05.06 Construction (600.060)			
T960060A1	Construct/Startup Module 2 - Capital	01OCT08	30SEP10
T960060A2	Construct/Startup Module 3 - Capital	01APR11	29MAR13
T960060A3	Construct/Startup Module 4 - Capital	01OCT13	30SEP15
T960060A4	Construct/Startup Module 5 - Capital	01APR16	30MAR18
T960060A5	Construct/Startup Module 6 - Capital	01OCT18	30SEP20
T960060A6	Construct/Startup Module 7 - Capital	01APR21	31MAR23
T960060A7	Construct/Startup Module 8 - Capital	02OCT23	30SEP25
1.01.09.01.01.05.07 Permits (600.030)			
T960030A1	ILAW Permitting Module 2 - Module 8	02JAN08	30SEP25
1.01.09.01.01.05.08 Authorization Basis (600.035)			
T960035A1	ILAW Safety	02JAN08	30SEP25
1.01.09.01.01.06 ILAW Operations			
1.01.09.01.01.06.01 W-520 Operations (Balance Part 1) (470.075)			
T947075A1	M-90-10: CD 4-Initiate W-520 Hot Operations	17MAY11	
T947075A2	Perform W-520 Hot Operations	17MAY11	24JUN14
T947075A3	Complete W-520 Hot Operations		24JUN14
1.01.09.01.01.06.02 Operations and Monitoring (640.040)			
T964040A1	Init Hot Operations - ILAW Module 2 - Module 8	01OCT10	



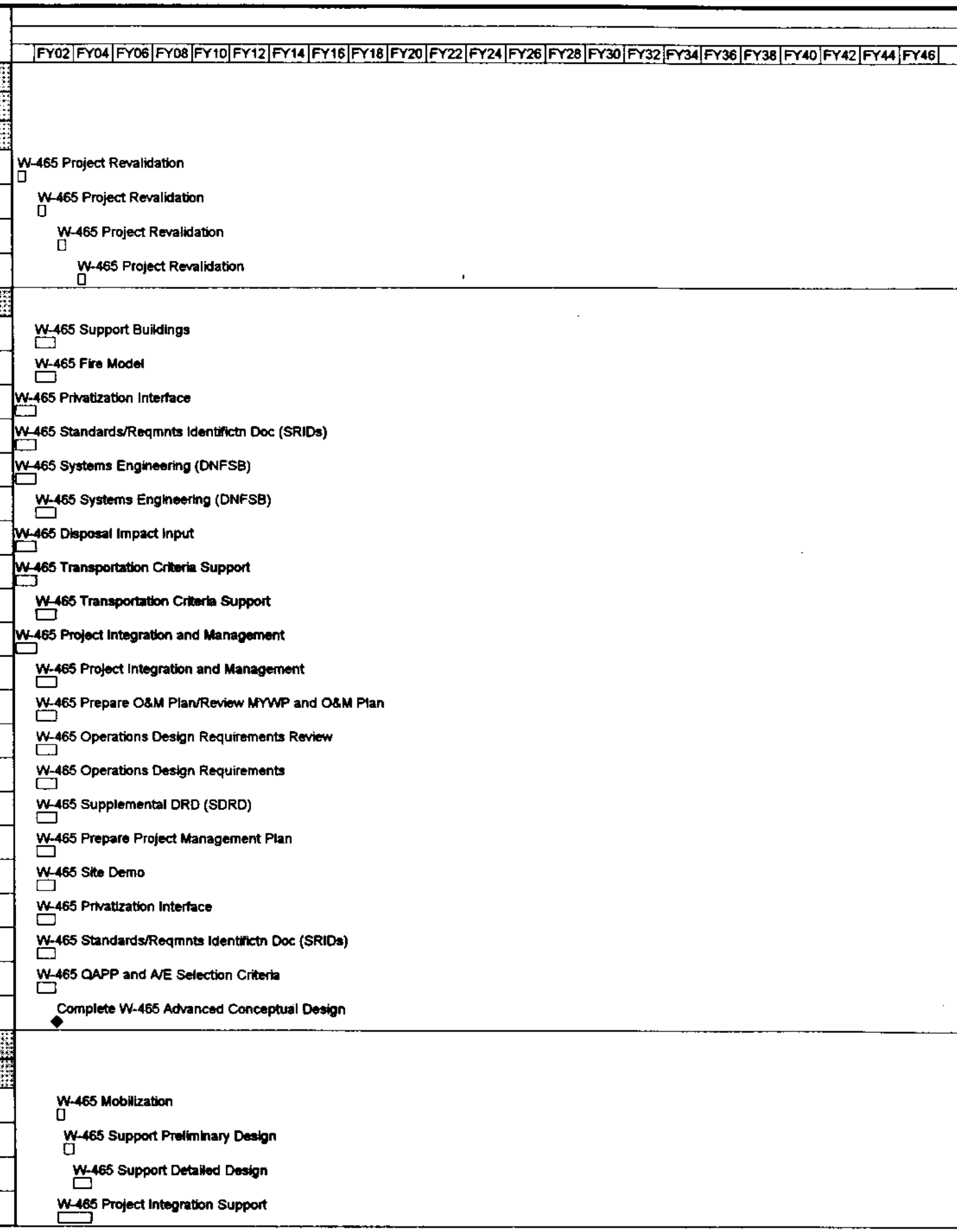
Sheet 18 of 24

Activity ID	Activity Description	Early Start	Early Finish
T964040A2	ILAW Hot Operations Module 2 - Module 8	01OCT10	29SEP28
T964040A2A	HSP.ET.6.B ILA Fraction Will Be Disposed On-Site		29SEP28
T964040B1	Write Maintenance PA #2	02JUL12	28JUN13
T964040B2	Create Database for Maintenance PA #3	02JUL12	30JUN17
T964040B3	Write Maintenance PA #3	05JUL17	29JUN18
T964040B4	Create Database for Maintenance PA #4	05JUL17	30JUN22
T964040B5	Write Maintenance PA #4	01JUL22	29JUN23
T964040B6	Create Data Packages for Closure PA	01JUL22	31DEC27
T964040B7	Prepare/Issue Closure PA for HQ Review	04JAN28	31MAY28
1.01.09.01.01.06.03 Maintain ILAW Part 1 Per Assessment (460.170)			
T946170A0	Create Data Packages for the 2003 PA	02JAN03	31JAN03
T946170A0A	Issue Data Packages for the 2003 PA		31JAN03
T946170A1	Estab 2003 PA Base Analy Case/Sensitivity Cases	03FEB03	31MAR03
T946170B	Perform Calculations for 2003 PA	01APR03	30SEP03
T946170C	Prepare 2003 PA for HQ Review	01APR03	30JAN04
T946170D	Interact with HQ on 2003 PA	02FEB04	31JAN05
T946170DA	Receive Permission to Dispose Waste		31JAN05
T946170I	Create Database for Maintenance PA #1	01OCT02	29JUN07
T946170J	Issue Maintenance PA #1	02JUL07	30JUN08
T946170K	Create Database for Maintenance PA #2	02JUL07	29JUN12
1.01.09.01.04 Close ILAW Disposal Facility			
1.01.09.01.04.01 ILAW D&D			
1.01.09.01.04.01.01 Close ILAW Disposal Facilities (470.080)			
T947080A1	Deactivate ILAW Part 1 Facilities	03MAR14	02MAR15
T947080A1A	Comp Deactivation-ILAW Part 1 Facilities		02MAR15
T947080B1	Closure of Grout Vaults - Capital	03MAR15	28JUN17
1.01.09.01.04.01.03 Closure/D&D (640.050)			
T964050A1	ILAW Closure of Part 1 Modules	03MAR15	31MAY17
T964050A2	ILAW Closure of Part 2 Modules	05OCT26	29SEP28
T964050A3	Post Closure Monitoring	02OCT28	30SEP48
1.01.09.01.04.01.04 Initiate Post-Closure Monitoring (550.020)			
T955020A1	Interact with HQ on Closure PA	01JUN28	29SEP28
T955020B1	Perf Long-Term Monitoring-ILAW Facilities	25JUN14	30SEP48
T955020B1A	Comp Long-Term Monitoring-ILAW Facilities		30SEP48
T955020B1B	END OF LLW DISPOSAL		30SEP48



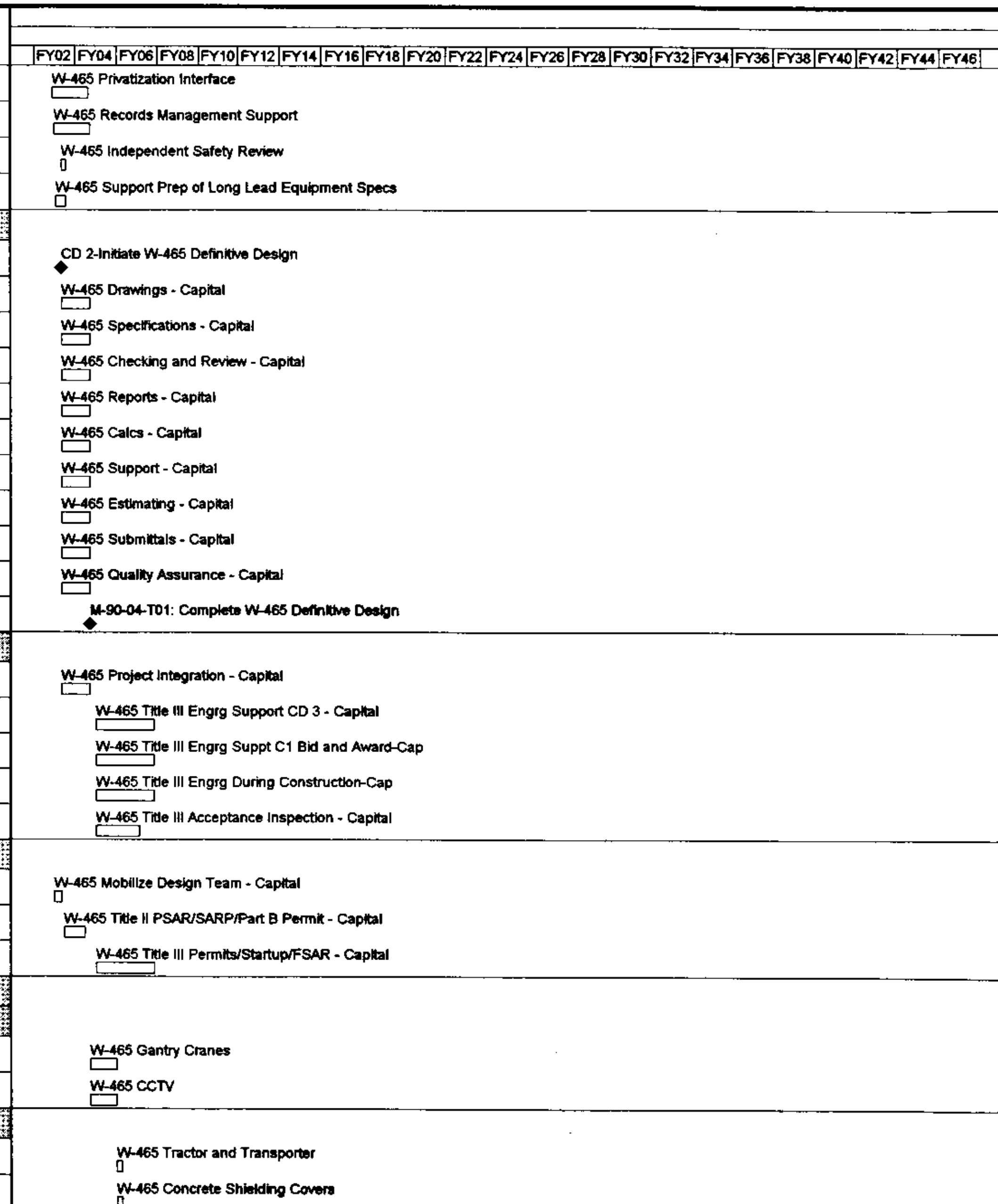
Sheet 19 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.05 Store ILAW On-Site			
1.01.09.01.05.01 Project W-465, Immobilized LAW Interim Stor Fac			
1.01.09.01.05.01.01 W-465 Project Revalidation (460.060)			
T946060A2	W-465 Project Revalidation	16DEC99	28APR00
T946060A3	W-465 Project Revalidation	15DEC00	30APR01
T946060A4	W-465 Project Revalidation	17DEC01	30APR02
T946060A5	W-465 Project Revalidation	16DEC02	30APR03
1.01.09.01.05.01.02 W-465 Advanced Conceptual Design (460.045)			
T946045B1	W-465 Support Buildings	02OCT00	28SEP01
T946045B2	W-465 Fire Model	02OCT00	28SEP01
T946045B3	W-465 Privatization Interface	01OCT99	29SEP00
T946045B4	W-465 Standards/Reqmnts Identifictn Doc (SRIDs)	01OCT99	29SEP00
T946045B5	W-465 Systems Engineering (DNFSB)	01OCT99	29SEP00
T946045B5A	W-465 Systems Engineering (DNFSB)	02OCT00	28SEP01
T946045B6	W-465 Disposal Impact Input	01OCT99	29SEP00
T946045B7	W-465 Transportation Criteria Support	01OCT99	29SEP00
T946045B7A	W-465 Transportation Criteria Support	02OCT00	28SEP01
T946045B8	W-465 Project Integration and Management	01OCT99	29SEP00
T946045B8A	W-465 Project Integration and Management	02OCT00	28SEP01
T946045B9	W-465 Prepare O&M Plan/Review MYWP and O&M Plan	02OCT00	28SEP01
T946045BA	W-465 Operations Design Requirements Review	02OCT00	28SEP01
T946045BB	W-465 Operations Design Requirements	02OCT00	28SEP01
T946045BC	W-465 Supplemental DRD (SDRD)	02OCT00	28SEP01
T946045BD	W-465 Prepare Project Management Plan	02OCT00	31AUG01
T946045BE	W-465 Site Demo	02OCT00	31AUG01
T946045BF	W-465 Privatization Interface	02OCT00	31AUG01
T946045BG	W-465 Standards/Reqmnts Identifictn Doc (SRIDs)	02OCT00	31AUG01
T946045BH	W-465 QAPP and A/E Selection Criteria	02OCT00	31AUG01
T946045BHA	Complete W-465 Advanced Conceptual Design		28SEP01
1.01.09.01.05.01.03 W-465 Design (460.065)			
1.01.09.01.05.01.03.01 W-465 Project Integration-Expense			
T946065A1	W-465 Mobilization	01OCT01	31JAN02
T946065A2	W-465 Support Preliminary Design	01FEB02	31JUL02
T946065A3	W-465 Support Detailed Design	01AUG02	30JUN03
T946065A4	W-465 Project Integration Support	01OCT01	30JUN03



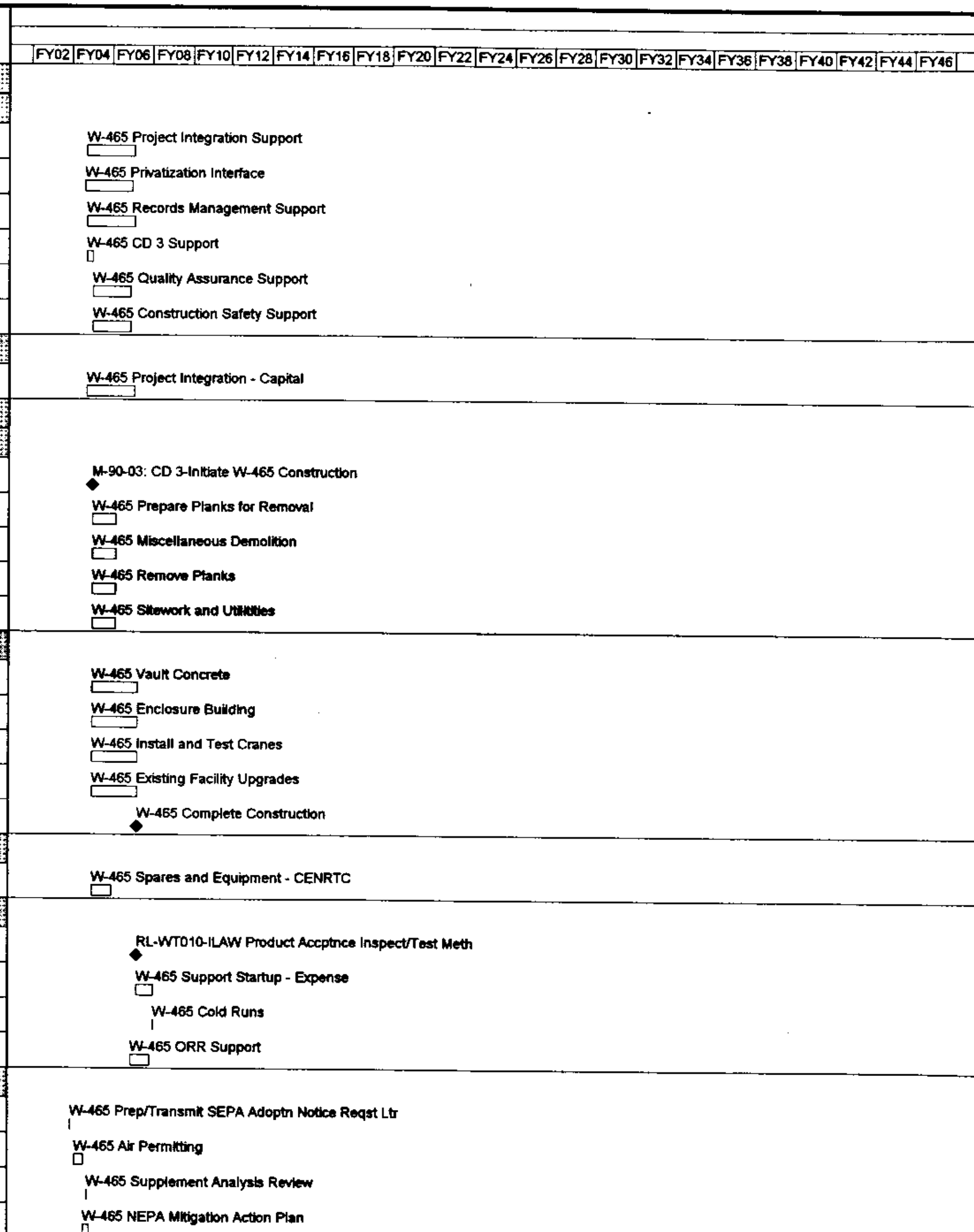
Sheet 20 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946065A5	W-465 Privatization Interface	04SEP01	30MAY03
T946065A6	W-465 Records Management Support	01OCT01	30JUN03
T946065A7	W-465 Independent Safety Review	01FEB02	30APR02
T946065A8	W-465 Support Prep of Long Lead Equipment Specs	31OCT01	30APR02
1.01.09.01.05.01.03.02 W-465 Definitive Design (Title I and II)-Capital			
T946065B1	CD 2-Initiate W-465 Definitive Design	01FEB02	
T946065B2	W-465 Drawings - Capital	01FEB02	30JUN03
T946065B3	W-465 Specifications - Capital	01FEB02	30JUN03
T946065B4	W-465 Checking and Review - Capital	01FEB02	30JUN03
T946065B5	W-465 Reports - Capital	01FEB02	30JUN03
T946065B6	W-465 Calcs - Capital	01FEB02	30JUN03
T946065B7	W-465 Support - Capital	01FEB02	30JUN03
T946065B8	W-465 Estimating - Capital	01FEB02	30JUN03
T946065B9	W-465 Submittals - Capital	01FEB02	30JUN03
T946065BA	W-465 Quality Assurance - Capital	01FEB02	30JUN03
T946065BB	M-90-04-T01: Complete W-465 Definitive Design		30JUN03
1.01.09.01.05.01.03.03 W-465 Title III-Capital			
T946065C1	W-465 Project Integration - Capital	01FEB02	30JUN03
T946065E1	W-465 Title III Engrg Support CD 3 - Capital	01OCT03	31JUL06
T946065E2	W-465 Title III Engrg Suppt C1 Bid and Award-Cap	01OCT03	31JUL06
T946065E3	W-465 Title III Engrg During Construction-Cap	01OCT03	31JUL06
T946065E4	W-465 Title III Acceptance Inspection - Capital	01OCT03	31OCT05
1.01.09.01.05.01.03.04 W-465 Other Support Work-Capital			
T946065D1	W-465 Mobilize Design Team - Capital	01OCT01	31JAN02
T946065D2	W-465 Title II PSAR/SARP/Part B Permit - Capital	01APR02	31MAR03
T946065F1	W-465 Title III Permits/Startup/FSAR - Capital	01OCT03	31JUL06
1.01.09.01.05.01.04 W-465 Equipment Procurement (460.068)			
1.01.09.01.05.01.04.01 W-465 P-1 Early Procurement			
T946068A1	W-465 Gantry Cranes	01JUL03	30SEP04
T946068A2	W-465 CCTV	01JUL03	30SEP04
1.01.09.01.05.01.04.02 W-465 P-2 Late Procurement			
T946068A3	W-465 Tractor and Transporter	01OCT04	31JAN05
T946068A4	W-465 Concrete Shielding Covers	01OCT04	31JAN05



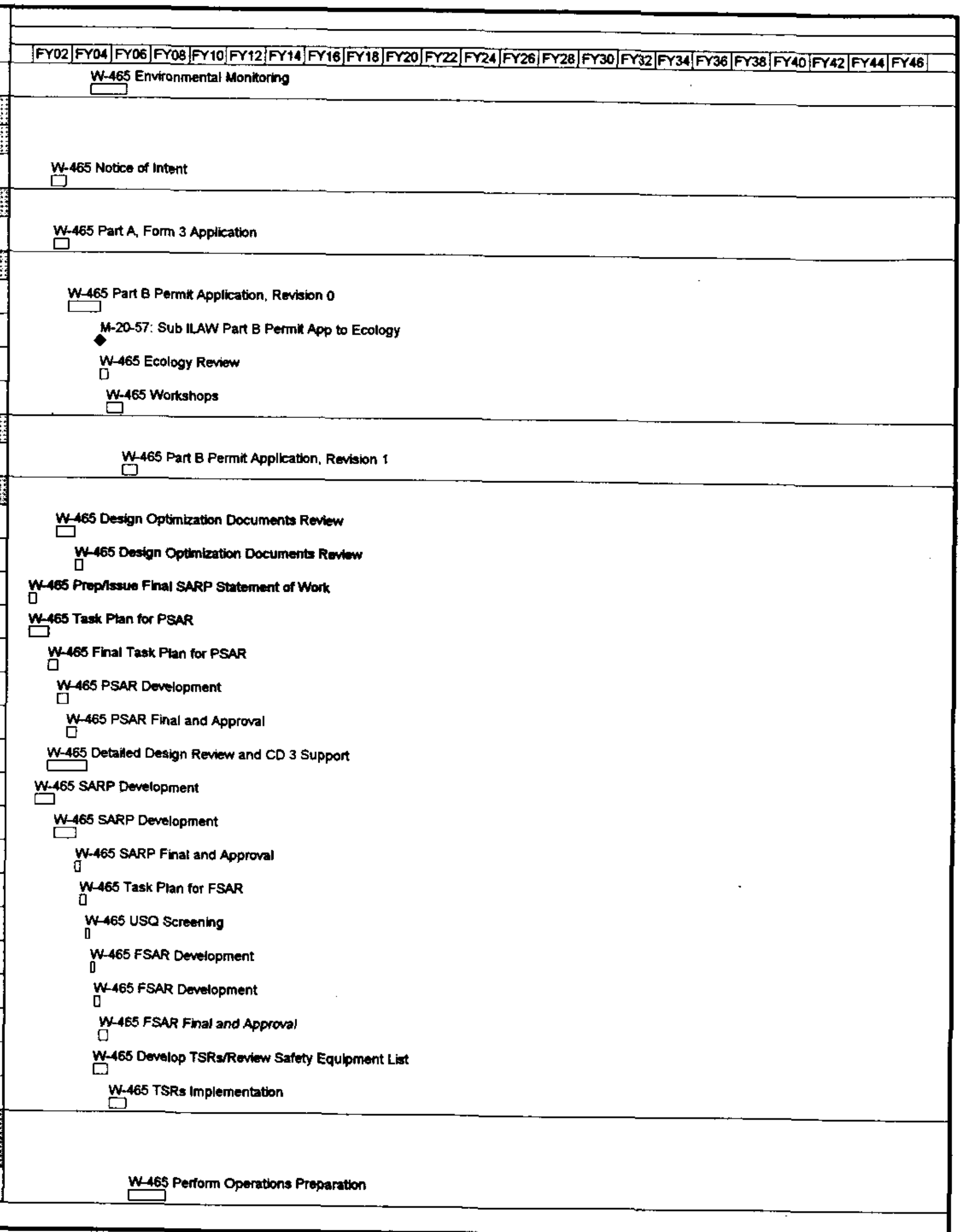
Sheet 21 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.05.01.05 W-465 Modify Vaults (460.070)			
1.01.09.01.05.01.05.01 W-465 Project Integration-Expense			
T946070A1	W-465 Project Integration Support	01JUL03	31OCT05
T946070A2	W-465 Privatization Interface	02JUN03	30SEP05
T946070A3	W-465 Records Management Support	01JUL03	31OCT05
T946070A4	W-465 CD 3 Support	01JUL03	30SEP03
T946070A5	W-465 Quality Assurance Support	01OCT03	30AUG05
T946070A6	W-465 Construction Safety Support	01OCT03	30AUG05
1.01.09.01.05.01.05.02 W-465 Project Integration-Capital			
T946070B1	W-465 Project Integration - Capital	01JUL03	31OCT05
1.01.09.01.05.01.05.03 W-465 Construction-Capital			
1.01.09.01.05.01.05.03.01 W-465 C-1 Early Construction			
T946070C1	M-90-03: CD 3-Initiate W-465 Construction	01OCT03	
T946070C2	W-465 Prepare Planks for Removal	01OCT03	30NOV04
T946070C3	W-465 Miscellaneous Demolition	01OCT03	30NOV04
T946070C4	W-465 Remove Planks	01OCT03	30NOV04
T946070C5	W-465 Sitework and Utilities	01OCT03	30NOV04
1.01.09.01.05.01.05.03.02 W-465 C-2 Late Construction			
T946070D1	W-465 Vault Concrete	01OCT03	31JAN06
T946070D2	W-465 Enclosure Building	01OCT03	31JAN06
T946070D3	W-465 Install and Test Cranes	01OCT03	31JAN06
T946070D4	W-465 Existing Facility Upgrades	01OCT03	31JAN06
T946070D5	W-465 Complete Construction		31JAN06
1.01.09.01.05.01.05.04 Spares and Equipment - CENRTC			
T946070E1	W-465 Spares and Equipment - CENRTC	01OCT03	29SEP04
1.01.09.01.05.01.06 W-465 Proc/Train/OTP/ORR (Init Part 1)(470.010)			
T947010A1	RL-WT010-ILAW Product Accptnce Inspect/Test Meth	01FEB06	
T947010A2	W-465 Support Startup - Expense	01FEB06	31OCT06
T947010A3	W-465 Cold Runs	01NOV06	30NOV06
T947010A4	W-465 ORR Support	03OCT05	31AUG06
1.01.09.01.05.01.07 W-465 NEPA Documentation (460.075)			
T946075A1	W-465 Prep/Transmit SEPA Adoptn Notice Reqst Ltr	01OCT02	14OCT02
T946075A2	W-465 Air Permitting	02DEC02	09JUN03
T946075A3	W-465 Supplement Analysis Review	31JUL03	06AUG03
T946075A4	W-465 NEPA Mitigation Action Plan	10JUN03	08SEP03



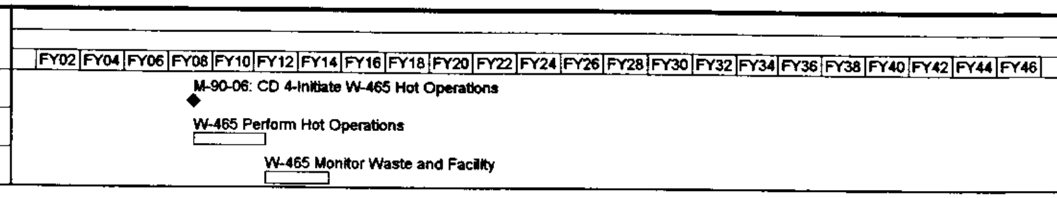
Sheet 22 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946075A5	W-465 Environmental Monitoring	01OCT03	29JUL05
1.01.09.01.05.01.08 W-465 RCRA Permits (460.080)			
1.01.09.01.05.01.08.01 W-465 Notice of Intent (NOI)			
T946080A1	W-465 Notice of Intent	01OCT01	28JUN02
1.01.09.01.05.01.08.02 W-465 Part A Permit Application			
T946080B1	W-465 Part A, Form 3 Application	27DEC01	30AUG02
1.01.09.01.05.01.08.03 W-465 Part B Permit Application, Rev. 0			
T946080C1	W-465 Part B Permit Application, Revision 0	03SEP02	30APR04
T946080C1A	M-20-57: Sub ILAW Part B Permit App to Ecology		30APR04
T946080C2	W-465 Ecology Review	03MAY04	31AUG04
T946080C3	W-465 Workshops	01SEP04	30JUN05
1.01.09.01.05.01.08.04 W-465 Part B Permit Application, Rev. 1			
T946080D1	W-465 Part B Permit Application, Revision 1	01JUL05	31MAR06
1.01.09.01.05.01.09 W-465 Authorization Basis Dev/Approval (460.085)			
T946085A1	W-465 Design Optimization Documents Review	01FEB02	31JAN03
T946085B1	W-465 Design Optimization Documents Review	03FEB03	30JUN03
T946085C1	W-465 Prep/Issue Final SARP Statement of Work	02OCT00	28FEB01
T946085D1	W-465 Task Plan for PSAR	02OCT00	28SEP01
T946085D2	W-465 Final Task Plan for PSAR	01OCT01	29MAR02
T946085D3	W-465 PSAR Development	01APR02	30SEP02
T946085D4	W-465 PSAR Final and Approval	01OCT02	31MAR03
T946085E1	W-465 Detailed Design Review and CD 3 Support	01OCT01	30SEP03
T946085F1	W-465 SARP Development	01MAR01	28FEB02
T946085F2	W-465 SARP Development	01MAR02	31MAR03
T946085F3	W-465 SARP Final and Approval	01APR03	30JUN03
T946085G1	W-465 Task Plan for FSAR	01JUL03	30SEP03
T946085G2	W-465 USQ Screening	01OCT03	31DEC03
T946085G3	W-465 FSAR Development	02JAN04	31MAR04
T946085G4	W-465 FSAR Development	01APR04	30JUN04
T946085G5	W-465 FSAR Final and Approval	01JUL04	31DEC04
T946085H1	W-465 Develop TSRs/Review Safety Equipment List	01APR04	31DEC04
T946085J1	W-465 TSRs Implementation	04JAN05	31OCT05
1.01.09.01.05.02 W-465 Operations			
1.01.09.01.05.02.01 W-465 Operations (Initial Part 1) (470.040)			
T947040A1	W-465 Perform Operations Preparation	01FEB06	31DEC07



Sheet 23 of 24

Activity ID	Activity Description	Early Start	Early Finish
T947040A2	M-90-06: CD 4-Initiate W-465 Hot Operations	02JAN08	
T947040A3	W-465 Perform Hot Operations	02JAN08	31MAR11
T947040A4	W-465 Monitor Waste and Facility	01APR11	28FEB14



Sheet 24 of 24

DISTRIBUTION

Number of Copies		
Onsite	U.S. Department of Energy	
5	C. A. Babel	A0-21
	P. E. Lamont	A0-21
	S. A. Sieracki	A7-08
	B. L. Williams	A0-21
	Reading Room	H2-53
8	Fluor Daniel Hanford, Inc.	
	J. C. Allen-Floyd	S7-40
	D. J. Ashley	A3-03
	S. K. Barnard	B3-70
	L. E. Borneman	A3-03
	J. L. Jacobsen	B3-70
	P. T. Jewell	H8-46
	T. B. Veneziano	S7-40
	D. J. Washenfelder	A3-03
14	Lockheed Martin Hanford Corporation	
	H. L. Boston	R2-53
	S. D. Brumley	H7-07
	D. A. Burbank	S4-45
	K. C. Burgard	S4-45
	P. A. Craig	R1-04
	M. L. Deffenbaugh	R1-51
	M. P. DeLozier	H7-07
	L. R. Dunbar	H7-07
	M. D. Ebben	H7-07
	M. P. Payne	R2-58
	C. J. Rice	R2-53
	R. W. Root	R2-53
	R. F. Wood	H7-07
	HLB/File LB	H7-07
5	Lockheed Martin Services, Inc.	
	Central Files	A3-88
	OSTI (2)	
	TFIC	
	EDMC	

DISTRIBUTION

Number of Copies

1	Pacific Northwest National Laboratory Hanford Technical Library	P8-55

Sta. 6. S

MAY 18 2000 **ENGINEERING DATA TRANSMITTAL**

Page 1 of 1

1. EDT 703451

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) CH2MHill Hanford Group, Inc.	4. Related EDT No.: N/A
		7. Purchase Order No.: N/A
5. Proj./Prog./Dept./Div.: River Protection Project	6. Design Authority/Design Agent/Cog. Engr.: D.A. Burbank	9. Equip./Component No.: N/A
8. Originator Remarks: This EDT is bringing revision 1 of HNF-1517 into the Hanford Document Control System (HDCS) for the purpose of establishing formal change control. Revision Ø was published December 1997 but not officially released. Revision 1 was published September 1999 under cover of correspondence: LMHC-9956054. Rev Ø is in RMIS.		10. System/Bldg./Facility: N/A
		12. Major Assm. Dwg. No.: N/A
11. Receiver Remarks: N/A	11A. Design Baseline Document? ☑ Yes ☐ No	13. Permit/Permit Application No.: N/A
		14. Required Response Date: N/A

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	HNF-1517		1	River Protection Project Immobilized Low-Activity Waste Disposal Plan	N/A	1		

16. KEY

Approval Designator (F)	Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information	4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment	4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Authority D.A. BURBANK	[signature]	5/17/00	S4-45						
		Design Agent									
		Cog. Eng.									
		Cog. Mgr.									
		QA									
		Safety									
		Env.									

18.	19.	20.	21. DOE APPROVAL (if required)
Henry W. Booth [signature] 17 May 2000 Signature of EDT Originator / Date	Authorized Representative for Receiving Organization / Date	[signature] 5/17/00 Design Authority/ Cognizant Manager / Date	Ctrl No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments

BD-7400-172 (05/96)

River Protection Project Immobilized Low-Activity Waste Disposal Plan

D.A Burbank
CH2MHill Hanford Group, Inc.
Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-99RL14047

EDT/ECN: 703451
Cost Center:
B&R Code:
UC:
Charge Code:
Total Pages: 154

Key Words: River Protection Project, Immobilized Low-Activity Waste,

Abstract: N/A

5/17/00

Release Approval | Date

DATE:
STA: 4
HANFORD
RELEASE
ID: 2
MAY 18 2000

Release Stamp

Approved For Public Release

HNF-1517
Revision 1

River Protection Project Immobilized Low-Activity Waste Disposal Plan

Prepared for the U.S. Department of Energy

FLUOR DANIEL HANFORD, INC.
Richland, Washington

Hanford Management and Integration Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

APPROVED FOR PUBLIC RELEASE

HNF-1517
Revision 1

River Protection Project Immobilized Low-Activity Waste Disposal Plan

D. A. Burbank
Lockheed Martin Hanford Corporation

Date Published
September 1999

Prepared for the U.S. Department of Energy

FLUOR DANIEL HANFORD, INC.
Richland, Washington

Hanford Management and Integration Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

APPROVED FOR PUBLIC RELEASE

CONTENTS

1.0 INTRODUCTION 1-1
  1.1 DOCUMENT PURPOSE 1-1

2.0 HANFORD SITE MISSION 2-1
  2.1 RIVER PROTECTION PROJECT MISSION 2-1
  2.2 RIVER PROTECTION PROJECT IMMOBILIZED TANK WASTE STORAGE AND DISPOSAL MISSION 2-2
  2.3 IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL MISSION AND OBJECTIVES 2-2

3.0 SCOPE OF IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SUBPROJECT 3-1
  3.1 SCOPE OF IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SUBPROJECT PLAN 3-1

4.0 PROJECT BACKGROUND AND TECHNICAL APPROACH 4-1
  4.1 GENERAL CHARACTERISTICS OF TANK WASTE AND VITRIFICATION FEEDS TO BE PROCESSED 4-1
  4.2 PROJECTED INVENTORIES OF IMMOBILIZED LOW-ACTIVITY WASTE 4-1
  4.3 OPTIONS FOR GOVERNMENT AND COMMERCIAL ACTIVITIES AND CONCEPT SELECTION AND IMPLEMENTATION 4-4
  4.4 CURRENT GOVERNMENT/COMMERCIAL LOW-LEVEL WASTE DISPOSAL ACTIVITIES 4-8
  4.5 DISPOSAL FACILITIES DESCRIPTION 4-8

5.0 REQUIREMENTS 5-1
  5.1 PERFORMANCE ASSESSMENT REQUIREMENTS 5-1
  5.2 REGULATORY REQUIREMENTS 5-1

6.0 TOP-LEVEL WORK BREAKDOWN STRUCTURE 6-1
  6.1 DISPOSE IMMOBILIZED LAW ON SITE 6-3
  6.2 MAINTAIN SAFE & COMPLIANT IMMOBILIZED LAW DISPOSAL FACILITY IN CP AREAS 6-3
  6.3 TRANSITION IMMOBILIZED LAW DISPOSAL FACILITY 6-3
  6.4 CLOSE IMMOBILIZED LAW DISPOSAL FACILITY 6-4
  6.5 STORE ILAW 6-4

7.0 RIVER PROTECTION PROJECT IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL LOGIC 7-1

8.0 RIVER PROTECTION PROJECT IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SCHEDULE 8-1
  8.1 TRI-PARTY AGREEMENT CONTROLLING MILESTONES 8-1
  8.2 OTHER REQUIREMENTS 8-2
  8.3 SCHEDULE REQUIREMENTS 8-2
    8.3.1 Milestones, Key Deliverables, and Performance Measures 8-3
    8.3.2 Schedule Critical Path 8-3

9.0 PROJECT COST 9-1

10.0 PROJECT ORGANIZATION, ROLES, AND RESPONSIBILITIES 10-1

11.0 MANAGEMENT APPROACH 11-1
11.1 BUSINESS OPERATIONS 11-1
11.1.1 Project Execution Plans (Phase 1 and 2 ILAW Disposal Line-Item Projects) 11-1
11.1.2 Acquisition Strategy 11-2
11.1.3 Schedule Baseline Control 11-2
11.1.4 Cost Baseline Control 11-3
11.1.5 Performance Measurement and Reporting 11-3
11.1.6 Work Authorization 11-4
11.1.7 Funds Management 11-4
11.1.8 Contingency Management 11-4
11.1.9 Meetings and Reviews 11-5
11.1.10 Project Validations 11-5
11.1.11 Critical Decisions 11-5
11.2 ENGINEERING 11-5
11.2.1 System Engineering Management 11-5
11.2.2 Technical Baseline Control 11-8
11.2.3 Test and Evaluation Plan 11-8
11.3 QUALITY, SAFETY, AND ENVIRONMENTAL PROTECTION 11-10
11.3.1 Environmental Management 11-10
11.3.2 Regulatory Compliance with Disposal Facility Requirements 11-12
11.3.3 Nuclear Safety Activities and Authorization Basis Process 11-12
11.4 BASELINE MANAGEMENT 11-17

12.0 RISK MANAGEMENT 12-1
12.1 APPROVAL REQUIREMENTS 12-1
12.1.1 Performance Assessment Approval 12-1

13.0 CONFIGURATION MANAGEMENT 13-1

14.0 INTERFACE MANAGEMENT 14-1
14.1 INTERFACING ORGANIZATIONS AND APPROVAL AUTHORITIES 14-1

15.0 QUALIFICATIONS AND TRAINING 15-1

16.0 REFERENCES 16-1

APPENDICES

A Cross-Check Matrix of Plan Elements .... A-i

B Applicable Documents .... B-i

C Summary of Hanford Low-Level Tank Waste Performance Assessment, DOE/RL-97-69, Rev. 0 .... C-i

D Key Deliverables and Performance Measurements .... D-i

E Division of Responsibility Matrix• Immobilized Low-Activity Waste Storage/Disposal Subproject .... E-i

F Immobilized Low-Activity Waste Subproject Schedule .... F-i

LIST OF FIGURES

Figure 1. Immobilized Low-Activity Waste Disposal Program. 4-5

Figure 2. Site Plan for the Immobilized Low-Activity Waste Disposal Location. 4-9

Figure 3. Immobilized Low-Activity Waste Disposal Concept Using Grout Vaults....4-10

Figure 4. Conceptual Immobilized Low-Activity Waste Disposal Site Development Plan. 4-12

Figure 5. Low-Activity Waste Storage and Disposal Subproject. 7-2

Figure 6. Immobilized Low-Activity Waste Disposal Subproject Organizational Relationships....10-2

Figure 7. Systems Engineering Activities and Documentation—Project W-465. 11-7

Figure 9. Programmatic Risk Management Process. 12-2

LIST OF TABLES

Table 1. Summary of Immobilized Low-Activity Waste Package Production for the Immobilized Low-Activity Waste Disposal Subproject. 4-3

Table 2. Immobilized Low-Activity Waste Disposal Subproject Work Breakdown Structure..6-1

Table 3. Tri-Party Agreement Milestones for the Immobilized Low-Activity Waste Storage and Disposal Project. 8-1

Table 4. Major Subproject Activities and Activity Durations. 8-3

Table 5a. Immobilized Low-Activity Waste Storage Subproject Estimated Life-Cycle Costs - FY 2000-FY 2018. 9-2

Table 5b. Immobilized Low-Activity Waste Storage Subproject Estimated Life-Cycle Costs - FY 2019-FY 2050. 9-4

Table 6. Safety-Related Activities and Schedule. 11-15

Table 7. Immobilized Low-Activity Waste Disposal Subproject Activities that Require Approval. 12-3

TERMS

AGA	alternatives generation and analysis
CAT	construction acceptance test
CD	critical decision
CDR	conceptual design report
CENRTC	Capital expense not related to construction
CFR	*Code of Federal Regulations*
CSB	canister storage building
CWBS	contractor work breakdown structure
DOE-HQ	U.S. Department of Energy-Headquarters
DOE	U.S. Department of Energy
DPD	Tank Waste Processing and Disposal Program Division
DRD	design requirements document
DST	double-shell tank
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
FSAR	final safety analysis report
FY	fiscal year
HLW	high-level waste
ICD	interface control document
IHLW	immobilized high-level waste
ILAW	immobilized low-activity waste
LAW	low-activity waste
LLW	low-level waste
MYWP	multi-year work plan
NEPA	*National Environmental Policy Act of 1969*
NRC	U.S. Nuclear Regulatory Commission
ORP	Office of River Protection
PA	performance assessment
PHMC	Project Hanford Management Contractor
PEP	project execution plan
PSAR	preliminary safety analysis report
PSE	preliminary safety evaluation
QAPP	quality assurance project plan
RCRA	*Resource Conservation and Recovery Act of 1976*
RFP	request for proposals
RL	U.S. Department of Energy, Richland Operations Office
ROD	record of decision
RPP	River Protection Project
SAR	safety analysis report
SEMP	system engineering and management plan
SEPA	"State Environmental Policy Act of 1971"
SSC	structures, systems, and components

SST	single-shell tank
TPC	total project cost
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TWRS	Tank Waste Remediation System
WAC	*Washington Administrative Code*
WBS	work breakdown structure

RIVER PROTECTION PROJECT IMMOBILIZED LOW-ACTIVITY WASTE DISPOSAL PLAN

1.0 INTRODUCTION

The *TWRS Retrieval and Disposal Mission Immobilized Low-Activity Waste Disposal Plan*, Revision 0, was issued in fiscal year (FY) 1998 (Shade 1997). Since the issuance of this Plan, several important programmatic events have occurred that warrant revision of the Plan. The primary events that impact the immobilized low-activity waste (ILAW) waste disposal mission are the evolution of the Phase 1A privatization contract to Phase 1B; new planning guidance (Taylor 1998) from the U.S. Department of Energy, Office of River Protection (DOE ORP) to the Project Hanford Management Contract (PHMC) team based on the Phase 1B contract, update of cited references, change to the format of the Plan to provide consistency with the format of HNF-1883, *Program Plan for the River Protection Project* (Norman 1999); and general editorial modifications to the document.

This plan supports the privatization need dates as described in the 90% confidence case in the July 1998 report to Congress (DOE 1998).

1.1 DOCUMENT PURPOSE

This project plan has a twofold purpose. First, it provides a waste stream project plan specific to the River Protection Project (RPP) (formerly the Tank Waste Remediation System [TWRS] Project) Immobilized Low-Activity Waste (ILAW) Disposal Subproject for the Washington State Department of Ecology (Ecology) that meets the requirements of *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) Milestone M-90-01 (Ecology et al. 1994) and is consistent with the project plan content guidelines found in Section 11.5 of the Tri-Party Agreement action plan (Ecology et al. 1998). Second, it provides an upper tier document that can be used as the basis for future subproject line-item construction management plans. The planning elements for the construction management plans are derived from applicable U.S. Department of Energy (DOE) planning guidance documents (DOE Orders 4700.1 [DOE 1992] and 430.1 [DOE 1995a]). The format and content of this project plan are designed to accommodate the requirements mentioned by the Tri-Party Agreement and the DOE orders. A cross-check matrix is provided in Appendix A to explain where in the plan project planning elements required by Section 11.5 of the Tri-Party Agreement are addressed.

The RPP TWRS Immobilized Waste Storage and Disposal Project is divided into three subprojects.

- The Canister Storage Building (CSB) Subproject
- The ILAW Disposal Facility Subproject
- The IHLW Storage Modules Subproject, Part 2.

This document discusses the project plan for the ILAW Disposal Subproject. Updates to this document (i.e., scope, cost, and schedule) will be reflected in appropriate multi-year activity planning and subproject technical baseline documents.

This project plan is supplemented by the information contained in the following:

- Appendix A—Cross-Check Matrix of Plan Elements
- Appendix B—Applicable Documents
- Appendix C—Summary of *Hanford Immobilized Low-Activity Tank Waste Performance Assessment* (Mann 1998a)
- Appendix D—Key Deliverables and Performance Measurements
- Appendix E—Division of Responsibility Matrix—Immobilized Low-Activity Waste Disposal Subproject
- Appendix F—Immobilized Low-Activity Waste Subproject Schedule.

2.0 HANFORD SITE MISSION

As part of the Hanford Site mission, the DOE has established the Office of River Protection (ORP) to manage the tank waste activities. The *Office of River Protection Integration Management Plan for the Hanford Tank Waste Remediation System* (DOE/RL-99-06) (RL 1999) states:

> "The ORP mission is to store, treat, and immobilize highly radioactive Hanford Site waste (including current and future tank waste and cesium and strontium capsules) in an environmentally sound, safe, and cost-effective manner. The long-term goal is to protect the Columbia River from future tank waste leaks."

2.1 RIVER PROTECTION PROJECT MISSION

The RPP will provide safe storage and management of the legacy and new waste, retrieval and disposal of the waste, decontamination and decommissioning (D&D) of RPP facilities, and closure of RPP sites.

To support environmental remediation and restoration at the Hanford Site, the ORP has established a two-phase approach of using private contractors to treat and immobilize the radioactive waste currently stored in underground tanks at the Site. Treatment will produce a small volume of high-level waste and a much larger volume of low-activity waste. After immobilization, the high-level waste will be held in interim storage for eventual shipment to a high-level waste repository and the low-activity waste will be disposed of on site. The request for proposals (RFP) for the first phase of waste treatment and immobilization was issued in February 1996 (Wagoner 1996) and initial contracts for two private contractor teams led by BNFL Inc. and Lockheed-Martin Advanced Environmental Services (RL 1996b) were signed in September 1996. In 1998, the BNFL contract was amended to continue with more detailed design and planning activities (RL 1998a). Phase 1 is a proof-of-concept and commercial demonstration effort with the following goals:

- Demonstrate the technical and business feasibility of using private facilities to treat Hanford Site waste
- Maintain radiological, nuclear, process, and occupational safety
- Maintain environmental protection and compliance while reducing life-cycle costs and waste treatment times.

Phase 1 production of ILAW is planned to begin in June 2008 and could treat up to about 13 percent of the waste. Phase 1 production is expected to be completed in 2018. Phase 2 is a full-scale production effort that will begin in 2012 and treat and immobilize most of the remaining waste. ILAW production in Phase 2 is scheduled to be completed by 2024.

The DOE will supply the feed to the private contractors and will receive the ILAW product from the private treatment facilities during Phase 1. For Phase 2, retrieval and feed delivery, as well as waste treatment and immobilization, will be done by private contractors.

The DOE will pay the private contractors for each ILAW package that meets the product specifications. DOE, the ILAW disposal Project, and the contractor are working closely to develop product specifications that will meet the performance requirements. Acceptance of immobilized waste will be based on private contractor activities to qualify, verify, document, and certify the product and DOE activities to audit, review, inspect, and evaluate the treatment and immobilization process and products. The acceptance process is expected to result in ILAW product packages certified for transport and disposal at the Hanford Site safely and in compliance with environmental regulations.

2.2 RIVER PROTECTION PROJECT IMMOBILIZED TANK WASTE STORAGE AND DISPOSAL MISSION

The DOE ORP established the RPP Storage and Disposal (S&D) Project to perform storage and disposal functions for IHLW and ILAW products generated as part of the RPP privatization effort. The Project also will provide integration with federal disposal facilities. To accomplish its mission, the RPP S&D Project is divided into three subprojects: the Canister Storage Building Subproject, the ILAW Disposal Facility Subproject, and the IHLW Storage Modules Subproject. This plan addresses the ILAW Disposal Facilities Subproject.

2.3 IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL MISSION AND OBJECTIVES

The mission of the ILAW Disposal Subproject is to receive the certified ILAW packages produced by private contractor, transport the packages to a disposal site on the 200 Area Plateau of the Hanford Site, and dispose of the packages at the Hanford Site. The mission includes the following activities:

- Designing, constructing, and operating ILAW disposal facilities for initial Phase 1 production (retrofitted grout vaults). This includes developing and operating a system for transporting the product from the private contractors to the disposal facilities.

- Preparing performance assessments for U.S. Department of Energy-Headquarters (DOE-HQ) authorization for construction and operation of disposal facilities.

- Constructing additional disposal facilities for the remaining Phase 1 production and all the Phase 2 production.

- Developing closure procedures and obtaining authorization from DOE-HQ and other regulatory agencies via permitting and performance assessment analyses for closure and long-term monitoring activities to establish a permanent ILAW package disposal system.

Initial project planning contemplated interim storage of ILAW in the grout vaults in the year 2002 pending completion of the disposal performance assessment work and disposal authorization. The revised BNFL contract schedule allows the ILAW disposal performance assessment and disposal authorization to be completed before production begins. Therefore, the grout vault modifications will now be completed for operation as a disposal facility. The disposal action itself will be planned to include a period for product retrieval if circumstances make it necessary.

The objectives of this project are to evaluate, select, and implement alternatives for design, construction, operation, and closure of ILAW disposal facilities. The following specific objectives are discussed in more detail in subsequent sections.

- Select the optimum alternatives for a disposal system that meet expected ILAW package specifications and production rates as well as disposal constraints. These alternatives are evaluated and selected by alternatives generation and analysis (AGA) studies. (Section 4.3)

- Select an appropriate site for the disposal system on the 200 Area plateau and obtain authorization designating the site for ILAW disposal. Site authorization has been obtained from the RL Site Infrastructure Division (Rutherford 1997). (Section 2.3)

- Develop package transportation and handling facilities consistent with expected package characteristics, such as contact versus remote handled, based on contract requirements and private contractor interface agreements. (Section 11.2)

- Construct ILAW disposal facilities including obtaining construction and operational permits (e.g., Part B) and have ILAW disposal facilities operational on a schedule consistent with private contractor production schedules and Tri-Party Agreement obligations. (Section 4.5)

- Prepare and maintain performance assessments (PA) of facility design, including obtaining required DOE approvals for construction and operation. An interim PA was completed in September 1997. A PA was issued in March 1998 and forwarded to DOE for approval. As of June 1999, the subpanel of the Low-Level Waste Federal Review Group dealing with Hanford PAs has recommended approval of the PA with conditions. DOE-HQ management must still act. (Section 12.1)

- Acquire waste from performance and disposal system data to support maintenance updates of the PA and input to Phase 2 product specifications. (Section 12.1)

- Develop and implement all operational and closure plans including postclosure monitoring of ILAW facilities. (Section 4.7)

- Develop interfaces with the privatization contractor, DOE, and Ecology as required for schedule, system operation, and regulatory compliance. (Section 14.0)

- Support development of a conceptual design report (CDR) and detailed designs for both initial disposal facilities (grout vaults) and additional disposal facilities including project validation. (Section 11.2)

- Support environmental, safety, and health requirements through compliance with the *National Environmental Policy Act of 1969* (NEPA) and safety analyses. (Section 11.3)

3.0 SCOPE OF IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SUBPROJECT

The packaged ILAW will be supplied by private contractors to DOE in accordance with contract specifications described in the TWRS Privatization Contract with BNFL Inc. (RL 1998a). The ILAW disposal subproject includes activities and functions to provide and operate product transportation facilities and facilities for disposal of ILAW packages on the Hanford Site. Initially the ILAW production will be disposed of in the existing four grout vaults, which will be modified as part of Project W-465. Later product will be disposed of in additional facilities in the 200 East Area in a separate low-activity waste disposal complex under Project W-520. These permanent disposal systems will be designed to accommodate the complete inventory of ILAW packages produced during the treatment of Hanford Site tank waste, currently contained in 177 underground tanks.

3.1 SCOPE OF IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SUBPROJECT PLAN

This subproject plan is intended to outline the activities and requirements for the receipt of packaged ILAW that has been certified and accepted by DOE in containers with specified dimensions and properties.

This subproject plan presents organizational and management approaches that will be used to control and execute the subproject. It also identifies the elements needed for subproject and line-item project management and includes subproject schedules and milestones. The cost and schedule information presented in this document are derived from the TWRS Immobilized waste portion of the annual multiyear program plan. Future cost, scope, and schedule updates will be reflected in the MYWP and technical baseline documents.

Specifically, the project plan covers the following key project planning elements:

- Mission and objectives
- Subproject scope
- Subproject definition and background
- Approach to subproject and line-item construction project management and controls.
- Schedules, outputs, and milestones
- Cost
- Approach to risk assessment and mitigation
- Responsible Organizations and interfacing organizations or projects

- Acquisition strategy
- Approach to quality, safety, environmental protection and test and evaluation.

4.0 PROJECT BACKGROUND AND TECHNICAL APPROACH

4.1 GENERAL CHARACTERISTICS OF TANK WASTE AND VITRIFICATION FEEDS TO BE PROCESSED

High-level radioactive waste has been stored at the Hanford Site in large underground tanks since 1944. This chemically neutralized waste is generally non-uniform between tanks, highly caustic, and composed of various chemicals and radionuclides in different forms distributed in liquids, slurry, sludge, and salt cake. These waste forms originated from different process separations technologies and have been transferred and mixed among 177 tanks over the years. For a more detailed description of tank waste chemical characteristics and variability see Kupfer et al. (1997).

In general, the neutralized waste consisted mainly of insoluble solids that tend to settle to the bottom of the tanks and supernates that were treated by evaporation. These treated supernates resulted in soluble salt cake that is primarily stored in single-shell tanks (SST) and more concentrated supernate that is generally transferred to newer double-shell tanks (DST) for storage. Current plans are for supernates, salt cake, and sludges to be recovered from all 177 tanks and separated into high-level waste (HLW) and low-activity waste (LAW) fractions. The LAW fraction will be treated to remove ^{137}Cs, ^{90}Sr, and ^{99}Tc, then immobilized in a glass or similar waste form to become the ILAW. The contract specifies that the average concentrations of ^{137}Cesium (^{137}Cs), ^{90}Strontium (^{90}Sr), and Technetium (^{99}Tc) shall be limited as follows: $^{137}Cs<Ci/m^3$, $^{90}Sr<Ci/m^3$ and $^{99}Tc<0.1\ Ci/m^3$. The contractor is also required to remove 80% of the ^{99}Tc present in the feed. These plans are described in more detail in the privatization contract (Wagoner 1996) and the TWRS environmental impact statement (EIS), DOE/EIS-0189 (DOE 1996). The following section summarizes the history of the actions and decisions that led to the current strategy for disposal of ILAW.

4.2 PROJECTED INVENTORIES OF IMMOBILIZED LOW-ACTIVITY WASTE

As a result of a diverse fuel separation process history and waste transfers among tanks and tank farms over approximately 50 years, variability exists in waste inventories among tanks. Sixty-seven of the older SSTs have been designated as confirmed or suspected leakers (Hanlon 1999). Liquids have been removed from all leakers and many other SSTs by the salt well pumping program. The liquid volumes were reduced in evaporator campaigns with evaporator bottoms being returned to non-leaking tanks. This activity has resulted in much of the salt cake waste residing in the SST farms, while liquids dominate the DST farms. As a result of these transfers and processes, the majority of the ^{137}Cs and ^{99}Tc is contained in the DST farms.

The current strategy is to immobilize LAW from the DST inventory in Phase 1 and possibly in the initial periods of Phase 2 (Kirkbride 1999). This implies that, because of the differences in waste types and levels of specific radionuclides among the tanks, and waste loading specifications in the contract, both remote- handled (>200 mRem/hr) and contact-handled ($\leq$200 mRem/hr) ILAW packages may be produced. Because higher levels of radioactivity exist in the

DST farms, more remote-handled ILAW packages are likely to be generated during treatment of DST waste. The ILAW Disposal Project currently is planning for the receipt of both waste types; however, further study to determine the feasibility of producing contact-handled ILAW is required.

The TWRS tank waste privatization contract specifies three types of waste feed composition envelopes, designated A, B, and C, for LLW streams to be supplied to the privatization contractor during the Phase 1 effort. The waste feeds will be staged in AP tank farm before delivery to the Phase 1 private contractor. The composition envelopes were based in part on waste composition variability uncertainty, pretreatment process assumptions, actual tank waste characterization data, and vitrification process limitations. Studies are in progress to develop optimum tank waste retrieval sequences, blending strategies, and mass balance determinations to ensure that waste feeds meet contract waste feed supply requirements (Kirkbride et al. 1999). This information, along with the waste loading specifications in the contract, were used to estimate the total inventory of ILAW to be received by the ILAW Disposal Project.

An estimate of the expected number of ILAW packages from Phase 1 and Phase 2 privatization production activities is given in Table 1. Dates are based on the 50% confidence and 90% confidence cases desorbed in the Privatization Report to congress (RL 1998b). For a more complete analysis, see *Reanalysis of Alternatives for Immobilized Low-Activity Waste Disposal* (Burbank 1999). The bases for this estimate are the contract specifications for waste loading and durability and the preliminary block flow diagram provided by BNFL in the privatization Part 1A deliverables. For Phase 1 these specifications include 800 units as described in specification 7.2.3 of the Privatization Contract of LAW treated each year. The minimum waste loadings, specified in the contract, were used to derive a maximum inventory and the waste loadings, found in the BNFL block flow diagrams, were used to derive the minimum expected inventory. Based on contract specifications and DOE guidance, the individual package size is assumed to be a 1.4 m cube. These assumptions yield a maximum inventory of 7,900 packages (21,000 m^3) for Phase 1 privatization and maximum total production of 81,200 packages (223,000 m^3). If the higher waste loadings proposed by BNFL in the Part A deliverables are used, the Phase 1 package count is reduced to 6,000 and the total mission production would be 56,000 packages (154,000 m^3). These quantities are considered minimum package counts because preliminary testing of glass at the higher waste loadings indicate that the waste form performance may not meet the waste acceptance requirements in the contract specifications.

Table 1. Summary of Immobilized Low-Activity Waste Package Production for the Immobilized Low-Activity Waste Disposal Subproject.

Item	Phase 1		Phase 2		Total
	50% Confidence	90% Confidence	50% Confidence	90% Confidence	90% Confidence
Hot operations start date	01/01/07	01/01/08	01/03/12	01/03/12	01/01/08
Hot operations end date	02/28/18	02/28/18	07/31/25	07/31/25	07/31/25
Post-closure monitoring start					08/01/25
Post-closure monitoring end					12/21/34
Waste inventory (per contract specification)	7,900 packages 21,000 m^3		73,300 packages		81,200
Waste inventory (per BNFL proposal)	6,000 packages 16,000 m^3		50,800 packages		56,800 packages 156,000 m^3
Nominal package receipt rate	2 per day		15 per day		
Peak package receipt rate	5 per day		29 per day		
Nominal waste package size	1.4 m x 1.4 m x 1.4 m = 2.744 m^3				

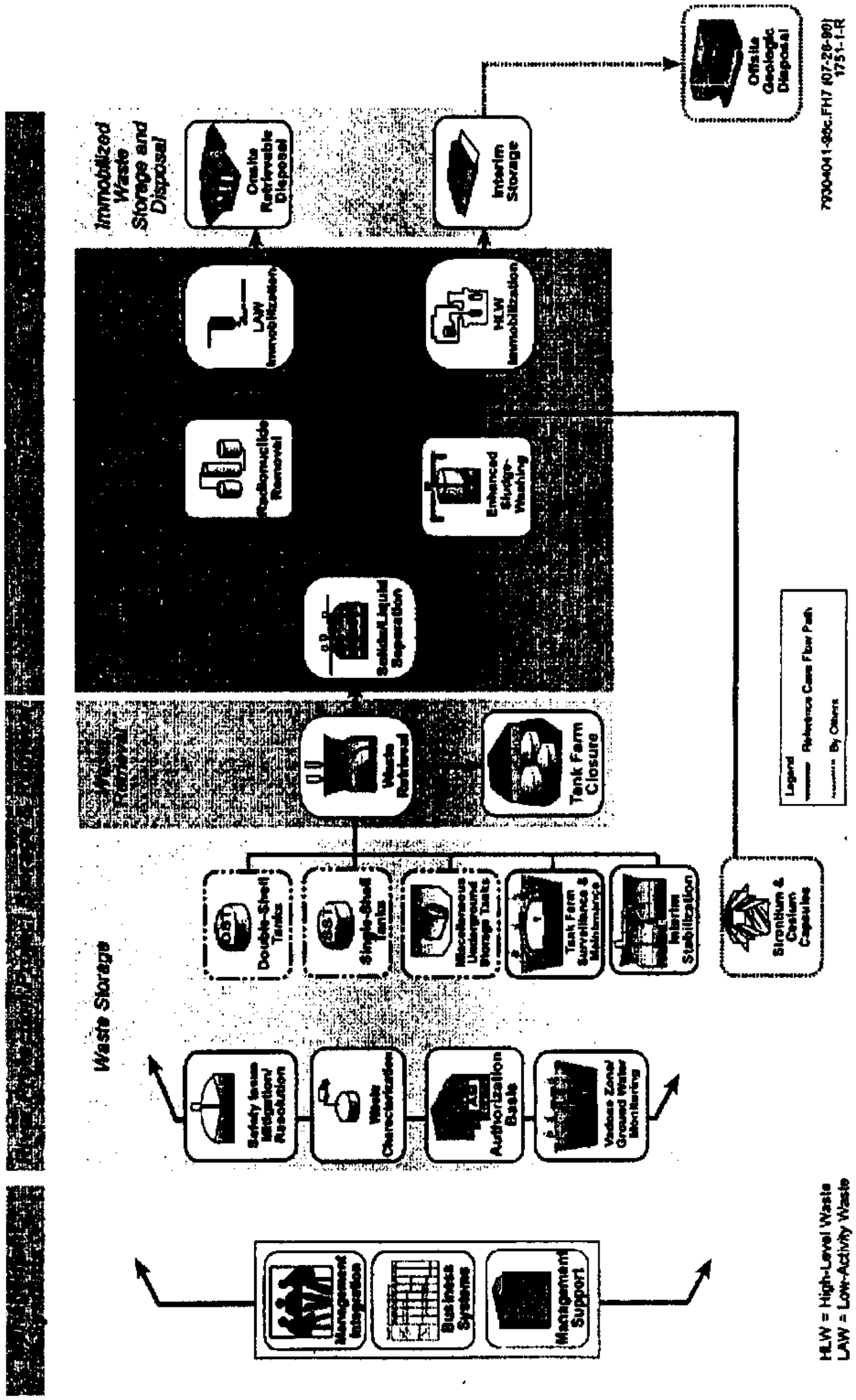
Sources: Privatization Authorization to Proceed, Waste Disposal Division Planning Guidance, Baseline Updating Guidance.

4.3 OPTIONS FOR GOVERNMENT AND COMMERCIAL ACTIVITIES AND CONCEPT SELECTION AND IMPLEMENTATION

The BNFL contract identifies the services that DOE will provide to the treatment contractor and specifies ILAW product requirements for Phase 1 privatization. A separate RFP will be issued for Phase 2 privatization and may include modified product requirements based on experience from the Phase 1 privatization results that could affect ILAW disposal capacity. A possible impact could be a change in the waste form durability specification that limits waste loading and results in more packages than currently anticipated. Also, the current baseline schedule anticipates Phase 2 ILAW production starting in 2012 and running to 2024. If this schedule is changed, disposal system planning must be modified to meet the new schedule. For ILAW disposal, these contingencies are considered by taking a staged approach to disposal system construction.

Figure 1 is a logic flow diagram for the ILAW disposal program that shows the interaction with the privatization contractors. ILAW disposal of packages from Phase 1 production in retrofitted grout vaults is planned for between 2008 and 2014 when additional disposal facilities must be made available. Performance assessments have been prepared (Mann et al. 1998a) to verify that both disposal system designs and sites meet long-term performance objectives.

Figure 1. Immobilized Low-Activity Waste Disposal Program.



Current plans are to modify the existing grout vaults for disposal of the initial Phase 1 production. Based on a stacking height of 7 packages, 10 cm spacing between stacks, and space requirements for handling equipment, about 7,000 packages could be stored in the existing 4 vaults. This should accommodate approximately 5 years' production. The remaining Phase 1 and Phase 2 production will be disposed of in separate facilities to be provided by the ILAW Storage and Disposal Project in the 200 East Area disposal facility.

Summary of Earlier LLW Management and Disposition Options. The history of previous low-level waste treatment and disposal options at the Hanford Site can be summarized as follows:

- A Hanford Site tank waste environmental impact statement issued in 1987 (DOE 1987) and a record of decision (ROD) issued in 1988 (53 FR 12449) focused on the disposal of tank waste. The ROD included the following conclusions:
- DST waste would be separated into two fractions.
  - The high-level waste fraction of DST would be vitrified and disposed in a geologic repository off site. This waste is not of concern to the ILAW disposal project.
  - The low-activity fraction of DST waste would be solidified as grout and disposed in near-surface vaults on site at the Hanford Site.
  - Additional development and evaluation would be done on SST waste before a disposal decision would be made.
- Since the 1988 ROD, the following events have occurred:
  - The DOE, EPA, and Ecology signed the Tri-Party Agreement (Ecology et al. 1989).
  - B Plant was eliminated from consideration as a waste pretreatment facility.
  - The TWRS Program was established by the Secretary of Energy in December of 1991 to safely treat, store, and dispose of the tank waste.
  - SST waste retrieval was included as a planning basis in the TWRS program. If all Hanford Site LAW from both DST and SST was immobilized as grout, the disposal space requirements would be greatly enlarged. The original grout disposal site was planned only for grout from DST LAW.

- Public concern over the use of grout. As recommended by the Hanford Tank Waste Task Force, the grout concept was put on hold because of public perceptions about difficult retrievability of grout monoliths and durability uncertainties concerning release of hazardous materials.

- The 1989 Tri-Party Agreement was renegotiated in September 1993 and was signed by all parties in January 1994 (Ecology et al 1994). A decision was made to use the vitrification option for LAW as well as for HLW.

- A TWRS EIS was issued in August 1996 that includes a multiple disposal option (DOE 1996). The preferred alternative is to retrieve the waste, separate it into HLW and LAW fractions, and immobilize the LAW with disposal on the Hanford Site.

- In November 1996, RL submitted to the NRC the technical basis for incidental waste and requested that the NRC grant an incidental waste determination on the LAW fraction.

- DOE decided to privatize the treatment and immobilization of tank waste. DOE issued an RFP for privatized treatment of tank wastes (Wagoner 1996) in early 1996 and contracts for Phase 1A were signed with two private contractor teams in October 1996.

- The ILAW product specifications were based on the assumption that the product would be glass or equivalent based on the short-term release rate as measured by the product consistency test (ASTM C1285-94).

- The TWRS EIS ROD (62 FR 8693) confirmed interim storage of ILAW at the Hanford Site and final disposal of ILAW in near-surface disposal facilities on Site.

- In June 1997, the NRC granted an incidental waste determination on the LAW fraction, subject to certain conditions (Paperiello 1997).

- In August 1998, the DOE signed a contract modification (RL 1998a) with the private contractor team lead by BNFL Inc. authorizing them to proceed with conceptual design of the combined HLW/LAW treatment facility, according to a revised schedule that would start ILAW production in 2008 instead of 2002.

To support the RPP program strategy, a site evaluation study was conducted (Shord 1995) to identify a TWRS tank waste treatment, storage, and disposal complex site. As a result of the study, a preferred site was selected in the 200 East Area. This site included a 36.5 ha (90-acre) parcel for disposal of ILAW. After the TWRS complex site evaluation, the Phase 1 tank waste immobilization privatization approach was initiated. A site for the Phase 1 privatization tank waste immobilization facilities was identified in the former grout disposal site area. In parallel with this activity, the four existing grout vaults were identified as storage and disposal facilities for initial privatization Phase 1 production and the 36.5 ha (90-acre) site was identified as the location for construction of disposal facilities for the remainder of Phase 1 production and all of Phase 2 production.

4.4 CURRENT GOVERNMENT/COMMERCIAL LOW-LEVEL WASTE DISPOSAL ACTIVITIES

A number of government and commercial organizations both in the U.S. and in the international nuclear community currently operate facilities for the disposal of LLW. Most of these facilities are near-surface trenches or vaults that may or may not be lined or designed according to RCRA requirements, depending on the type of waste involved and its classification. Other facilities for LLW disposal, such as the Centre de l'Aube in France, are based on the tumulus (burial mound) concept. In general, the currently operating LLW facilities dispose of solid waste from a variety of sources such as contaminated laboratory materials or low-level process or decontamination components, including filters, or cemented and containerized ion exchangers. At the Hanford Site, much of these kinds of activities are conducted by US Ecology commercially and the solid waste program that includes the Waste Receiving and Processing facility for DOE. Similar activities are conducted at other DOE sites. Procedures have been established for receiving and disposing of heterogenous waste with various nonradioactive components from different sources and diverse packaging.

Probably the closest analog to the Hanford ILAW disposal project is the Savannah River Site Saltstone Disposal Facility. The saltstone grout is produced by mixing an aqueous LLW stream with slag, fly ash, and cement, which will be poured into concrete vaults where it will harden and cure. Up to 15 vaults will be constructed. The vaults will be divided into cells each of which will contain the volume of saltstone produced from treating approximately 4.2 million L (1.1 million gal) of waste. The vaults will be built at or near grade. Once full, the vaults will be backfilled and covered with materials that include a moisture barrier and a clay and gravel drainage system. Similarities of the Savannah River Site concept and the Hanford Site concept for LLW disposal include features of large volumes of similar liquid waste treated to form a large amount of a single waste type in consistent packaging. The waste generally originate from a single type of source, i.e., of tank waste pretreatment. This makes the immobilized waste product and packaging relatively homogenous and consistent compared with the kinds of waste typically received from a variety of sources in other LLW disposal sites. About 200,000 m^3 of the same type of waste form (vitrified monoliths in packages) are expected to be generated by the ILAW privatization contractors at the Hanford Site. Also, the immobilized product will be disposed of in near-surface vault systems.

4.5 DISPOSAL FACILITIES DESCRIPTION

ILAW disposal requires appropriate site selection and characterization, performance assessment, facility design and construction, development of systems to transport packages from private contractors to the facility, and all necessary supporting activities to implement these functions. Two sites in the 200 East Area have been selected for disposal of ILAW packaged waste. The first site is the existing four grout vaults as authorized in Taylor (1996), at the eastern portion of the 200 East Area, as shown in Figure 2. The second site, shown in Figure 2, consists of

Figure 2. Site Plan for the Immobilized Low-Activity Waste Disposal Location.

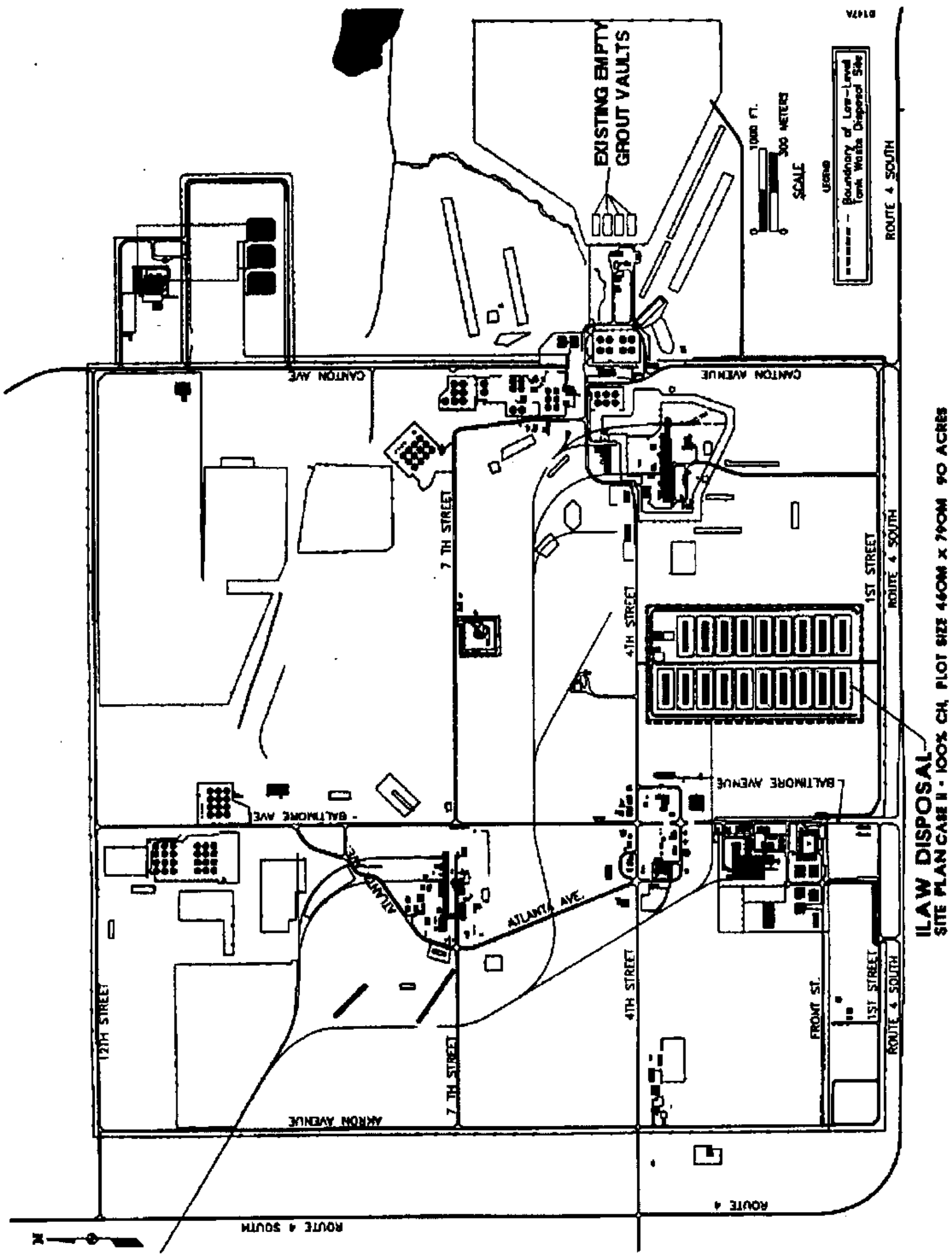
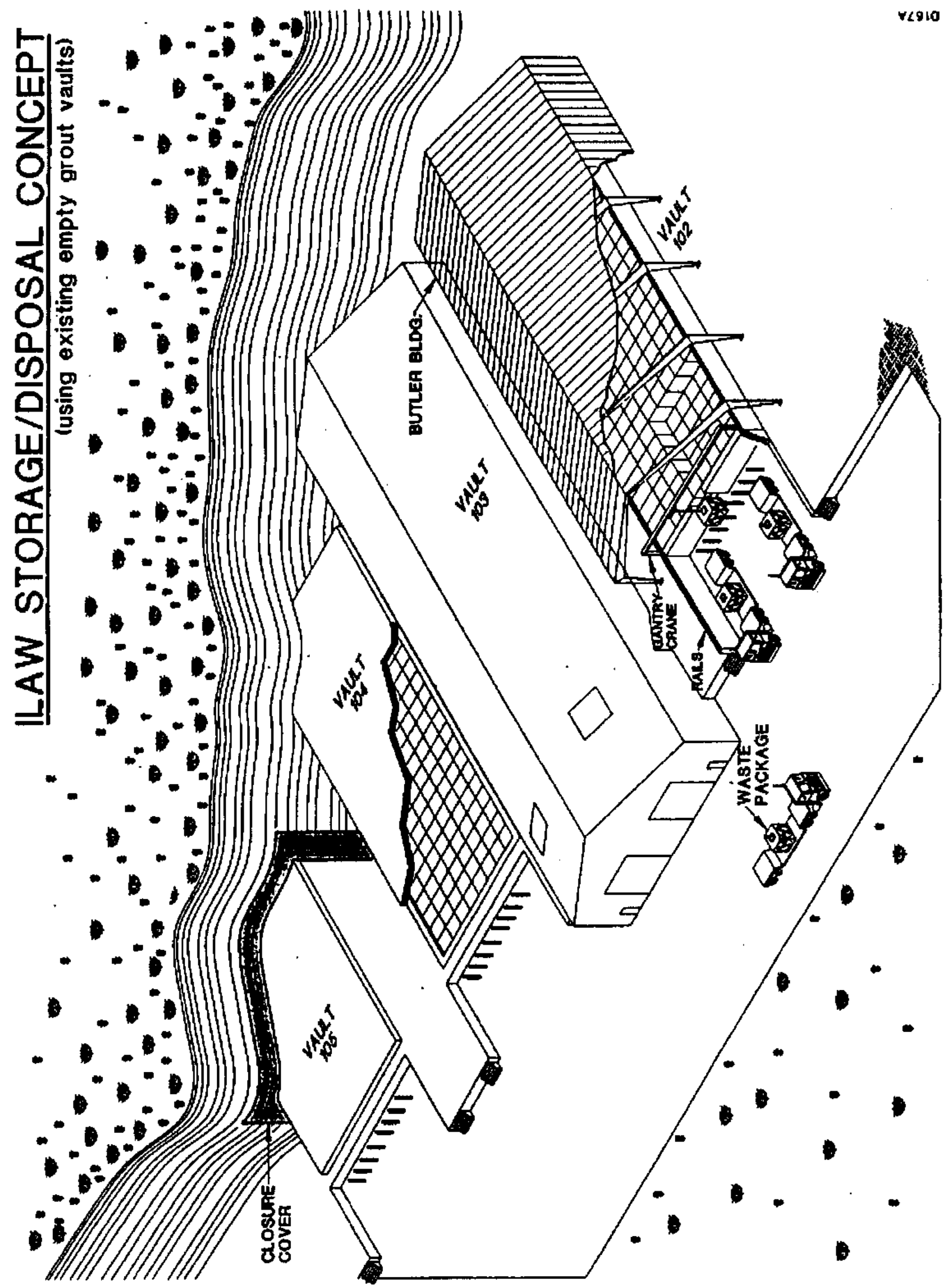


Figure 3. Immobilized Low-Activity Waste Disposal Concept Using Grout Vaults.

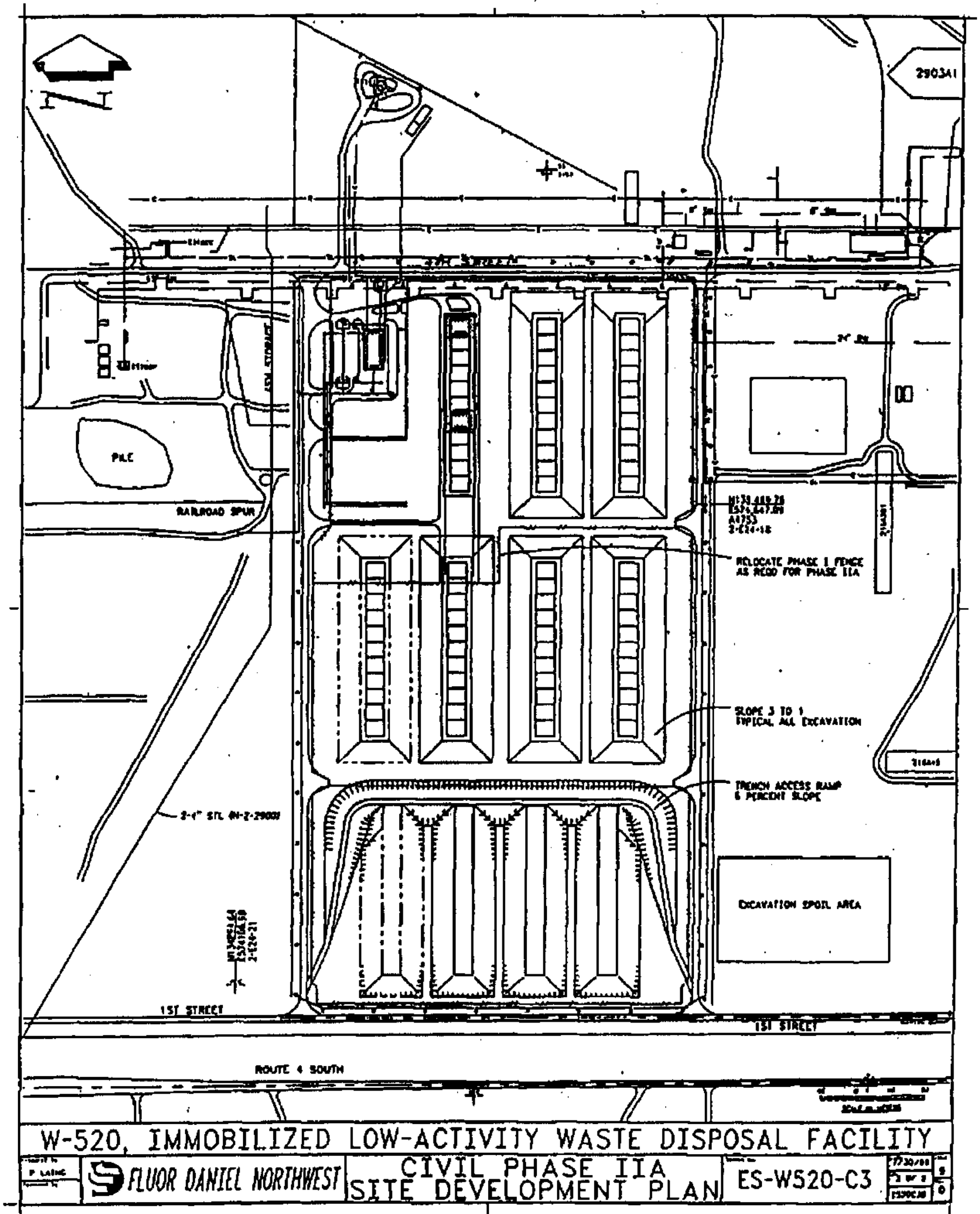


approximately 90 acres west of the Plutonium-Uranium Extraction Plant. It will be used to construct additional disposal facilities. This site is identified in the TWRS Complex Site Evaluation Report (Shord 1995) and has been approved by the RL Site Infrastructure Division in Rutherford (1997).

The grout vaults are located east of the grout treatment facility and have the capacity for about 7,000 ILAW packages based on product specifications given in the Phase 1 Privatization Contract. These vaults, illustrated in Figure 3, will be modified for disposal of ILAW. Because more than 7,000 packages may be produced during the Phase 1 Privatization Contract, additional disposal space will be required. The additional disposal facilities, designated as the Low-Activity Waste Disposal Complex, located in the south central portion of the 200 East Area will contain disposal units for the portion of Phase 1 production that exceeds the grout vault capacity, as well as all remaining ILAW production expected during Phase 2 Privatization resulting from treatment of all remaining tank waste. Depending on the level of package radioactivity, some ILAW packages may require remote handling; others may be contact handled. The package activity level, combined with the package hazardous waste classification, is expected to allow both trench and vault disposal concepts to be used. Depending on the waste loading achieved by BNFL, between 56,800 and 81,200 ILAW packages may result from treatment of all 177 tanks (Burbank and Hohl 1999).

A 36.5 ha (90-acre) disposal system site has been identified in the south central portion of the 200 East Area for additional permanent disposal of the ILAW inventory (Shord 1995). A conceptual design has been prepared for this area that evaluated alternative concepts for the actual disposal system layout. All layout concepts assume that packages can be stacked up to six high and may include any combination of four different waste types. These are remote- or contact-handled mixed waste and remote- or contact-handled non-mixed waste. The different waste types have different shielding and disposal system liner requirements. The disposal system space requirements include the actual waste package footprint, excavations up to 10 m deep to allow for both package volume and an infiltration (capillary break) diversion cap on closure, and excavations with a slope as low as 1 to 3 as in solid waste excavation practices (U.S. Occupational Safety and Health Administration requirements are a slope of 1 to 1.5). The disposal system area requirements include roads and related infrastructure, buildings for operations, and coordination with other 200 East Area facilities. The disposal area is currently expected to be used for disposal of Phase 1 product in excess of the grout vault capacity, as well as for disposal of Phase 2 production. Disposal modules will be constructed on a time phased basis as needed. Figure 4 shows the proposed layout of this site.

Figure 4. Conceptual Immobilized Low-Activity Waste Disposal Site Development Plan.



5.0 REQUIREMENTS

5.1 PERFORMANCE ASSESSMENT REQUIREMENTS

The performance assessment (PA) evaluates the long-term potential for contaminant migration from disposal systems to estimate its potential effect on human health and the environment. The function of the PA is to establish requirements on disposal facility design, waste form acceptance, and disposal system operations that provide 'reasonable expectation" that releases from the disposal system will meet performance objectives. This analysis is based on site-specific geologic, hydraulic and geochemical parameters, disposal system design, inventory of waste to be disposed of, waste form durability, as well as radiological dose factors. Based on the *Hanford Immobilized Low-Activity Tank Waste Performance Assessment* 1998 (Mann et al. 1998a), ^{99}Tc is the major low-activity radionuclide contributing to the long-term dose. Uranium isotopes, ^{129}I, and ^{126}Sn contribute significantly less long term dose although 126 Sn is the major contributor to dose in the intruder scenarios. The next update of the PA is expected to be published in the spring of 2001. Additional details and programmatic impacts of the PA are discussed in Section 12.1. Appendix C contains the summary of the 1998 ILAW PA.

Also, depending on the amount of ^{137}Cs and other isotopes removed during waste pretreatment, individual ILAW packages received from privatization contractors may or may not require remote handling. Accordingly, current planning anticipates that both contact- and remote-handled packages will be received. A trade study has been identified to evaluate the proportion of remote- to contact-handled packages, based primarily on cesium loading. These factors affect the total number of ILAW packages produced during both phases of privatization. They also affect the design and selection of transportation, storage, and disposal methods.

5.2 REGULATORY REQUIREMENTS

This section summarizes and lists references of regulatory requirements applicable to the project. Approaches to meeting these requirements are discussed in Chapter 8. The requirements include federal and Washington State regulations along with DOE orders applicable to the design, construction, operation, decommissioning, and closure of the ILAW disposal facilities.

In compliance with DOE Orders 5400.1, *General Environmental Protection Program* (DOE 1988a), and 5484.1, *Environmental Protection, Safety and Health Protection Information Reporting Requirements* (DOE 1981), a site evaluation study for a TWRS integrated waste immobilization complex that included both vitrification facilities and storage/disposal facilities was completed before the privatization RFP was issued (Shord 1995). This study identified the 36.5 ha (90-acre) site within the selected complex in the 200 East area as a proposed site for the ILAW disposal system. Also, as part of this compliance process, an environmental baseline site characterization plan was prepared (Reidel et al. 1995) that includes establishing baseline preexisting conditions for the ILAW disposal site. The plan will be implemented during the preconstruction phase.

A NEPA review of TWRS proposed treatment and disposal actions resulted in a TWRS EIS (DOE 1996) that includes disposal of ILAW at the Hanford Site. This has been completed and a record of decision (ROD) (DOE 1997) was issued. The TWRS EIS ROD describes a phased implementation alternative with an initial demonstration phase where ILAW is prepared for disposal in grout vaults or similar facilities, and a second phase that will treat and immobilize the remainder of the LAW for onsite disposal in near-surface facilities. A supplement analysis (DOE 1998) was performed to evaluate the impact of revised tank waste inventory, accident analysis, vadose zone data, engineered parameters, and technology development activities that have occurred since the original ROD. The analysis showed that the changes would have no effect on the conclusions of the EIS.

An environmental requirements checklist for interim storage of Phase 1 production has been drafted (Borneman 1997) that includes an evaluation of both NEPA and the "State Environmental Policy Act of 1971" (SEPA) documentation requirements as well as other state and federal requirements for applicability to the project. Checklists also will be prepared for future disposal facilities. Because the waste will contain hazardous constituents, RCRA Part A and B dangerous waste permits will be required unless delisting is feasible. A permitting plan for Part A and Part B permits has been drafted (Deffenbaugh 1997). Also, a proposed EPA "Hazardous Waste Identification Rule" (60 FR 66343) may revise existing rules and develop risk-based exit levels for hazardous waste constituents that may allow the ILAW product to be regulated as ordinary low-level waste instead of under RCRA. The DRD for the ILAW interim storage project (Burbank 1997) lists government and DOE regulations applicable to the project. These are given in Appendix B along with the environmental checklist results.

In addition, various DOE orders apply; DOE Order 5820.2A requires an approved performance assessment of the proposed facility before construction begins. DOE Order 435.1, which will replace DOE Order 5820.2A, still requires a performance assessment to get disposal authorization from DOE. Performance assessment requirements and implementation guidance are discussed in Chapter 7. The ILAW Disposal Project is working closely with the private contractor to develop classes that will meet performance requirements.

Waste Classification. At the request of the ILAW Disposal project, the NRC recently determined that ILAW is "incidental waste" (Paperiello 1997) subject to the following conditions:

- The "waste has been processed (or will be further processed) to remove key radionuclides to the maximum extent technically and economically practical."

- The "waste will be incorporated in a solid physical form at a concentration that does not exceed the applicable concentration limits for Class C low-level waste as set out in 10 CFR [*Code of Federal Regulations*] Part 61."

- The solid, immobilized waste will be managed, pursuant to the *Atomic Energy Act of 1954*, so that safety requirements comparable to the performance objectives set out in 10 CFR Part 61 are satisfied.

This classification removes the ILAW from the high-level waste disposal licensing authority of the NRC and allows its disposal from both SSTs and DSTs under DOE requirements in shallow land disposal facilities. DOE Order 5820.2A, Chapter 3 (DOE 1988), contains DOE policy and requirements for managing low-activity waste.

The technical basis, supporting the NRC determination to classify ILAW as incidental waste, was provided by Petersen (1996). Nine key radionuclides were considered for removal because they represent 99.9 percent of the waste tank curie inventory. Cesium-137 was the only radionuclide to meet the "technical and economically practical" removal criteria for incidental waste. The other radionuclides were either technically or economically impractical to remove. The technical basis recommended removing Cesium-137 without removing the other soluble radionuclides. The NRC classification will be revisited under any of the following circumstances:

- The tank radionuclide inventory is higher than or different from that described in the technical basis report
- The LAW fraction is not vitrified or the final waste form is significantly different from that described in the technical basis report
- Changes in the ILAW disposal site or site characterization parameters adversely affect the conclusions drawn in the final performance assessment.

Product Acceptance Process. The product acceptance process ensures that the ILAW product meets the specifications listed in the privatization contract and serves as the basis for DOE payment to the contractor. A preliminary product acceptance strategy was began when the RFP was issued; the draft was updated after the contracts were awarded. When completed, the strategy, along with more recent interface control documents, will serve as guide for preparing a detailed product acceptance procedure that will describe the transfer mechanism and detail the supporting documentation needed to transfer the ILAW product from the private contractor to the ILAW Disposal Subproject. This procedure, to be developed and implemented by DOE, is expected to ensure that each ILAW package received by the ILAW Disposal Subproject is within specifications and has the required documentation to comply with all permitting, safety, performance assessment, and operating requirements. As part of the interface control document process, the ILAW Disposal Subproject has supplied DOE with a list of assumptions and requirements based on RFP specifications that must be addressed in the acceptance procedure (Interface Control Document [ICD] 15, ILAW Product). While a detailed acceptance procedure has not been developed, current guidance calls for interim product acceptance 15 days after production on a batch basis, and final acceptance within 60 days. The ILAW Disposal Subproject will transport the product after interim acceptance.

The ILAW product will be accepted by DOE and disposed of on the Hanford Site by the ILAW Disposal Subproject, making it subject to DOE orders for radioactive waste management. The current order, 5820.2A (DOE 1988) and its replacement, 435.1, require that a performance assessment of the disposal system be conducted and approved before beginning construction. For new disposal facilities, both a performance assessment and a site composite analysis must be submitted to the Deputy Assistant Secretary for approval before beginning construction.

Construction may not start until authorization from the Assistant Secretary for Environmental Management is received.

6.0 TOP-LEVEL WORK BREAKDOWN STRUCTURE

A work breakdown structure (WBS) was established for planning, execution, and control of the ILAW Disposal Subproject work. The WBS represents the way in which work will be estimated, scheduled, budgeted, performed, and managed. The WBS defines all authorized ILAW Disposal Subproject work regardless of funding source by relating elements of work to each other and to the end products. Because it describes all the work to be done on the ILAW Disposal Subproject, the WBS provides the basis for technical, schedule, and cost control. The status of each active element is monitored regularly to determine if the planned work is being accomplished on schedule and within budget.

The ILAW Disposal Subproject WBS is broken into discrete packages for performance tracking and reporting. Major work activities for the Subproject have been defined as shown in the WBS, Table 2, and are detailed in activity data sheets held as backup to the TWRS multi-year program plan. The activity data sheets are available from the TWRS Storage and Disposal Project files.

Table 2. Immobilized Low-Activity Waste Disposal Subproject Work Breakdown Structure. (3 sheets)

Activity identification number	Activity description
1	Hanford Site
1.01	River Protection Project
1.01.09	Immobilized Waste
1.01.09.01	Immobilized LAW Disposal Facility
1.01.09.01.01	Dispose Immobilized LAW On Site
1.01.09.01.01.01	ILAW Project Management
1.01.09.01.01.01.01	ILAW Project Management
1.01.09.01.01.02	ILAW Systems Definition
1.01.09.01.01.02.01	Maintain Interface with Private Contractor
1.01.09.01.01.02.02	Maintain Technical Requirements for Storage/Disposal
1.01.09.01.01.02.03	Project Management Plan Update
1.01.09.01.01.02.04	Prepare/Maintain Technical Requirements for Disposal
1.01.09.01.01.03	ILAW Performance Assessment
1.01.09.01.01.03.01	1998 Performance Assessment
1.01.09.01.01.03.02	Data Collection for 2001 Performance Assessment
1.01.09.01.01.03.03	2001 Performance Assessment
1.01.09.01.01.03.04	Data Collection for Performance Assessment
1.01.09.01.01.04	ILAW Project W-520, Immobilized LAW Disposal Complex
1.01.09.01.01.04.01	W-520 Conceptual Design

Table 2. Immobilized Low-Activity Waste Disposal Subproject Work Breakdown Structure. (3 sheets)

Activity identification number	Activity description
1.01.09.01.01.04.02	W-520 Advanced Conceptual Design
1.01.09.01.01.04.03	W-520 Project Validation
1.01.09.01.01.04.04	W-520 Design
1.01.09.01.01.04.05	W-520 Equipment Procurement
1.01.09.01.01.04.06	W-520 Construction
1.01.09.01.01.04.07	W-520 Procurement/Training/OTP/ORR (Bal Part I)
1.01.09.01.01.04.08	W-520 Regulatory Requirements
1.01.09.01.01.04.09	W-520 Authorization Basis Development/Approval
1.01.09.01.01.05	ILAW Future Projects
1.01.09.01.01.05.01	ILAW Project Management
1.01.09.01.01.05.02	Update Technical Baseline
1.01.09.01.01.05.03	Maintain Technical Baseline
1.01.09.01.01.05.04	CDR, ACDR, and Validation
1.01.09.01.01.05.05	Design
1.01.09.01.01.05.06	Construction
1.01.09.01.01.05.07	Permits
1.01.09.01.01.05.08	Authorization Basis
1.01.09.01.01.06	ILAW Operations
1.01.09.01.01.06.01	W-520 Operations (Balance Part I)
1.01.09.01.01.06.02	Operations and Monitoring
1.01.09.01.01.06.03	Maintain ILAW Part I Per Assessment
1.01.09.01.02	Maintain Safe/Compliant ILAW Disposal Facility in CP Area
1.01.09.01.02.01	Compliant ILAW
1.01.09.01.03	Transition ILAW Disposal Facility
1.01.09.01.03.01	ILAW Transition
1.01.09.01.04	Close ILAW Disposal Facility
1.01.09.01.04.01	ILAW D&D
1.01.09.01.04.01.01	Close ILAW Disposal Facilities
1.01.09.01.04.01.03	Closure/D&D
1.01.09.01.04.01.04	Initiate Post-Closure Monitoring
1.01.09.01.05	Store ILAW On Site
1.01.09.01.05.01	Project W-465 Immobilized LAW Interim Storage Facility

Table 2. Immobilized Low-Activity Waste Disposal Subproject Work Breakdown Structure. (3 sheets)

Activity identification number	Activity description
1.01.09.01.05.01.01	W-465 Project Revalidation
1.01.09.01.05.01.02	W-465 Advanced Conceptual Design
1.01.09.01.05.01.03	W-465 Design
1.01.09.01.05.01.04	W-465 Equipment Procurement
1.01.09.01.05.01.05	W-465 Modify Vaults
1.01.09.01.05.01.06	W-465 Procure/Train/OTP/ORR (Init Part I)
1.01.09.01.05.01.07	W-465 NEPA Documentation
1.01.09.01.05.01.08	W-465 RCRA Permits
1.01.09.01.05.01.09	W-465 Authorization Basis Dev./Approval
1.01.09.01.05.02	W-465 Operations
1.01.09.01.05.02.01	W-465 Operations (Init Part I)

6.1 DISPOSE IMMOBILIZED LAW ON SITE

The scope of work for the *Dispose Immobilized Low Activity Waste (LAW) On-Site* function is to provide on-site disposal of Immobilized LAW. Transport, receive, unload, emplace and cover sealed containers of immobilized LAW from the LAW Treatment Facility, Phase 2. It also includes monitor, control, containment and handling for disposal of Immobilized LAW. This function includes transporting the Immobilized LAW from the Interim Storage site (if necessary) to the disposal site.

6.2 MAINTAIN SAFE & COMPLIANT IMMOBILIZED LAW DISPOSAL FACILITY IN CP AREAS

The scope of work for the *Maintain Safe and Compliant Immobilized Low Activity Waste Disposal Facility in the Central Plateau (CP) Area* function is to maintain the Immobilized LAW Disposal facility structures, operating systems and equipment, and monitoring systems within the approved safety and compliance requirements until the facility is ready for closure.

6.3 TRANSITION IMMOBILIZED LAW DISPOSAL FACILITY

The scope of work for the *Transition Immobilized Low Activity Waste (LAW) Disposal Facility* function is to initiate the transition phase of decontamination and decommissioning for the Immobilized LAW Disposal Facility.

6.4 CLOSE IMMOBILIZED LAW DISPOSAL FACILITY

The scope of work for the *Close Immobilized Low Activity Waste (LAW) Disposal Facility* function begins at the completion of the long term storage mission of the Immobilized LAW Disposal Facility. The facility will be placed into a state to be the final disposal site for the ILAW. This could include decontamination, filling and sealing the storage vaults, and emplacement of an engineered surface barrier.

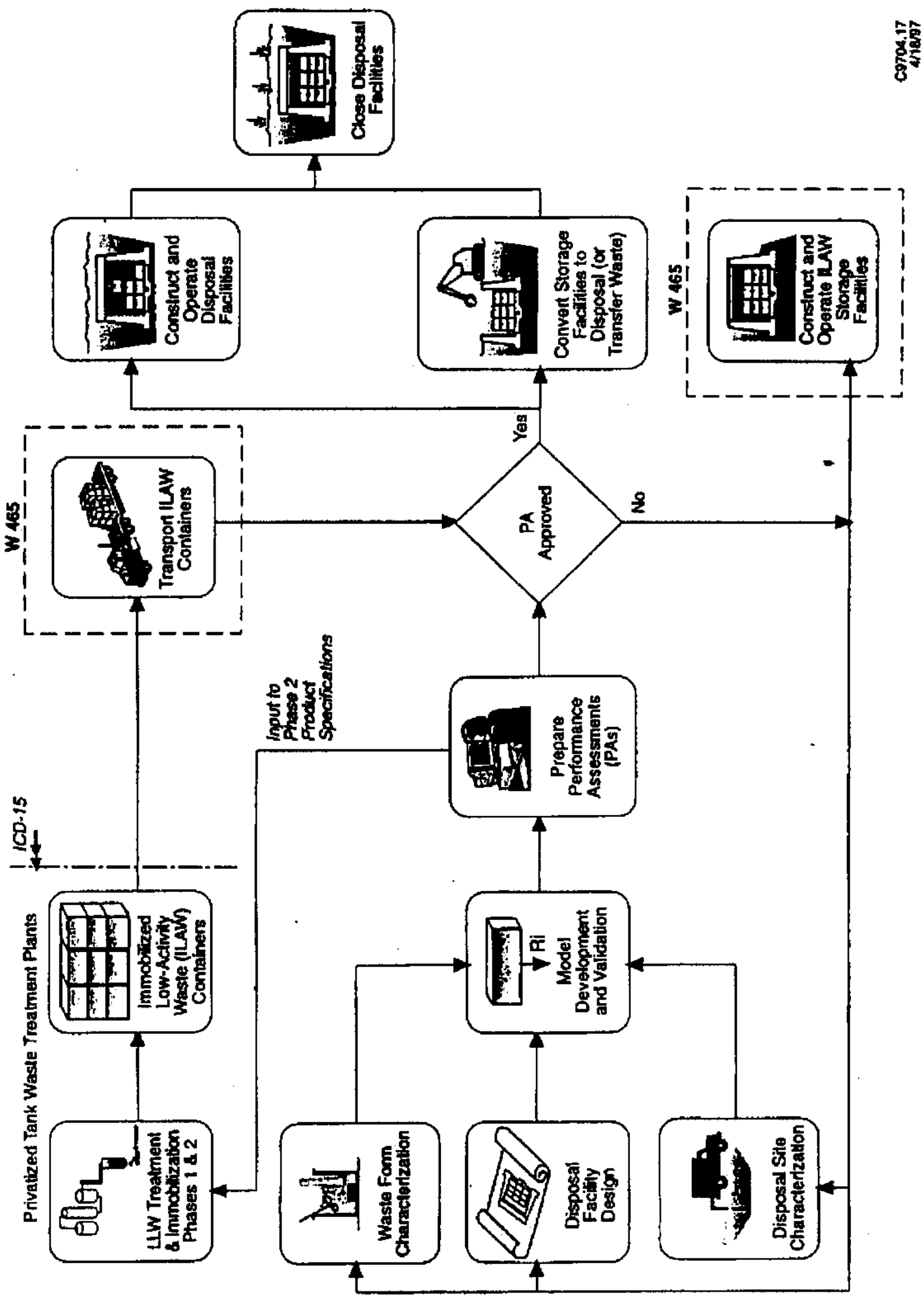
6.5 STORE ILAW

The scope of the *Store Immobilized Low Activity Waste (ILAW) Onsite* function is to package, transport, receive, unload, emplace and store sealed containers of immobilized LAW from the LAW Plant Phase 1 and the LAW/HLW Plant, Phase 1. Monitor the receipt, movement, placement and containment integrity of the immobilized LAW during storage.

7.0 RIVER PROTECTION PROJECT IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL LOGIC

Figure 1 presents the overall logic for the ILAW treatment, vitrification, storage, and disposal of Hanford Site tank waste. Figure 5 presents the logic for the ILAW Disposal Subproject. This logic indicates the subproject functions included and identified in the interfaces with the ILAW private contractor (BNFL 1998) and the performance assessment activities for the ILAW disposal program. The multi-year work plan (LMHC 1998) provides more detailed logic.

Figure 5. Low-Activity Waste Storage and Disposal Subproject.



8.0 RIVER PROTECTION PROJECT IMMOBILIZED LOW-ACTIVITY WASTE STORAGE AND DISPOSAL SCHEDULE

8.1 TRI-PARTY AGREEMENT CONTROLLING MILESTONES

The ILAW Disposal Subproject is governed by the Tri-Party Agreement Milestones. These milestones and their due dates are shown in Table 3. A complete list of milestones and deliverables, including both Tri-Party Agreement and RL milestones, and associated descriptions for the ILAW Disposal Subproject are given in Appendix D. These milestones are currently being renegotiated to reflect the new privatization schedule (RL 1998b).

Table 3. Tri-Party Agreement Milestones for the Immobilized Low-Activity Waste Storage and Disposal Project. (2 Sheets)

Milestone Number	Milestone Title	Due Date
M-90-01	Submit Project Management Plan to Ecology	12/31/97 Complete
M-90-02T	Complete Conceptual Design of ILAW Interim Storage Facility	6/30/98 Complete
M-90-07T	Complete Conceptual Design of ILAW Additional Storage Facilities	6/30/00
M-90-04T	Complete Detailed Design of ILAW Interim Storage Facility	6/30/01
M-90-03	Key Decision 3 - Initiate Construction ILAW Interim Storage Facility	6/29/01
M-90-06	Initiate Hot Operations - ILAW Interim Storage Facility - Phase 1	12/31/02
M-20-00	Submit Part B Permit Application or closure/post-closure plans for all RCRA TSD units. Permit applications, closure, and post-closure plans will be submitted to Ecology and/or EPA for approval in accordance with their respective authorities.	2/28/04
M-20-57	Submit Interim ILAW Facility Part B Permit Application to Ecology	12/31/00
M-20-58	Submit ILAW Disposal Facility Part B Permit Application to Ecology	12/31/03

Table 3. Tri-Party Agreement Milestones for the Immobilized Low-Activity Waste Storage and Disposal Project. (2 Sheets)

Milestone Number	Milestone Title	Due Date
M-90-09T	Complete Detailed Design - ILAW Additional Storage & Disposal	3/31/03
M-90-08	Key Decision 3 - Initiate Construction - ILAW Additional Storage and Disposal	6/30/03
M-90-05T	Submit Final PA to Ecology for Review	3/31/01 Complete
M-90-10	Initiate Hot Operations - ILAW Disposal Module 1	12/30/05

Ecology = Washington State Department of Ecology
EPA = U.S. Environmental Protection Agency
ILAW = immobilized low-activity waste
PA = performance assessment
RCRA = *Resource Conservation and Recovery Act of 1976*
TSD = treatment, storage, and disposal

8.2 OTHER REQUIREMENTS

Other requirements and guidelines that are imposed on the project include orders, regulations and codes that are beyond the control of design, construction, and operating organizations. The key requirements come from the *Code of Federal Regulations* (CFR), the *Washington Administrative Code* (WAC), and DOE orders. The primary requirements that have been identified for the ILAW Disposal Subproject are discussed in the DRD (Burbank 1997), the AGA for ILAW (Burbank and Klem 1997), and the *Reanalysis of Alternatives for ILAW Disposal* (Burbank and Hohl 1999). Appendix D contains a comprehensive list of these requirements. Activities to ensure compliance with these requirements are included in the MYWP for the ILAW Disposal Subproject (LMHC 1998).

8.3 SCHEDULE REQUIREMENTS

The current ILAW subproject baseline schedule, provided in Appendix F, also is provided in the TWRS FY 1999 multiyear work plan (LMHC 1998). It identifies major Tri-Party Agreement, DOE, and PHMC milestones. The activities making up the subproject baseline schedule have been defined and are included in milestone logs that will be maintained under project change control (see Chapter 12). Table 4 summarizes the major project activities and their durations. This summary is presented in accordance with the established subproject WBS (see Section 11.1.1). The complete baseline schedule that shows critical path activities is given in Appendix F.

8.3.1 Milestones, Key Deliverables, and Performance Measures

A complete list of Tri-Party Agreement and RL milestones and key deliverables for the ILAW subproject is given in Appendix D. This appendix briefly describes the activities and performance measures for each milestones or key deliverable for the subproject.

Table 4. Major Subproject Activities and Activity Durations.

Activity	Start	Finish
Phase 1		
W-465 Conceptual Design	2-97	12-97
W-465 Adv Conceptual Design	10-99	9-01
W-465 Detailed Design	2-02	6-03
Modify Vaults	7-03	1-06
NEPA/RCRA	10-02	3-06
Safety Authorization Basis	10-00	10-05
Operations	1-08	3-11
Phase 2		
W-520 Conceptual Design	2-98	12-98
W-520 Adv Conceptual Design	1-04	12-05
W-520 Detailed Design	12-05	6-07
W-520 Construction	1-08	8-10
Permits	10-06	4-09
Performance Assessment	10-97	12-01
Safety Authorization Basis	10-03	9-09
Operations	5-11	6-14

NEPA = *National Environmental Policy Act of 1969*
RCRA = *Resource Conservation and Recovery Act of 1976*

8.3.2 Schedule Critical Path

The project critical path is derived from the MYWP for Projects W-465 and W-520. The critical path activities emphasize the congressional budget cycle, facility design, construction, and startup.

This page intentionally left blank.

9.0 PROJECT COST

The total projected cost for the ILAW Disposal Subproject is shown in Table 5. The costs are provided for the life of the project and are presented according to established ILAW Disposal Subproject WBS Level 6. A more detailed cost for each discreet project activity is provided in the FY 1999 MYWP (LMHC 1998).

More definitive total project cost (TPC) estimates for the ILAW Storage and Disposal line-item projects have been developed as part of each project's conceptual design activities. The TPC is made up of a total estimated cost (plant and capital equipment funding); other project costs, consisting of operating expense; and capital equipment not related to construction (CENRTC) funding. The TPC estimates and associated components are detailed in the Conceptual Design Report and validation packages. Other project costs are based on estimates conducted as part of the project budget submission to DOE-HQ, as validated by DOE-HQ, and are provided by the project performer, the PHMC. These other project costs are an integral part of the MYWP baseline estimate (LMHC 1998). Project costs will be evaluated during the project life cycle through a value engineering process to identify opportunities for cost reductions.

Table 5a. Immobilized Low-Activity Waste Storage Subproject Estimated Life-Cycle Costs - FY 2000-FY 2018. (2 sheets)

WBS	FY00 ($)	FY01 ($)	FY02 ($)	FY03 ($)	FY04 ($)	FY05 ($)	FY06 ($)	FY07 ($)	FY08 ($)	FY09 ($)	FY10 ($)	FY11 ($)	FY12 ($)	FY13 ($)	FY14 ($)	FY15 ($)	FY16 ($)	FY17 ($)	FY18 ($)	Total activity cost ($)
1.01.09.02.01.01.02 ILAW Systems Definition																				
Expense	474.5	475.6	128.1	128.7	129.2	128.7	128.1	128.7	128.7	128.7	128.7	128.7	128.7	128.1	128.7	128.7	129.2	128.1	42.5	3,050.1
1.01.09.01.01.03 ILAW Performance Assessment																				
Expense	3,432.1	4,290.0	2,128.5	503.6	42.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10,396.9
CENRTC	67.1	279.4	265.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	611.6
1.01.09.01.01.04 ILAW Project W-520 Immobilized LAW Disposal Complex																				
Expense	--	--	--	500.0	2,018.7	1,955.6	1,191.7	1,000.0	2,131.5	3,916.3	--	--	--	--	--	--	--	--	--	16,893.1
CENRTC	--	--	--	--	--	--	--	--	804.8	195.2	--	--	--	--	--	--	--	--	--	1,000.0
Capital	--	--	--	--	--	3,797.3	11,872.3	24,020.8	17,501.6	14,719.2	1,127.9	--	--	--	--	--	--	--	--	72,949.1
1.01.09.01.01.05 ILAW Future Projects																				
Expense	--	--	--	--	--	415.4	948.2	527.6	13,844.2	945.8	945.8	7,445.8	945.8	7,442.1	945.8	945.8	7,449.6	1,026.6	7,952.7	51,781.3
Capital	--	--	--	--	--	--	--	--	--	44,973.9	44,973.9	13,511.7	26,704.2	13,086.1	26,651.0	26,651.0	13,511.7	26,597.8	13,192.5	249,853.9
1.01.09.01.01.06 ILAW Operations																				
Expense	--	--	--	955.0	605.2	551.4	545.3	505.4	370.0	340.0	340.0	6,454.1	8,736.9	8,572.7	7,579.3	4,839.5	4,858.8	4,820.3	4,829.6	54,903.4
1.01.09.01.02.01 Compliant ILAW																				
N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1.01.09.01.03.01 ILAW Transition																				
N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1.01.09.01.04.01 ILAW Decontamination and Decommissioning																				
Expense	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,157.7	938.7	164.0	162.7	163.4	2,586.6
Capital	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,732.1	6,354.7	4,260.6	--	14,347.4
1.01.09.01.05.01 Project W-465, Immobilized LAW Interim Storage Facility																				
Expense	724.2	1755.0	1653.2	1505.7	1570.4	896.0	729.5	118.3	--	--	--	--	--	--	--	--	--	--	--	9,416.8
CENRTC	--	--	--	--	506.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	506.0
Capital	--	--	3,510.6	5,318.7	18,536.0	9,021.5	2,521.4	--	--	--	--	--	--	--	--	--	--	--	--	38,908.3
1.01.09.01.05.02 W-465 Operations																				

Table 5a. Immobilized Low-Activity Waste Storage Subproject Estimated Life-Cycle Costs - FY 2000-FY 2018. (2 sheets)

WBS	FY00 ($)	FY01 ($)	FY02 ($)	FY03 ($)	FY04 ($)	FY05 ($)	FY06 ($)	FY07 ($)	FY08 ($)	FY09 ($)	FY10 ($)	FY11 ($)	FY12 ($)	FY13 ($)	FY14 ($)	FY15 ($)	FY16 ($)	FY17 ($)	FY18 ($)	Total activity cost ($)
Expense	--	--	--	--	--	--	1,324.0	1,989.3	8,621.2	10,753.7	10,753.7	5,316.1	7.0	7.0	2.9	--	--	--	--	38,765.6

Notes:

1.) All costs are in thousands of dollars.

2.) Costs from FY01 out are not escalated.

3.) FY03 through FY05 operations expense is for performance assessment maintenance.

4.) Prior year costs (FY 95-99) are $13,960.

CENRTC =

FY = fiscal year

ILAW = immobilized low-activity waste

N/A = not applicable

WBS = work breakdown structure

Table 5b. Immobilized Low-Activity Waste Storage Subproject Estimated Life-Cycle Costs - FY 2019-FY 2050.

WBS	FY19 ($)	FY20 ($)	FY21 ($)	FY22 ($)	FY23 ($)	FY24 ($)	FY25 ($)	FY26 ($)	FY27 ($)	FY28 ($)	FY29 ($)	FY30 ($)	FY31 ($)	FY32 ($)	FY33 ($)	FY34-FY50 ($)	Total activity cost
1.01.09.01.01.05 ILAW Future Projects																	
Exp.	1,634.3	1,647.3	8,140.8	1640.8	8,134.3	1,640.8	1,640.8	1,061.6	1,061.6	1,061.6	568.7	566.5	568.7	571.0	568.7	4,166.8	34,674.3
1.01.09.01.01.06 ILAW Operations																	
Exp.	4,780.4	4,818.7	4,799.6	4,819.4	4,808.7	4,808.7	4,808.7	4,808.7	4,808.7	4,871.5	--	--	--	--	--	--	48,136.2
1.01.09.01.04.01 ILAW Decontamination and Decommissioning																	
Exp.	162.7	164.0	163.4	162.7	163.4	163.4	163.4	163.4	163.4	190.6	163	162.7	163.4	164.0	163.4	2,449.4	4,946.2
Cap.	--	--	--	--	--	--	--	--	22,488.7	22,669.3	--	--	--	--	--	--	45,158.0

NOTE: All costs are in thousands of dollars.

FY = fiscal year

ILAW = immobilized low-activity waste

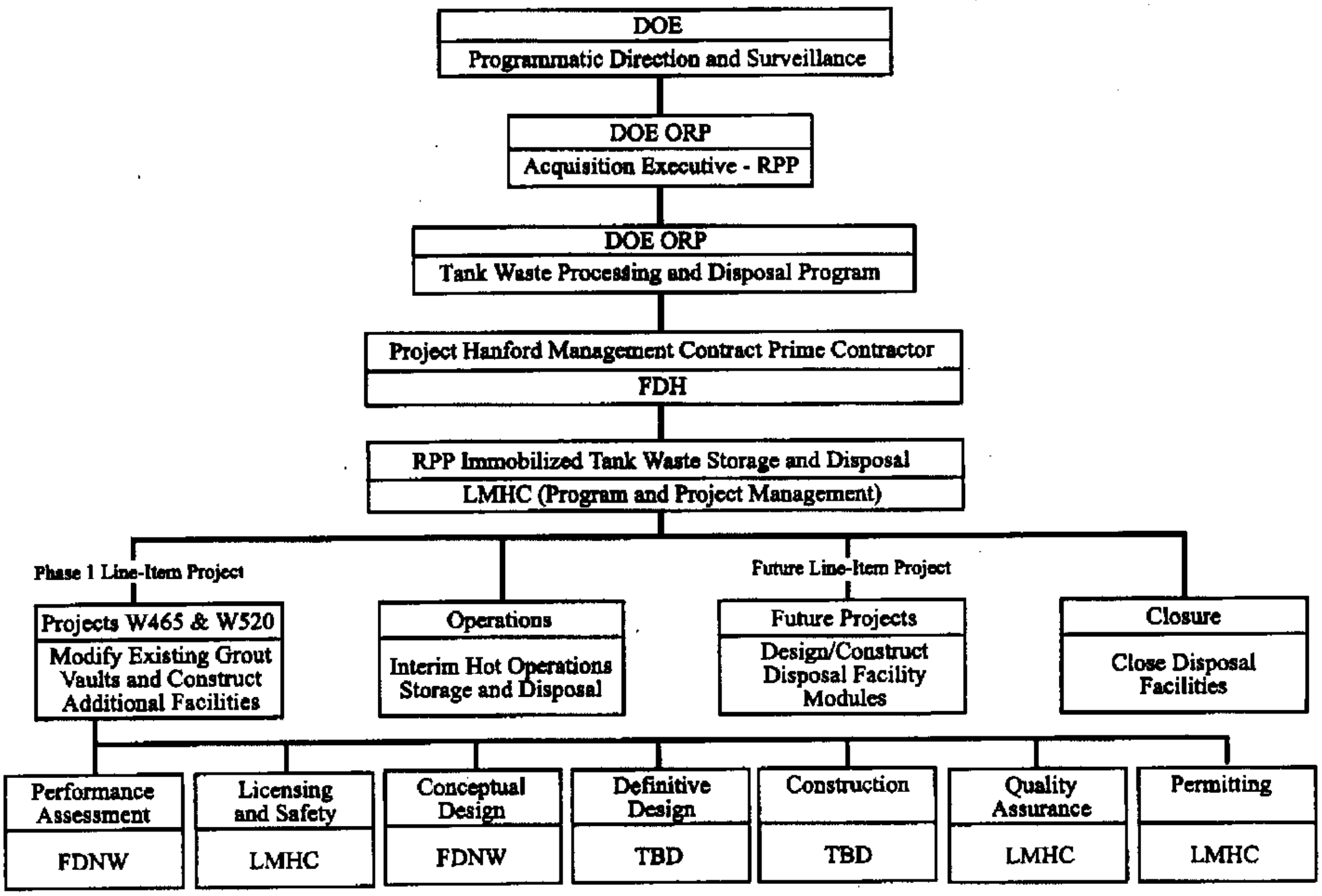
WBS = work breakdown structure

10.0 PROJECT ORGANIZATION, ROLES, AND RESPONSIBILITIES

The ILAW Disposal Subproject organization is based on the PHMC team concept. Active participants include the ORP, performing RPP program or project organizations, and, as appropriate, subcontracted architect-engineer and construction contractors. The performing subproject organizations provide program and project management and technical direction for the ORP during all phases of the project. Appropriate onsite support services, quality, safety, environmental, and health organizations are called on to provide expert support in their areas of expertise.

The organizational relationship of the ILAW Disposal Subproject is shown in Figure 6. The overall responsibility matrix is provided in Appendix E. Responsibilities, authorities, and the activities required of each participating organization throughout the project are described in DOE Order 430.1, *Life-Cycle Cost Management* (DOE 1998b). A more definitive subset will be developed before definitive design using guidance provided in Hanford Site procedures specific to line-item PMPs [HNF-PRO-1997, *Construction Program Overview* (FDH 1998)].

Figure 6. Immobilized Low-Activity Waste Disposal Subproject Organizational Relationships.



D&D = Decontamination and Decommissioning
DOE = U.S. Department of Energy
FDH = Fluor Daniel Hanford, Inc.
FDNW = Fluor Daniel Northwest, Inc.
LMHC = Lockheed Martin Hanford Corporation
ORP = U.S. Department of Energy, Office of River Protection
RPP = River Protection Project
TBD = To Be Determined

1517-6-R

11.0 MANAGEMENT APPROACH

The Subproject management and control process consists of the following elements: project planning, baseline management and control, performance measurement and reporting, work authorizations, funds management, contingency management, meetings and reviews, project validation, critical decisions, and external interface control.

11.1 BUSINESS OPERATIONS

The intent of the project management system and project planning is to ensure the successful execution of the LAW Storage Subproject management and system definition activities, and design, procurement, construction, testing, and startup of the LAW Storage facilities (Phase 1 and 2) within baseline cost and schedule and meeting technical criteria.

Sections 11.1.1 through 11.1.5 describe the LAW Storage Subproject management systems to be used, including procedures, practices, hardware, and software.

The LAW Storage Subproject Control organization will perform an annual assessment of the participant's management systems. The assessment scope and content will be tailored to an evaluation of implementation or execution and relate to some or all of the management system elements listed in Sections 11.1.1 through 11.1.5.

As Phase 1 and future projects (Phase 2) line-item projects are validated in accordance with DOE Order 4700.1 or its equivalent, contractors will be responsible for developing contractor WBSs (CWBS) and preparing CWBS dictionaries at the cost-account level to support the ILAW Storage and Disposal Subproject WBS for DOE. Each CWBS dictionary will specify what work will be performed, how it will be done, and who will do it. The CWBS dictionary also will contain other significant data, such as the identity of technical work scope and planning documents that further describe the work activities.

11.1.1 Project Execution Plans (Phase 1 and 2 ILAW Disposal Line-Item Projects)

A PEP will be developed for Phase 1 and 2 validated line-item projects in accordance with relevant PHMC procedures and DOE orders. These orders and procedures include DOE Orders 4700.1 (1992) and are expected to include 430.1 (1995a). Each line-item project PEP will identify the plans, organizational interfaces, management control systems, and reporting requirements that will be used by those responsible for managing the line-item projects. The line-item PEPs will be part of the line-item project-specific baseline and will be controlled documents subject to configuration management. Documents that will be developed after and to support the line-item PEP also are considered controlled documents and must be subject to disciplined configuration management procedures. The line-item PEP will be updated annually and will be supplemented to meet the requirements of the RL Site Management System and the annual multiyear work plan. Each line-item PEP will be developed after the line-item project's conceptual design activity is complete.

11.1.2 Acquisition Strategy

Conceptual design information and cost estimates developed during the conceptual design activity for Projects W-465 and W-520, and future disposal units will be used to prepare the PEP. A construction/procurement strategy will be developed during conceptual design and will be used to develop a detailed acquisition strategy that will be included in the PEP. The primary purpose of the PEP acquisition strategy is to describe line-item project acquisition objectives and contracting processes and provide them to line-item project participants for implementation. The PEP acquisition strategy is intended to be a framework for providing the requirements for lower tier documents to direct implementation, not a detailed roadmap for implementation.

The Subproject's intent is that retrofit of the grout vaults to accommodate initial Phase 1 ILAW production will be performed based on fixed-price, competitive-bid contracts. Long-lead materials, including items and components, may be procured by either the construction manager's subcontractors or by the PHMC Procurement organization. Contracting for construction will be performed by the line-item project construction manager.

11.1.3 Schedule Baseline Control

The LAW Storage Subproject baseline schedule is reflected in the annual multiyear work plan.

For each WBS element identified in the Subproject summary WBS, separate detail schedules will be prepared that identify the activities needed to successfully complete that phase of the subproject work scope. Each detail schedule will identify the logic ties and interfaces necessary to coordinate the completion of that phase of the work scope with the other elements of the Subproject summary schedule. Detail schedules will contain sufficient detail to allow integration of all detail schedules into the Subproject summary schedule. Detailed schedules will also identify the critical path and critical path activities.

All detail schedules will be resource loaded with staff hours associated with the particular skills mix that is identified for each activity and other direct costs. Schedule control of the Subproject will be implemented through critical path schedule analyses (resulting in the identification of schedule float) and establishment of milestones and corrective actions for schedule variances (determined by Earned Value Methodology). PHMC and its subcontractors will analyze schedule variances and evaluate trends on schedule performance using acceptable methodologies on their PHMC-approved master schedule. Performance reporting and variance analyses will be reported to the Subproject manager as specified in Section 12.6. When variance analyses reveal problems, the PHMC and its subcontractors will ensure that the affected participants take appropriate corrective actions. Changes to the Subproject schedule baseline will be processed in accordance with HNF-PRO-533 and implemented in accordance with the appropriate procedures in HNF-IP-0842.

11.1.4 Cost Baseline Control

The Subproject cost baseline is the Subproject cost estimate and is established and controlled in the annual multiyear work plan. Cost estimates are built up from activities or subactivities. The cost estimate level of detail is specified in the general guidance for the preparation of program plans issued annually by DOE and is generally at the activity level. The Subproject estimate will include contingency (as identified in the validated line-item project cost). The budget authorization requirement will consider the requirements of contract commitments and phase funding allowances. Carryover of expense funds to support the budget authorization/budget outlay profile will be required.

Cost control is implemented by PHMC through corrective action in response to cost variances reflected in the routine Earned Value analysis of the established cost performance baseline. The PHMC will prepare estimates to complete for the Subproject and line-item projects (including contingency), taking into account the cost-performance index. The PHMC and other Subproject contractors will prepare and seek appropriate approval for documentation of corrective action for any cost estimate change that exceeds the thresholds established in HNF-MD-008.

The PHMC prime contractor, Fluor Daniel Hanford, has the primary responsibility for preparing and reporting cost performance data to the ORP Disposal Program Division (DPD) as specified in Section 12.6. Significant variances, corresponding variance analyses, and recommended corrective action will be included in the report. The estimates to complete for each Subproject WBS element will be prepared by the PHMC subcontractors based on the status of the work element and the cost-performance index, and reported monthly at the status review meeting. The estimates to complete will be based on the latest performance data, current assessment conditions, current and projected pricing factors and rates, and knowledgeable forecasts of projected conditions.

Changes to the Project and Subproject cost baselines including line-item project contingency will be processed through Change Control in accordance with the procedures found in HNF-PRO-533 and as outlined in the PEP. The PHMC will ensure that all Subproject cost estimates and revised estimates are based on current schedules and that the basis for cost estimates is consistent with the documented Subproject scope baseline.

11.1.5 Performance Measurement and Reporting

Earned Value methodology will be used to measure performance on this Project. Each PHMC contractor and subcontractor will use and maintain internal cost and schedule performance measurement information that provides responsible managers with timely, accurate, and objective performance data. Performance will be measured against the multi-year program plan cost estimate and the TPC for the line-item projects.

The line-item projects will submit monthly status data to the LAW Storage Subproject for integration in their overall report. Reporting format and content will comply with DOE Order 4700.1 or equivalent. The progress tracking system and the site management system will be used for the monthly status reports. Line-item project reporting will be coordinated with the overall Subproject reporting. The line-item project will support overall Subproject weekly and monthly planning and other reporting systems and meetings.

11.1.6 Work Authorization

Overall work authorization occurs by contractual arrangements between the DOE contracting officer and the PHMC. All funding and work scope will be authorized by the DOE contracting officer. A PHMC internal process will be established to authorize specific projects.

Capital work will be controlled within the subprojects by cost account plans following project authorization from DOE. Appropriate work performed by the PHMC A/E will be authorized by a letter of instruction.

11.1.7 Funds Management

Allocation and authorization of funds will come from DOE to the integrating contractor and from the integrating contractor to the responsible subcontractor. Control of fiscal year costs will be accomplished in accordance with financial plan ceilings. Line-item project expense and CENRTC funding that is authorized but not spent (i.e. carry-over) within a fiscal year will remain with the Subproject for use to meet the next fiscal year CENRTC line-item project needs in accordance with the Subproject's cost, schedule, and technical baselines. Uncosted commitments will be carried over as budget outlay.

Cost, commitment, and fund authority information will be provided by the PHMC prime contractor, Fluor Daniel Hanford, in monthly status review meetings, as requested by the DOE WDD. This information will be used to keep the DOE WDD and management advised of current cost and commitment levels and potential funding impacts. Controls will be established to ensure that costs and commitments do not exceed available funding.

11.1.8 Contingency Management

Formal contingency will be included for Subproject activities approved as part of a validated line-item project. Contingency will be included in the ILAW Storage and Disposal Subproject as a part of the Subproject's TPC. Contingency is intended to cover costs that may result from unforeseen and unpredictable conditions and uncertainties within the defined line-item project scope. Contingency analysis will be performed on all line-item project cost estimates to determine contingency requirements. Contingency will be managed and controlled as identified in Section 11.1.4, "Cost Baseline Control."

11.1.9 Meetings and Reviews

The Subproject will conduct monthly management review meetings with DOE DPD. The line-item projects have dedicated management review meetings. The Subproject team leader will be responsible for recording action items, agreements, and commitments resulting from the meeting. Monthly reviews will focus on immediate decisions, critical issues, cost and schedule variances and assessments, risk management, corrective actions, and the general status of work in progress. Data from the monthly status report should be used as much as possible. The review is intended to focus on exceptions and major significant issues that require management decisions.

11.1.10 Project Validations

The line-item projects will be validated in accordance with DOE Order 430.1 or equivalent and Office of Management and Budget requirements if required by DOE-HQ Facilities Management. Design and construction cost estimates will be reviewed independently. The basis for validation is the technical information and cost estimates developed during conceptual design, the cost estimate review was held late in FY 1998 for FYs 2000 through 2002 authorizations. A complete validation review was conducted during FY 1998 for Project W-465. Validation for Project W-520 is scheduled for 2004.

11.1.11 Critical Decisions

The first critical decision (CD), CD-1, authorization to initiate conceptual design, for Project W-465, was delegated by Alvin L. Alm, DOE Assistant Secretary for Environmental Management, to J. D. Wagoner, manager of RL, and granted by him. Future CDs are delegated to the ORP manager. CD-2, authorization to begin definitive design, will be granted by the ORP manager. CD-3 is authorization to begin construction activities and CD-4 is authorization to begin operation.

11.2 ENGINEERING

Engineering includes systems engineering management, technical baseline control, and testing and evaluation planning.

11.2.1 System Engineering Management

The ILAW Disposal subproject will use the TWRS *System Engineering and Management Plan* (SEMP) [HNF-SD-WM-SEMP-002 (Peck 1998)] as the basis for applying the systems engineering concept to the program. A Subproject SEMP has been prepared after the conceptual design is completed to ensure that the technical requirements and basic design criteria are clearly defined and traceable to the functions and requirements document.

The systems engineering process to apply scientific and engineering principles to accomplish the following goals:

- Transform an operational need into a system of defined performance and configuration characteristics through iterative, disciplined, and documented processes.
- Ensure that all necessary related parameters are integrated to optimize a system design that meets program cost, schedule, and technical performance goals
- Maintain a controlled definition of the system over its life cycle.

Adoption of the TWRS Systems engineering approach will provide the following benefits:

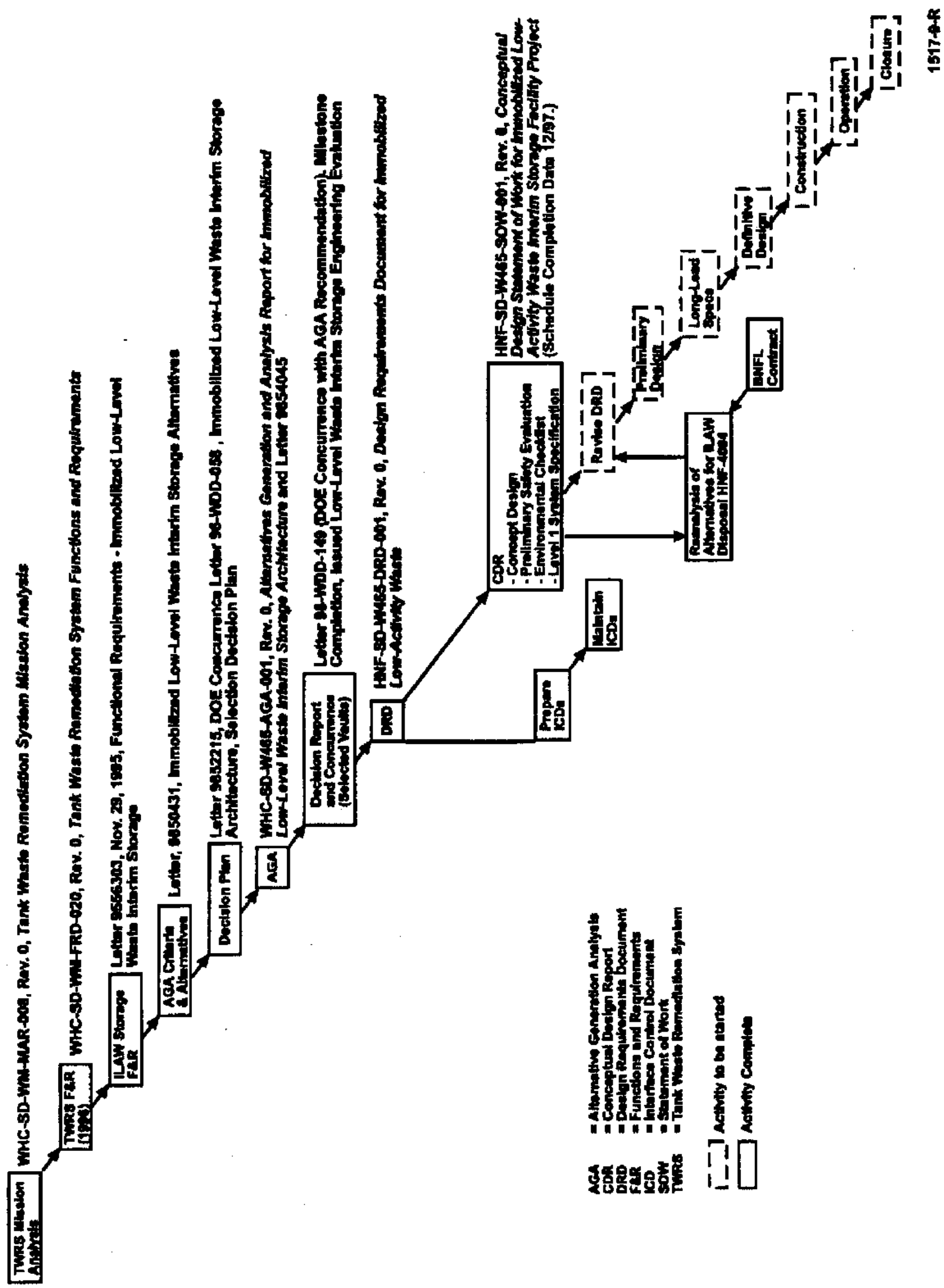
- An orderly and structured approach to systems development.
- A common understanding of program goals and expectations by all participants.
- An integrated schedule of activities showing how they relate to each other.
- Documented evidence of the current condition or status.
- Traceability of significant program characteristics and system configuration at any point in the program life cycle.
- Control of project cost, schedule, and technical performance.
- Ensurance that the system being built will accomplish the mission.

Line-item project-specific systems engineering management and implementation plans (SEMIP) have been prepared for Projects W-465 and W-520 to ensure that the technical requirements and basic design criteria of the line-item projects are clearly defined and traceable throughout the design, acquisition, construction, and operation phases.

The TWRS SEMP (Peck 1998) provides guidance to migrate to the approved systems engineering process for Hanford Site projects that were established before the approved TWRS SEMP was issued. Projects W-465 and W-520 were defined before development of the TWRS SEMP. Figure 7 summarizes the major systems engineering processes and products for Projects W-465 and W-520.

The Project W-465 and W-520 requirements were documented in DRDs. Changes to the Hanford Site and TWRS technical baselines in the Hanford Site Technical Database will be incorporated as updates to the Project DRDs. The DRDs will be converted to level 1 system specifications before preliminary design.

Figure 7. Systems Engineering Activities and Documentation—Project W-465.



Risk will be managed in accordance with the TWRS SEMP, TWRS programmatic risk management plan, the risk management plan for the ILAW Storage and Disposal Project (Murkowski 1995), and the appropriate risk management procedures in WHC-IP-0842, Volume IV (LMHC 1997).

Interface control will be managed in accordance with the TWRS SEMP and the appropriate interface control procedures found in WHC-IP-0842, Volume IV.

11.2.2 Technical Baseline Control

A technical baseline will be established for the ILAW Disposal Subproject as depicted by the Subproject WBS and Subproject activities. A more detailed technical baseline will be developed for each ILAW Disposal Subproject line-item projects following conceptual design. The technical baseline is the reference set of technical data used in establishing the Subproject and line-item projects. The Subproject technical baseline defines the technical data needs and requirements and data generation necessary to establish the line-item projects and includes the more detailed technical data developed by the line-item project to design, construct, start up, and operate the line-item project interim storage facilities. More specifically, the line-item project technical baseline includes functions and requirements, Level 1 process flow diagrams, performance specifications, interface control documentation, and design packages that contain specifications and drawings, quality assurance provisions, safety basis documents, and test and inspection requirements.

The PHMC will ensure that configuration management activities and systems engineering activities are performed and will maintain definition and control of the line-item project baseline and associated documentation. These activities will be applied to all systems and subsystems necessary to achieve all functional requirements and deliver all products to satisfy the integrated technical baseline and overall line-item project objectives. At all times during the life of the line-item projects, the current configuration will be maintained in orderly and auditable project files. These project files will include, but not be limited to, system descriptions, system specifications, conceptual and definitive system designs, system and material inspection reports, test reports, operating and surveillance procedures and vendor documentation.

11.2.3 Test and Evaluation Plan

A test and evaluation program based on systems engineering principles will be implemented on the Phase 1 ILAW Storage and Disposal Subproject to ensure that the completed facility and all installed systems meet the performance specifications. Detailed test plans, specifications, and procedures will be prepared, approved, controlled, and maintained in accordance with the requirements of this project plan and subsequent PEPs. These test plans or specifications and procedures will address testing requirements for all plant systems, subsystems, and individual pieces of equipment. The test planning and scheduling will coordinate development testing with design, and plant testing with plans for construction, turnover, and startup. The Subproject testing activities include construction and preoperational and operational testing.

Facility startup will be planned by a dedicated onsite PHMC organization. Actual startup will be performed by either an in-house group or a qualified subcontractor under direction of the Subproject.

Construction Testing. The Phase 1 Subproject startup program is an engineered multiphase sequence of activities culminating in successful startup and initial operation of the grout vault retrofit to accommodate ILAW interim storage. Startup activities physically begin during construction acceptance testing, continue with preoperational testing, and are completed during operational testing. These startup activities will be detailed in the Project W-465 ILAW Disposal Subproject startup plan.

Construction Acceptance Testing. Construction testing activities consist of factory acceptance tests and construction acceptance tests (CAT) that demonstrate compliance with procurement and construction specifications. Satisfactory completion of these tests is required to allow transition into startup testing activities: preoperational and operational testing.

The architect-engineer will prepare test requirements and acceptance criteria for facility acceptance tests and CATs to be included in procurement and construction specifications. Detailed test plans and/or acceptance test procedures may be prepared by the A-E, construction contractor, or vendors or subcontractors in accordance with the requirements of procurement and construction specifications and vendor data. These detailed test plans and/or acceptance test procedures will be reviewed and approved by the architect-engineer and PHMC. The facility acceptance tests and CATs will be performed by the responsible organization (i.e., the construction contractor, vendor, or subcontractor). The tests will be witnessed by DOE WDD and the PHMC as required to ensure that test requirements are met. The test data will be included in the structures, systems, and components (SSC) turnover package.

The CATs culminate with turnover of individual SSC segments to the PHMC for preoperational testing. The scope of each SSC segment and its turnover sequence will be determined by the PHMC. All test data and reports will be transferred to the PHMC along with the SSC segment. The construction contractor is responsible for controlling the vendor and construction test data until transfer. Information copies of the vendor data will be provided to the PHMC as requested to support preoperational testing.

Although the Startup organization is not responsible for acceptance testing, it may take administrative control of equipment and portions of systems before acceptance testing is complete to begin preoperational testing soon enough to meet Subproject milestones. The need to maintain custody control while allowing both acceptance testing and preoperational testing to proceed simultaneously is met by using a "blue tag" system, which passes jurisdictional control of the SSC, or a portion of the SSC, to Startup.

Preoperational Testing. Preoperational testing is performed on individual segments of SSC to demonstrate that plant systems or subsystems perform as designed. The architect-engineer will prepare test specifications containing test requirements and acceptance criteria for preoperational tests. The Subproject Startup organization will use these specifications to prepare test procedures that provide instructions for conducting the tests. The procedures will be reviewed and approved by the Subproject Test Review Board before testing. The Startup administrative procedures manual, which will provide the requirements and guidance for preoperational testing activities, will be prepared by the Subproject Startup organization and approved by the Test Review Board.

Operational Testing. Operational testing is performed to demonstrate integration of the entire facility. All systems are brought on line and operated under anticipated standard operating conditions and off-normal conditions using simulated, non-radioactive ILAW packages. Operational testing (e.g., product acceptance process) is performed with the actual plant equipment, operating procedures, and personnel. To ensure that operational testing is performed correctly, all testing activities will be performed in accordance with the requirements of detailed test procedures. These procedures will be prepared by the Subproject Startup organization and approved by the Subproject Test Review Board. Operational testing will be planned and scheduled to follow completion of preoperational testing. ILAW product acceptance testing and evaluation will be done by the DOE Waste Integration Team in accordance with the product acceptance process.

Dry-Run Demonstrations. A dry-run phase will follow completion of CSB preoperational testing to demonstrate that operators, procedures, and CSB equipment are in a final satisfactory state of readiness to safely and efficiently receive, handle, and store hot ILAW packages. The dry runs will be performed as part of the readiness review and culminate with receipt of Key Decision 4 from DOE to commence receipt of hot ILAW packages.

11.3 QUALITY, SAFETY, AND ENVIRONMENTAL PROTECTION

Effective quality and environmental safety and health protection programs will be established and maintained to ensure that a requisite level of quality, safety, and environmental compliance in all areas of transportation and disposal facility design, construction, test evaluation, operation, and closure.

11.3.1 Environmental Management

The environmental, safety, and health protection for the Subproject are established to ensure that all Subproject activities are carried out in compliance with federal, state, and local regulations, laws, and standards for the protection of the environment and the safety and health of employees and the public. Regulating agencies will be kept informed of Subproject plans and major activities.

The Subproject will cooperate with DOE and other federal, state, and local agencies and stakeholders at large, as appropriate, to ensure that its activities comply with environmental protection regulations and requirements. The necessary environmental permits and approvals will be procured at the appropriate times. Regulatory integration and public involvement are the responsibility of the PHMC organization charged with coordinating regulatory requirements and activities for the Subproject.

An environmental requirements checklist and a permitting plan have been prepared for Subproject. The environmental requirements checklist documents the TWRS Environmental Compliance organization's evaluation of the required environmental permits, approvals, and other documentation necessary for the project, and lists the contact person for each requirement. The permitting plans address environmental permitting requirements for the transportation and disposal of ILAW produced during the privatization effort. An environmental requirements checklist and permitting plan have been prepared for Projects W-465 (Deffenbaugh 1997). The permitting activities identified in the Projects W-465, W-520, and future projects permitting plans are included in the ILAW Disposal Subproject portion of the TWRS annual multiyear work plan. Important permitting activities are summarized in the ILAW Disposal Subproject summary schedule (Appendix F). For each applicable regulation, the permitting plan provides the following: a summary of data requirements, a discussion of alternatives, a recommended implementation strategy, and an estimated cost of implementing the recommended alternative.

The applicable environmental regulations identified in the Subproject permitting plan (Deffenbaugh 1997) are as follows:

- NEPA, 42 USC 4321, et seq., which was enacted to ensure environmental matters are considered before federal actions are initiated that might affect the quality of the human environment.

- SEPA, Chapter 43.21C, *Revised Code of Washington*, which is the Washington State equivalent of NEPA and is considered implementing regulations.

- RCRA, 42 USC 6901 et. seq., was enacted as a comprehensive program to mandate that hazardous waste will be treated, stored, and disposed of in a manner that minimizes the present and future threat to human health and the environment

- "Dangerous Waste Regulations," WAC 173-303, as amended, 1996, is the Washington State equivalent to RCRA and is considered implementing regulations.

- *Federal Clean Air Act of 1970*, 42 USC 7401 et seq., as amended in 1977 and overhauled and expanded in 1990.

- *General Environmental Protection Program*, DOE Order 5400.1 and *Radiation Protection of the Public and the Environment*, DOE Order 5400.5, which require that monitoring be performed to determine any impact on the environment from activities that involve potential emission of radionuclides.

11.3.2 Regulatory Compliance with Disposal Facility Requirements

Compliance with ILAW product specifications as stated in the privatization contract (Wagoner 1996) will be accomplished by a product acceptance process to be developed by the DOE Waste Integration team based on a product acceptance strategy. Implementation will be described in the final version of ICD 15, *Immobilized Low-Activity Waste*. DOE will assume responsibility for the ILAW product.

Compliance Documentation. The PHMC team will produce the documentation that DOE requires to allow the PHMC team to implement its Phase 1 tasks and to support follow-on DOE disposal actions for Phase 1 LAW products. Currently, the PHMC team is assuming that such supplemental compliance documentation will include at least the following:

- A document will be provided that contains the compliance approach that the PHMC team proposes to use for each applicable Phase 1 DOE product acceptance requirement.
- A document will be provided that contains evidence (e.g., analyses, test results, etc.) confirming that the proposed compliance approach is capable of meeting each such requirement.

11.3.3 Nuclear Safety Activities and Authorization Basis Process

This section covers the tasks needed to support the project activities to design and construct a facility that can be operated safely to protect the health of the public and the workers and preserve the environment.

The following discussion provides the approach to be used to implement the Project Safety Program based on implementation of HNF-PRO-430, Rev. 0, *Safety Analysis Program* (FDH 1997c) and HNF-PRO-705, Rev.0, *Safety Basis Planning, Documentation, Review, and Approval*, in accordance with applicable DOE orders, standards, and policies, as well as Hanford Site-specific guidelines and work procedures.

Nuclear Safety Activities—Project Support. A comprehensive, graded approach to safety is being developed for the Subproject. This approach will integrate the appropriate level of safety analysis and review to provide a continuous flow of safety inputs and requirements into the Subproject's technical, cost, and schedule baselines throughout the project life cycle. The approach will be implemented by establishing or performing the following activities.

- The PSE studies will be performed during the conceptual design stage (i.e., facility hazard categorization, preliminary hazard analysis, bounding accident scenario analysis and unmitigated consequences evaluations). These studies are expected to establish a set of safety functions to be further analyzed and tracked during the preliminary and definitive design phase. The PSE studies will be documented by a preliminary safety evaluation report as part of the CDR budget validation package. The primary objective of the PSE is to identify significant safety functions to support

CDR budget validation and to establish the safety basis for follow-on project phases. The PSE will not be submitted to DOE as an authorization basis document requiring a three-tier review. However, because a facility hazard categorization constitutes a safety basis, DOE will have to approve a PSE that contains a facility hazard categorization to be in compliance with DOE Orders 5480.23 and 5481.1B.

- Detailed safety analysis will be performed as necessary, depending on the PSE results (i.e., items needing further analysis), throughout the preliminary and detailed design phases. These studies will be used to establish the basis of the PSAR to be submitted to DOE for approval before the start of procurement and construction.

- Safety requirements will be addressed in the project design package using the safety equipment list, specific procurement requirements, and specific testing during start up.

The PSE and PSAR will undergo a Tier 1 PHMC functional review and a DOE review for approval. The three-tier review process will be reserved for the final authorization basis package to be approved for operation.

Authorization Basis Documentation Development Strategy and Approval Process. The safety process will be implemented in accordance with PHMC guidance on implementation of the authorization basis (Davis 1997). A safety plan (safety basis criteria document) will be developed in FY 1998 to outline the development, integration, and approval of overall nuclear safety documentation in accordance with HNF-PRO-705 requirements.

Program Level. The current RPP authorization does not include Project W-465 and future Phase 2 ILAW storage and disposal facility line-item projects or ILAW interim storage and disposal facilities. An integrated authorization basis will be developed to address these line-item projects and any interfaces with other Site projects or private contractors.

The baseline for the new integrated authorization basis will be a DOE-approved addendum to the upcoming TWRS FSAR, top-level up-front document that addresses the following issues for ILAW storage (Subproject W-465) and disposal (Subproject W-520):

- Site characteristics and natural phenomena data (boundaries, demography, climatology, meteorology, geology, etc.), which will rely on the existing approved TWRS authorization basis

- Overall vitrified waste management strategy throughout the Hanford Site (transportation, interim storage, and disposal)

- ILAW products description (i.e., radioactive material inventory, conditioning process, general characteristics, and certification)

- Interim storage and disposal facilities general description and purpose

- Overall hazard identification and control strategy (i.e., bounding potential scenarios including criticality, external exposure, heat removal, and canister drop)
- General nuclear safety functions that must be maintained
- Identification and discussion of applicable DOE, state, and federal rules and requirements
- Interfaces with other Site projects and private contractor facilities
- Site transportation basis (tracks, requirements, procedures, shipping, and cask maintenance)
- Operational safety basis and organization (should refer to the existing TWRS health and safety plan).

This TWRS FSAR addendum will form the basis for developing the line-item project safety analysis reports (SAR). The FSAR will be updated as the line-item project SARs are developed and specifically approved for each facility operation.

Subproject Level. Projects W-465 and W-520 and future projects will develop an independent FSAR to be approved by DOE for operation. A PSE has been developed (Mouette 1997). The FSAR will be completed before start up. However, the current plan, outlined in Table 6, assumes the development of stand-alone safety-basis documentation.

Transportation of Immobilized Low-Activity Waste. This means the transportation of radioactive materials only within Hanford Site boundaries. These areas are not accessible to the public and are not subject to U.S. Department of Transportation regulations. Transportation and packaging operations are authorized and controlled by contractor-approved procedures and safety evaluations.

The strategy for ILAW products packaging and transportation operations is addressed in HNF-SD-ENV-EE-003, Rev. 0, *Permitting Plan for the Immobilized Low-Activity Waste Project* (Deffenbaugh 1997). The permitting plan identifies the activities needed to conduct the design and safety evaluations in the onsite transportation program as described in WHC-CM-2-14, *Hazardous Material Packaging and Shipping.*

Safety Activity Schedule. A list of TWRS Storage and Disposal Project (W-465 and W-520) safety-related tasks, task durations, and performing organizations is provided in Table 6. The tasks and associated information (i.e., schedule, organizations) will be identified in more detail in the specific engineering task plans once the results of the PSE are known. Safety basis documentation development and the Project W-465 safety activity are identified in WBS 1.1.3.4.02.03.08.09, Project W-465, and WBS 1.1.3.4.01.04.18, Project W-520 Safety (see Table 2).

Quality Assurance. The scope of the project is defined as the transportation, interim storage, and disposal of immobilized LAW waste products provided by a private contractor. Interim storage is to be provided until disposal authorization is received by DOE. The project can only influence the quality of the immobilized product by confirming, documenting, and enforcing the continued quality of the private contractor's product. Projects W-465 and W-520 and future projects will implement the quality requirements to ensure that systems, structures, and components (design features) needed to ensure and document product quality are provided and available for use by individuals during the Conduct-of-Operations phase of the facility life cycle.

ILAW Storage and Disposal Subproject quality assurance activities are currently covered by the TWRS Quality Assurance Program Plan (QAPP) and associated implementing procedures. This program addresses the requirements of Fluor Daniel Hanford's *Quality Assurance Program Description*, HNF-MP-599 (FDH 1997d), which is based on 10 CFR 830.120 and DOE Order 5700.6C. 10 CFR 830.120 applies to all TWRS activities involving a nuclear facility and DOE Order 5700.6C applies to the other activities.

The project quality assurance requirements will be contained in a project-specific QAPP. The QAPP will be prepared after definitive design begins. Operational quality assurance is provided by existing operation quality assurance plans.

Requirements from HNF-MP-599 and applicable implementing procedures will be used as the baseline to produce line-item project-specific QAPPs.

Table 6. Safety-Related Activities and Schedule. (2 Sheets)

Tasks	Responsible and performing organizations	Observations/ project stages	DOE approval required	Tier review		
				1	2	3
Preliminary Safety Evaluation	RPP NS&L	Conceptual design	Validation as part of the conceptual design report - facility hazard categorization needs to be approved	x	x	(x)
Prepare safety plan	RPP NS&L, Licensing	Advance conceptual design and congress budget cycle	Approval per HNF-PRO-705	x	x	(x)
Preliminary TWRS FSAR addendum development	RPP NS&L, and Safety Analysis group	Basis for both low- and high-activity PSAR/ FSAR development - detailed design	No			
Update and final TWRS FSAR addendum	RPP NS&L, Safety Analysis group	Facility construction. Updates with separate facilities FSARs addendums (Grout Treatment Facility and Spent Nuclear Fuel Canister Storage Building)	Tier 3 review for each facility with separate safety basis documentation for operation	x	x	(x)

Table 6. Safety-Related Activities and Schedule. (2 Sheets)

Engineering task plan for development of PSAR	RPP NS&L, Licensing	Mobilization for detailed design	No	x		
Development and DOE approval of a PSAR	RPP NS&L, Safety Analysis and Licensing groups	Detailed design and prior to start of procurement	Authorization to start procurement	x	x	(x)
Development of transportation criteria related to safety	RPP NS&L, Licensing and Management Federal Services Hanford	Procurement specifications for trucks and casks	No			
SARP	TWRS NS&L, Licensing and Waste Management Federal Services Hanford	detailed design, construction and cold testing	Yes	x	x	x
USQ screening	TWRS NS&L, Licensing	Check that construction activities are covered by current AB	No			
Development and approval of a FSAR	TWRS NS&L, Safety Analysis and Licensing groups	construction and inactive testing	Yes	x	x	x

(x) Tier 3 review is assumed to be reserved to the specific facility safety basis documentation required to authorize operation.

RPP = River Protection Project
SA = Safety Analysis
SARP = Safety Analysis Report for Packaging
TBD = to be determined
USQ = unreviewed safety question
WMH = Waste Management Federal Services Hanford

Safety References

- HNF-PRO-430, Rev.1, Safety Analysis Program, based on the following orders, standards, and policies:

- DOE 5480.21, Unreviewed Safety Questions

- DOE 5480.22, Technical Safety Requirements

- DOE 5480.23, Nuclear Safety Analysis Reports, and DOE-STD-3009-94, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23

- DOE-STD-3009-94 and 3011-94, Guidance for Preparation of Nuclear Facility Safety Analysis Reports, Technical Safety Requirements and SAR Implementation Plans
- DOE 5481.1B, Safety Analysis and Review Systems
- DOE 6430.1A, General Design Criteria
- SEN-35-91, DOE Nuclear Safety Policy
- DOE-STD-1027-92, Hazard Categorization and Accident Analysis techniques for Compliance with DOE 5480.23
- DOE-EM-STD-5502-94, Hazard Baseline Documentation

- Davis 1997, Lockheed Martin Hanford Company Manual HNF-IP-0842, Volume IV, *Authorization Basis Amendment Process*
- Mouette 1997, HNF-SD-W465-PSE-001, Rev.0, Preliminary Safety Evaluation for project W-465 Immobilized Low-Activity Waste Interim Storage Facility
- HNF-SD-ENV-EE-003, Rev.0, Permitting Plan for the Immobilized Low-Activity Waste Project
- HNF-PRO-157, *Radioactive Material/Waste Shipments*
- HNF-PRO-705, Rev.1, Safety Basis Planning, Documentation, Review and Approval
- HNF-SD-BIO-001, Rev.1, Tank Waste Remediation System Basis for Interim Operation
- WHC-SD-WM-SAR-027, Rev.2, Hazard Identification and Evaluation for Operation of the Grout Facilities and Near Surface Disposal of Grout Phosphate/Sulfate Low Level Liquid waste
- WHC-SD-WM-SSP-005, Rev.0, *Grout Facilities Standby Plan.*

11.4 BASELINE MANAGEMENT

A total ILAW Disposal Subproject baseline is established for all activities to the completion of the subproject. All of these activities are reflected in the ILAW Disposal Subproject WBS. The technical baseline is the basis for the schedule and cost baselines that are reflected in the ILAW Disposal Subproject annual multiyear work plan. Effective control of the Subproject baseline is essential; changes to the baseline are managed in a disciplined fashion. The Subproject approach to managing baseline changes is based on maintaining an accurate description of the baseline, methodically evaluating proposals to alter it, and maintaining configuration to the technical baseline. This will be done by establishing change class levels (level of approval authority) and a project change control board as specified in HNF-PRO-533, *Change Control* (FDH 1998). This procedure defines the responsibilities and requirements for management, administration, and use of the technical, schedule, and cost baseline control systems for the subproject.

Controlled baseline documents will be changed through submittal of change requests that justify the proposed changes. Specific baseline change control requirements will be managed in accordance with Hanford Site change control procedures and established thresholds in accordance with appropriate procedures from HNF-IP-0842 (Davis 1997).

12.0 RISK MANAGEMENT

Risk planning, assessment, analysis, and management (Figure 8) will be used throughout the Subproject to identify significant risk factors and formulate mitigation plans. Risk management will be conducted in accordance with the RPP programmatic risk management plan (Zimmerman 1998) and procedure. Identified risks will be incorporated into the RPP risk management list for assessment and analysis. Risk assessment will be an ongoing, iterative, integrated process. The process will provide information needed to manage programmatic, technical, environmental, safety, and health risks. A risk management plan for the Storage and Disposal Subproject has been prepared. This plan includes developing and ranking a risk list, then tracking and reporting the status of the risks at monthly management review meetings. These meetings are held regularly to relay the status of all project activities.

The risk that disposal authorization will not be received from DOE-HQ in time to start disposal operations has been greatly reduced by the extension of the scheduled start date for the treatment plant. The ILAW subproject is working with DOE-HQ to obtain authorization for disposal and has received a conditional recommendation for approval from the Low-Level Waste Federal Review Group. Also, Line-Item Project W-465, which currently is scoped as an ILAW disposal facility, could be operated as an interim storage facility if necessary pending disposal authorization.

12.1 APPROVAL REQUIREMENTS

The ILAW Disposal Subproject includes several activities that require review and approval by external authorities. The subproject can not impose schedule commitments on the reviewing organizations. Activities that require external approval and the approving organizations are given in Table 7.

12.1.1 Performance Assessment Approval

The approval processes for most of the activities listed in Table 7 are established construction project requirements that apply to all construction projects and are considered in the MYWP planning activities. The performance assessment task also is well developed in the MYWP, but the approval process is not as well established because the PA applies only to disposal projects and approval requirements for those projects are changing. According to the recently issued DOE order on radioactive waste management (DOE O 435.1) and other DOE guidance (Guimond and O'Toole 1996), both a performance assessment and site composite analysis approved by DOE are required as the basis for the disposal authorization statement to be issued by the DOE Deputy Assistance Secretary for Waste Management. The performance assessment is required as part of the disposal process under the DOE order on radioactive waste management and is part of the ILAW Disposal Subproject. The performance assessment for ILAW disposal (Mann 1998a) covers ILAW disposal in both modified grout vaults and the additional ILAW disposal complex facilities. The composite analysis describes the impacts of contaminant

Figure 9. Programmatic Risk Management Process.

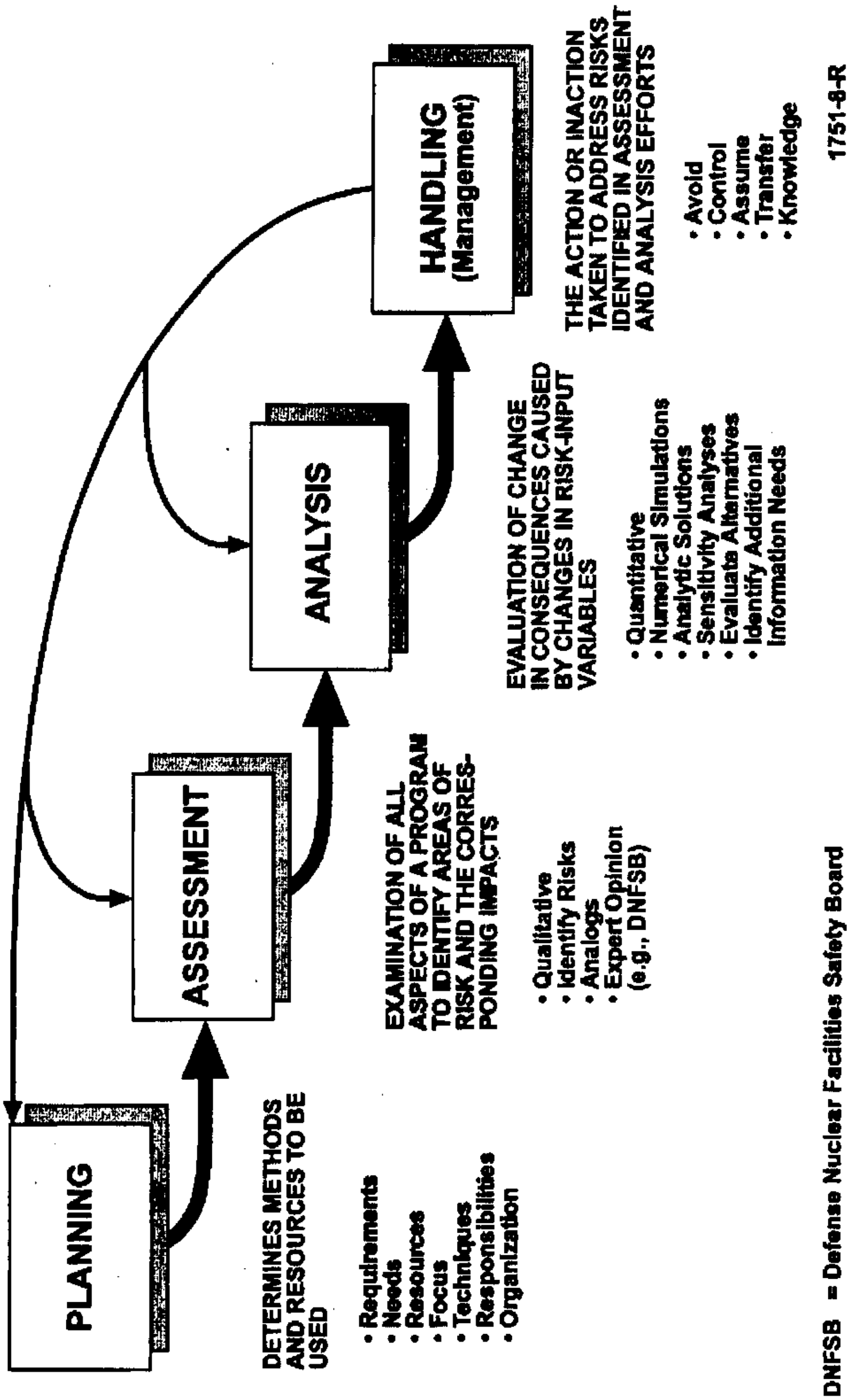


Table 7. Immobilized Low-Activity Waste Disposal Subproject Activities that Require Approval.

ILAW Disposal Subproject Activity	Approval Organization
Performance assessment	DOE-HQ, Deputy Assistant Secretary for Waste Management
Preliminary safety analysis report and final safety analysis report	ORP/DOE-HQ
RCRA Part A and Part B permits	Washington State Department of Ecology
Validation and capital funding	DOE-HQ, ORP
NRC incidental waste determination	NRC (Approved)
Design (Critical Decision 1,2,3)	DOE-HQ unless delegated to ORP
Construction	Various organizations
Project Execution Plan (PEP)	ORP
DOE approval to operate	DOE

DOE = U.S. Department of Energy
DOE-HQ = U.S. Department of Energy, Headquarters
ILAW = immobilized low-activity waste
NRC = U.S. Nuclear Regulatory Commission
RCRA = *Resource Conservation and Recovery Act of 1976*
ORP = U.S. Department of Energy, Office of River Protection

contributions from nearby sources on the disposal system performance objectives and is being conducted as a separate project by Pacific Northwest National Laboratory (Kincaid 1998). Both the ILAW performance assessment and composite analysis are now undergoing final DOE review. The timing and number of review cycles of the PA and composite analysis and the final disposal decision by DOE-HQ may affect the disposal system closure action budget and schedule.

This page intentionally left blank.

13.0 CONFIGURATION MANAGEMENT

Configuration Management maintains and controls changes to the technical baseline once the baseline is placed under change control. RPP will prepare a configuration management plan consistent with applicable DOE orders (DOE-STD-1073-93, *Guide for Operational Configuration Management Program*, and DOE Order 430.1, *Life-Cycle Asset Management*). The ILAW Disposal Subproject will follow Vann, 1998, and the current configuration management plan guidance (Treat et al. 1998). In addition, a line-item-project-specific configuration management plan will be developed consistent with the TWRS configuration management plan, applicable portions of DOE-STD-1073-93, and the TWRS SEMP. Line-item project configuration management plans will be developed following the respective conceptual design activities.

The Hanford Information Resource Management System develops and maintains the project files and ensures that information is available to support the subproject and line-item projects and that the information product is complete and accurate for the staging, interim storage, and disposal of Phase 1 and 2 ILAW products. Information resources are managed throughout the information life cycle, which includes information creation, collection, processing, distribution, management, and disposition or retirement. Life-cycle activities shall be managed toward making information useful, available, and effective in accomplishing the subproject and line-item project objectives. Project files will be developed and maintained in accordance with the Subproject's configuration management plan and the line-item project's document management plan. The line-item project's document management plan will be developed after the conceptual design is complete.

This page intentionally left blank..

14.0 INTERFACE MANAGEMENT

Interface activities between the privatization contractor and ILAW Disposal will be conducted in accordance with the procedures described in the ICD for ILAW product (BNFL 1999). The ICD addresses all aspects of the transfer of ILAW from BNFL to DOE. Internal PHMC interfaces (water, electricity, transportation, etc.) are described in the annual multiyear work plan.

14.1 INTERFACING ORGANIZATIONS AND APPROVAL AUTHORITIES

This project plan addresses the interfaces with DOE, the privatization contractor, permitting authorities such as Ecology and the U.S. Environmental Protection Agency (EPA), and specific organizations, such as Permitting and Safety, inside the Project Hanford Management Contractor (PHMC). Because both construction and ILAW disposal functions will be implemented, permitting requirements will include state (Ecology) and EPA regulations as well as DOE orders covering disposal. These permitting requirements apply to facility operation, surveillance, closure, and post-closure monitoring. PHMC organizations that will issue approvals include Safety, Environmental Compliance, Site Infrastructure Coordination, and Quality Assurance. An environmental requirements checklist evaluation and a safety evaluation are included in project plans. These will identify applicable requirements and regulations where approvals are required. Site infrastructure coordination is achieved through the infrastructure project and the RL Site Infrastructure Division. A quality assurance plan will be developed for the subproject through the Waste Disposal Division. DOE reviews and approvals are required for conceptual design, definitive design, and construction stages. Performance assessment approval is required before construction authorization for disposal systems. Accordingly, the performance assessment was submitted to DOE-HQ in March 1998 for review and has received a recommendation for conditional approval. Details of approval authorization requirements are given in Chapter 12 and Appendix E.

This page intentionally left blank.

15.0 QUALIFICATIONS AND TRAINING

Subproject staff qualifications and training will be conducted in accordance with DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*. This order requires that the following requirements be applied to contractors awarded DOE procurement, management, and operating contracts for operable DOE nuclear facilities.

- Implement the requirements of DOE Order 5480.20A as they apply to the facility and the position.
- Prepare and submit a training implementation matrix to the Operations Office manager for review and approval.
- Prepare and submit procedures that establish the requirements for granting exceptions to specific training or qualification requirements for an individual to the Operations Office manager for review and approval.
- Provide written requests for certification extensions to the Operations Office manager for approval.
- Prepare and submit an assessment of the need for a simulator to the Operations Office manager for review and approval (Category A test and research reactors only).
- Perform periodic systematic evaluations of training and qualification programs.

The line-item project baseline requirement documents (DRD, Level 1 specification) specify DOE Order 5480.20A, and the line-item PEPs will provide the implementation details.

This page intentionally left blank.

16.0 REFERENCES

10 CFR 61, "Licensing Requirements for Low-Level Waste Disposal," *Code of Federal Regulations*, as amended.

10 CFR 830.120, "Quality Assurance Requirements," *Code of Federal Regulations*, as amended.

53 FR 12449, 1988, "Record of Decision Hanford High-Level, Transuranic, and Tank Wastes," *Federal Register*, Vol. 53, pp. 12449, April 8.

60 FR 66344, 1995, "Hazardous Wastes: Identification and Listing; Proposed Ruling," *Federal Register*, Vol. 60, No. 245, pp. 66344, December 21.

62 FR 8693, 1997, "Record of Decision for the Tank Waste Remediation System," *Federal Register*, Vol. 62, pp. 8693, February 26, 1997.

Acree, C. D, Jr., 1995, *Tank Waste Remediation Analysis Mission Analysis*, WHC-SD-WM-MAR-008, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Alm, A. L., 1996, *Approval of Critical Decisions for Phase 1 Immobilized High-Level and Low-Activity Waste Interim Storage and Tank Farm Restoration and Safe Operations Projects (Projects W-464, W-465, and W-314)*, Letter to J. Wagoner, Manager, U.S. Department of Energy, Richland Operations Office, dated December 26, 1996, U.S. Department of Energy, Headquarters, Washington, D.C.

Ashworth, S. C., and D. A. Burbank, 1998, *Design Requirements Document For Project W-520 Immobilized Low Activity Waste Disposal*, prepared by COGEMA Engineering Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

ASME, 1989, *Quality Assurance Program Requirements for Nuclear Facilities*, ASME NQA-1-1989 with current addenda, American Society of Mechanical Engineers, New York, New York.

BNFL, 1999, *Interface Control Document ICD-15 for Immobilized Low-Activity Waste*, BNFL-5193-ID-15, Rev. 3, BNFL Inc., Richland, Washington.

Borneman, L. E., 1997, *Environmental Requirements Checklist for the Immobilized Low-Activity Waste Interim Storage Project W-465*, Appendix B of Deffenbaugh et. al., 1997, HNF-SD-ENV-EE-003, Rev. 0, Lockheed Martin Hanford Company, Richland, Washington.

Burbank, D. A., 1996, *Alternatives Generation and Analysis Report for Immobilized Low-Level Waste Interim Storage Architecture*, WHC-SD-W465-AGA-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Burbank, D. A., 1997, *Design Requirements Document for Project W-465, Immobilized Low-Activity Waste Interim Storage*, HNF-SD-W465-DRD-001, Rev. 0., SGN Eurisys Services Corporation, Richland, Washington

Burbank, D. A., and T. M. Hohl, 1999, *Reanalysis of Alternatives for Immobilized Low Activity Waste Disposal*, HNF-4003, prepared by COGEMA Engineering Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

Burbank, D. A. and M. J. Klem, 1997, *Analysis of Alternatives for Immobilized Low-Activity Waste Disposal*, HNF-SD-TWR-AGA-004, Rev. B.

Davis, J. S., 1997, *Authorization Basis Amendment Process*, HNF-IP-0842, Volume IV, Lockheed Martin Hanford Company, Richland, Washington.

Deffenbaugh, M. L., 1996, *Environmental Requirements Checklist for the High-Level Waste Storage Project Canister Storage Building*, letter to LAW IS Subproject, Correspondence No. 70100-96-004, dated 11-04-96, Lockheed Martin Hanford Company, Richland, Washington

Deffenbaugh, M. L., J. D. Guberski, C. J. Grando, V. L. Armstrong, J. E. Mercado, and M. W. Cline, 1997, *Permitting Plan for the Immobilized Low-Activity Waste Project*, HNF-SD-ENV- EE-003, Rev.0, Lockheed Martin Hanford Company, Richland Washington.

DOE, 1981, *Environmental Protection, Safety and Health Protection Information Reporting Requirements*, DOE Order 5484.1, U.S. Department of Energy, Washington, D.C.

DOE, 1987, *Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes*, DOE/EIS-0113, U.S. Department of Energy, Washington, D.C.

DOE, 1988, *General Environmental Protection Program*, DOE Order 5400.1, U.S. Department of Energy, Washington, D.C.

DOE, 1988, *Radioactive Waste Management*, DOE Order 5820.2A, U.S. Department of Energy, Washington, D.C.

DOE, 1991, *Quality Assurance*, DOE Order 5700.6C, U.S. Department of Energy, Washington, D.C.

DOE, 1992, *Project Management System*, DOE Order 4700.1, U.S. Department of Energy, Washington, D.C.

DOE, 1992, *Technical Safety Requirements*, DOE Order 5480.22, U.S. Department of Energy, Washington, D.C.

DOE, 1992, *Nuclear Safety Analysis Reports*, DOE Order 5480.23, U.S. Department of Energy, Washington, D.C.

DOE, 1993, *Guide for Operational Configuration Management Program*, DOE-STD-1073-93, U.S. Department of Energy, Washington, D.C.

DOE, 1993, *Radiation Protection of the Public and the Environment,* DOE Order 5400.5, U.S. Department of Energy, Washington, D.C.

DOE, 1993, *Startup and Restart of Nuclear Facilities Operational Readiness Review and Readiness Assessments.*

DOE, 1995, *Life-Cycle Asset Management*, DOE Order 430.1, U.S. Department of Energy, Washington, D.C.

DOE, 1996, *Tank Waste Remediation System, Hanford Site, Final Environmental Impact Statement*, DOE/EIS-0189, U.S. Department of Energy, Washington, D.C.

DOE, 1998a, *Life-Cycle Asset Management*, DOE Order 430.1A, U.S. Department of Energy, Washington, D.C.

DOE, 1998b, *EIS Supplement Analysis*, DOE/EIS-0189-SA2, U.S. Department of Energy, Washington, D.C.

DOE, 1999, *Radioactive Waste Management,* DOE Order 435.1, U.S. Department of Energy, Washington, D.C.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

Ecology, EPA, and DOE, 1994, *Hanford Federal Facility Agreement and Consent Order*, 2 volumes, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

FDH, 1997c, *Safety Analysis Program*, HNF-PRO-430, Fluor Daniel Hanford, Inc., Richland, Washington, Internet address: *//docs.rl.gov/phpp/procedures/disply.asp>doc_number= HNF-PRO-430.*

FDH, 1997d, *Quality Assurance Program Description*, HNF-MP-599, Fluor Daniel Hanford, Inc., Richland, Washington, Internet address: */docs.rl.gov/phpp/policy/disply.asp>doc_number= HNF-MP-599.*

FDH, 1998b, *Radioactive Material/Waste Shipments*, HNF-PRO-157, Fluor Daniel Hanford, Inc., Richland, Washington, Internet address: */docs.rl.gov/phpp/procedures/disply.asp>doc_number= HNF-PRO-157.*

FDH, 1998a, *Construction Program Overview HNF-PRO-1997*, HNF-PRO-1997, Rev. 2, Fluor Daniel Hanford, Inc., Richland, Washington, Internet address: */docs.rl.gov/phpp/procedures/disply.asp>doc_number= HNF-PRO-1997.*

FDH, 1998b, *Safety Basis Planning, Documentation, Review, and Approval*, HNF-PRO-705, Rev.1, Fluor Daniel Hanford, Inc., Richland, Washington, Internet address: */docs.rl.gov/phpp/procedures/disply.asp>doc_number= HNF-PRO-705.*

Guimond, R. J. and T. J. O'Toole, *Revised Interim Policy on Regulatory Structure for Low-Level Radioactive Waste Management and Disposal*, memorandum to U.S. Department of Energy, Department EM-30, dated July 31, 1996, U.S. Public Health Service, Washington, D.C.

Hanlon, B. M., 1999, *Waste Tank Summary Report for Month Ending April 30, 1999*, HNF-EP-0182-133, Lockheed Martin Hanford Company, Richland, Washington.

Kincaid, C. T., J. W. Shade, G. A. Whyatt, M. G. Peipho, K. Rhoads, J. A. Voogd, J. H. Westsik, M. D. Freshley, K. A. Blanchard, and B. G. Lauzon, 1994, *Performance Assessment of Grouted Double-Shell Tank Waste Disposal at Hanford*, WHC-SD-WM-EE-004, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Kincaid, C. T. , M. P. Bergeron, C. R. Cole, M. D. Freshley, D. L. Strenge, P. D. Thorne, L. W. Vail, and S. K. Wurtner, 1998, *Composite Analysis for the Low-Level Waste Disposal in the 200 Area Plateau of the Hanford Site*, PNNL-11800, Pacific Northwest National Laboratory, Richland, Washington.

Kirkbride, R. A., 1999, *Tank Waste Remediation System Operations and Utilization Plan*, HNF-SD-WM-SP-012, Rev. 1, Lockheed Martin Hanford Company, Richland, Washington.

Kupfer, M. J., A. L. Boldt, B. A. Higley, S. L. Lambert, R. M. Orme, D. E. Place, L. W. Shelton, R. A. Watsons, G. L. Borsheim, R. T. Winward, D. C. Hedengren, W. W. Schulz, M. D. LeClair, and N. G. Colton, 1997, *Standard Inventories of Chemicals and Radionuclides in Hanford Site Waste Tanks*, WHC-SD-WM-TI-740, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

LMHC, 1998, *Tank Waste Remediation System Fiscal Year 1999 Work Plan-WBS 1.1*, HNF-SP-1230, Rev. 0, Lockheed Martin Hanford Corp., Richland, Washington.

LMHC, 1999, *TWRS Administration*, HNF-IP-0842, prepared by Lockheed Martin Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

Mann, F. M., C. R. Eiholzer, A. H. Lu, P. D. Rittman, G. F. Williamson, N. K. Kline, Y. Chen, P. M. McGrail, and N. R. Brown, 1996, *Hanford Low-Level Tank Waste Interim Performance Assessment*, WHC-EP-0884, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Mann, F. M., R. J. Puigh, II, P. D. Rittmann, N. W. Kine, J. A. Voogd, Y. Chen, C. R. Eibolzer, C. T. Kincaid, B. P. McGrail, A. H. Lu, G. F. Williamson, N. R. Brown, and P. E. Lamont, 1998a, *Hanford Immobilized Low-Activity Tank Waste Performance Assessment*, DOE/RL-97-69, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Mann, F. M., 1998b, *Statement of Work for FY 1999 to 2004 for the Hanford Low-Level Tank Waste Performance Assessment Project*, HNF-SD-WM-PAP-062, Rev. 3, prepared by Lockheed Martin Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

Mouette, P., 1997, *Preliminary Safety Evaluation for Project W-465, Immobilized Low-Activity Waste Interim Storage*, HD-SD-W465-PSE-001, Rev. 0, Numatec Hanford Company, Richland, Washington.

Murkowski, R. J., 1995, "Storage and Disposal Project Risk Management Plan," Letter 73300-95-011, to J. D. Thomson, December 29, 1995.

National Environmental Policy Act of 1969, 42 USC 4321, et seq.

Orme, 1996, *TWRS Privatization Process Technical Baseline*, WHC-SD-WM-TI-774, Rev. 0 , Westinghouse Hanford Company, Richland, Washington.

Paperiello, C. J., *Classification of Hanford Low-Activity Tank Waste Fraction*, letter to J. J. Kinzer, Lockheed Martin Hanford Company, dated June 9, 1997, U.S. Nuclear Regulatory Commission, Washington, D.C.

Peck, L. G., 1998, *Tank Waste Remediation System Systems Engineering Management Plan*, HNF-SD-WM-SEMP-002, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Penwell, D. L., 1996, Initial Retrieval Sequence and Blending Strategy, WHC-SD-WM-RPT-229, Rev 0, Westinghouse Hanford Company, Richland, Washington.

Petersen, C. A., 1996, *Technical Basis for Classification of Low-Activity Waste Fraction from Hanford Site Tanks*, WHC-SD-WM-TI-699, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Reidel, S. P., A. M. Tallman, V. G. Johnson, C. J. Chou, S. M. Narbutovskih, and J. P. Kiesler, 1995, *Characterization Plan for the Proposed TWRS Treatment Complex*, WHC-SD-WM-PLN-109, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.

RL, 1987, *Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes, Final Environmental Impact Statement*, DOE/EIS-0113, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

RL, 1996a, TWRS Privatization Contract No. DE-RP06-96RL13308, contract with British Nuclear Fuels Ltd., U.S. Department of Energy, Richland Operations Office, Richland, Washington.

RL, 1996b, TWRS Privatization Contract No. DE-RP06-96RL13309, contract with Lockheed Martin Advanced Environmental Systems, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

RL, 1998a, TWRS Privatization Contract No. DE-RP06-96RL13308, Modification 0006, contract with British Nuclear Fuels Ltd., U.S. Department of Energy, Richland Operations Office, Richland, Washington.

RL, 1998b, "Report to Congress: Treatment & Immobilization of Hanford Radioactive Tank Waste," http://www.hanford.gov/docs/twrs-atp-twrs-atp.html, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Rutherford, W. A., "Approval of Tank Waste Remediation System Complex Site Evaluation Report," Letter 97-SID-285 to H. J. Hatch of Fluor Daniel Hanford, Inc., dated July 10, 1997, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Shade, J. W., 1997, *TWRS Retrieval and Disposal Mission Immobilized Low-Activity Waste Disposal Plan*, HNF-1517, Rev. 0, prepared by Numatec Hanford Company for Fluor Daniel Hanford, Inc., Richland, Washington.

Shord, A. L., 1995, *Tank Waste Remediation System Complex Site Evaluation Report*, WHC-SD-WM-SE-021, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

State Environmental Policy Act of 1971, Revised Code of Washington 43.21c, Olympia, Washington.

Taylor, W. J., "Milestone Completion Issue Low-Level Waste Engineering Evaluation," Letter 96-WDD-149 to the president, Westinghouse Hanford Company dated September 27, 1996, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Taylor, W. J., 1998, *Contract Number DE-AC06-96-RL13200 - Waste Disposal Division (WDD) Multi-Year Work Plan (MYWP) Update Guidance for Fiscal Year 1999 (FY 99)* (Letter 98-WDD-103 to R. D. Hanson, Fluor Daniel Hanford, Inc., September 21), U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Treat, R. L., R. D. Potter, and W. L. Willis, 1998, *TWRS Retrieval and Disposal Mission Technical Baseline Summary Description*, HNF-1901, Rev. 1, prepared by Lockheed Martin Hanford Corporation and Numatec Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

Vann, J. M., 1998, *Tank Waste Remediation Systems Configuration Management Plan*, HNF-1900, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington.

Wagoner, J. D., 1996, *TWRS Privatization Request for Proposals,* Solicitation Number DE-RPO6-96RL13308, (February 1996) U.S. Department of Energy, Richland Operations Office, Richland, Washington.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

Wagoner, J. D., 1996a, *Tri-Party Agreement Change Package*, letter to C. Clark, U.S. Environmental Protection Agency, and M. Riveland, Washington State Department of Ecology, Correspondence Number 96-EAP-116 dated December 16, 1996, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Wagoner, J. D., 1996b, Letter to Prospective Offerers (Feb. 20, 1996) Letter Number 96-RTI-029 for RFP DE-RP06-96RL13308).

Zimmerman, B. D., 1998, *Tank Waste Remediation System Risk Management Plan*, HNF-SD-WM-PMP-018, Rev. 2, prepared by Lockheed Martin Hanford Corporation for Fluor Daniel Hanford, Inc., Richland, Washington.

This page intentionally left blank.

APPENDIX A

CROSS-CHECK MATRIX OF PLAN ELEMENTS

This page intentionally left blank.

APPENDIX A

CROSS-CHECK MATRIX OF PLAN ELEMENTS

ITable A-1 is the road map showing where the elements of Revision 0 of this document are located in Revision 1 of this document.

Table A-1. Cross-Check Road Map between the Fiscal Year 1998 and Fiscal Year 1999 Project Plans for the Immobilized Low-Activity Waste Subproject. (3 Sheets)

Location in Rev. 0 (section)	Location in Rev. 1 (section)
2.0 Hanford Mission/Objectives	2.0 Hanford Site Mission
3.0 ILAW Project Mission/Objectives	2.3 ILAW Disposal Misison and Objectives
4.0 Scope of ILAW Subproject	3.0 Scope of Immobilized Low-Activity Waste Storage and Disposal Subproject
4.1 Facility Description	4.5 Disposal Facilities Description
4.2 Phase I and Phase II Privatization Impacts	11.0 Management Approach
4.3 Interfacing Organizations and Approval Authorities	14.0 Interface Management
4.4 Product Acceptance Process	5.1 Performance Assessment Requirements
4.5 Top-Level Work Breakdown Structure	6.0 Top-Level Work Breakdown Structure
4.6 Scope of ILAW Subproject Plan	3.1 Scope of Immobilized Low-Activity Waste Storage and Disposal Plan
5.0 Project Background	4.0 Project Background and Technical Approach
5.1 Summary of Treatment/Disposal Options	4.1 General Characteristics of Tank Waste and Vitrification Feeds to be Processed
5.2 Waste Stream Components/Projections	4.2 Projected Inventories for ILAW Products
5.3 S&D System Capacity	4.5 Disposal Facilities Description
5.4 Regulatory Requirements	5.2 Regulatory Requirements
5.5 Current Disposal Activities	4.4 Current Government/Commercial Low-Level Waste Disposal Activities
5.6 Performance Assessment	5.1 Performance Assessment Requirements
6.0 Line-Item Project Management Approach	
7.0 Project Controlling Milestones and Critical Activities Schedule	8.0 River Protection Project Immobilized Low-Activity Waste Storage and Disposal Schedule 12.0 Risk Management
7.1 Tri-Party Agreement Controlling Milestones	8.1 Tri-Party Agreement Controlling Milestones
7.2 Other Requirements	8.2 Other Requirements
7.3 Schedule Requirements	8.3 Schedule Requirements

Table A-1. Cross-Check Road Map between the Fiscal Year 1998 and Fiscal Year 1999 Project Plans for the Immobilized Low-Activity Waste Subproject. (3 Sheets)

Location in Rev. 0 (section)	Location in Rev. 1 (section)
8.0 Project Cost	9.0 Project Cost
9.0 Programmatic Risk Assessment	12.0 Risk Management
10.0 Project Organization, Roles, and Responsibilities	10.0 Project Organization, Roles, and Responsibilities
11.0 Project Management and Control	11.0 Management Approach
11.1 Project Planning	11.1.1 Project Execution Plans
11.2 Baseline Management	11.2.2 Technical Baseline Control
11.3 Work Authorization	11.1.6 Work Authorization
11.4 Funds Management	11.1.7 Funds Management
11.5 Contingency Management	11.1.8 Contingency Management
11.6 Performance Measurement and Reporting	11.1.5 Performance Measuring and Reporting
11.7 Meetings and Reviews	11.1.9 Meetings and Reviews
11.8 Project Validations	11.1.10 Project Validations
11.9 Critical Decisions	11.1.11 Critical Decisions
11.10 External Interface Control	14.0 Interface Managemenet
12/0 Acquisition Strategy	11.1.2 Acquisition Strategy
13.0 Quality, Safety and Environmental Protection	11.3 Quality, Safety and Environmental Protection
13.1 Quality Assurance	11.3 Quality, Safety and Environmental Protection
13.2 Nuclear Safety Activities and Authorization Basis Process	11.3.3 Nuclear Safety Activities and Authorization Basis Process
13.3 Environmental Management	11.3.1 Environmental Management
13.4 Regulatory Compliance with Disposal Facility Requirements	11.3.2 Regulatory Compliance with Disposal Facility Requirements
14.0 Test and Evaluation Plan	11.2.3 Test and Evaluation Plan
15.0 References	16.0 References
App. A Cross-Check Matrix of Plan Elements	App. A Cross-Check Matrix of Plan Elements
App. B Applicable Documents	App. B Applicable Documents
App. C Summary of *Hanford Low-Level Tank Waste Interim Performance Assessment*, HNF-EP-0844, Rev. 1	App. C Summary of *Hanford Low-Level Tank Waste Performance Assessment*, DOE/RL-97-69, Rev. 0
App. D Key Deliverables and Performance Measurements	App. D Key Deliverables and Performance Measurements

Table A-1. Cross-Check Road Map between the Fiscal Year 1998 and Fiscal Year 1999 Project Plans for the Immobilized Low-Activity Waste Subproject. (3 Sheets)

Location in Rev. 0 (section)	Location in Rev. 1 (section)
App. E Division of Responsibility Matrix - Immobilized Low-Activity Waste Storage/Disposal Subproject	App. E Division of Responsibility Matrix - Immobilized Low-Activity Waste Storage/Disposal Subproject
App. F Immobilized Low-Activity Waste Subproject Schedule	App. F Immobilized Low-Activity Waste Subproject Schedule

ILAW = immobilized low-activity waste
S&D = storage and disposal
Tri-Party Agreement = *Hanford Federal Facility Agreement and Consent Order*
TSD = treatment, storage, and disposal
WBS = work breakdown structure

This page intentionally left blank.

APPENDIX B

APPLICABLE DOCUMENTS

This page intentionally left blank.

APPENDIX B

APPLICABLE DOCUMENTS

The following tables list sources for specifications and requirements. The listing and specific requirements will evolve with project maturity. In the event of conflict between the documents referenced in the tables and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

B1.0 GOVERNMENT DOCUMENTS

Federal government and Washington State regulations along with U.S. Department of Energy (DOE) orders have been reviewed to determine constraints applicable to the design, construction, and operation of the immobilized low-activity waste (ILAW) Storage to the extent specified. To the extent specified, the documents listed in Table B-1 represent requirements imposed on the ILAW Storage Project by sources external to the Tank Waste Remediation System (TWRS) program.

Table B-1. Applicable Constraint Documents. (2 Sheets)

Document Identifier	Title
10 CFR 61	Licensing Requirements for Land Disposal of Radioactive Waste
10 CFR 830	Nuclear Safety Management, Subpart A, General Provisions, Section 830.120, Quality Assurance Requirements
10 CFR 835	Occupational Radiation Protection
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 50	EPA Regulations on National Primary and Secondary Air Quality Standards
40 CFR 52	Approval and Promulgation of Implementation Plans
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
49 CFR 172	Hazardous Materials Designations
49 CFR 173	Hazardous Materials Packaging Requirements
Bernero 1993	Bernero, NRC letter dated March 2, 1993
DOE Order 430.1	Life-Cycle Asset Management
DOE Order 460.1	Packaging and Transportation Safety
DOE Order 460.2	Departmental Materials Transportation and Packaging Management
DOE Order 4330.4B	Maintenance Management Program

Table B-1. Applicable Constraint Documents. (2 Sheets)

Document Identifier	Title
DOE Order 4700.1	Project Management System
DOE Order 1540.2	Hazardous Material Packaging for Transportation - Administrative Procedures
DOE Order 5400.1	General Environmental Protection Program
DOE Order 5400.5 (1993)	Radiation Protection of the Public and the Environment
DOE Order 5480.3	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Waste
DOE Order 5480.4 (1993)	Environmental Protection, Safety, and Health Protection Standards
DOE Order 5480.7A	Fire Protection
RL ID 5480.7	Fire Protection
DOE Order 5480.10	Contractor Industrial Hygiene Program
DOE Order 5480.11 (1988)	Radiation Protection for Occupational Workers
DOE Order 5480.19	Conduct of Operations Requirements for DOE Facilities
DOE Order 5480.20A (1994)	Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities
DOE Order 5480.21	Unreviewed Safety Questions
DOE Order 5480.22	Technical Safety Requirements
DOE Order 5480.23	Nuclear Safety Analysis Reports
DOE Order 5480.28	Natural Phenomena Hazards Mitigation
DOE Order 5483.1A (1983)	Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities
DOE Order 5500.7B	Emergency Operations Records Protection Program
DOE Order 5700.6C	Quality Assurance
DOE Order 5820.2A (1993)	Radioactive Waste Management
DOE Order 6430.1A (1989)	General Design Criteria
NFPA 70 (1996)	National Electrical Code
NFPA 101 (1994)	Code for Safety of Life from Fire in Buildings and Structures, Vol. 5
UBC (1994)	Uniform Building Code
Tri-Party Agreement (1996)	*Hanford Federal Facility Agreement and Consent Order* (Amendment 6)
WAC 173-303	Dangerous Waste Regulations
WAC 173-400	General Air Regulations
WAC 173-401	Operating Permit Regulation
WAC 173-460	Toxic Air Pollutants
WAC 173-480	Ambient Air Quality Standards and Emission Limits for Radionuclides
WAC 246-220	Radiation Protection - General Provisions
WAC 246-247	Radiation Protection - Air Emissions
WAS 246-272	On-Site Sewage Systems
WAC 246-290	Public Water Supplies

CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
NFPA = National Fire Protection Association
NRC = U.S. Nuclear Regulatory Agency
UBC = Uniform Building Code
WAC = *Washington Administrative Code*

APPENDIX C

SUMMARY OF *HANFORD LOW-LEVEL TANK WASTE PERFORMANCE ASSESSMENT*, DOE/RL-97-69, Rev. 0

This page intentionally left blank.

APPENDIX C

SUMMARY OF *HANFORD LOW-LEVEL TANK WASTE PERFORMANCE ASSESSMENT,* DOE/RL-97-69, Rev. 0[1]

The *Hanford Immobilized Low-Activity Tank Waste Performance Assessment* examines the long-term environmental and human health effects associated with the planned disposal of the vitrified low-level fraction of waste presently contained in Hanford Site tanks. The tank waste is the by-product of separating special nuclear materials from irradiated nuclear fuels over the past 50 years. This waste has been stored in underground single- and double-shell tanks. The tank waste is to be retrieved, separated into low- and high-activity fractions, and then immobilized by private vendors. The U.S. Department of Energy (DOE) will receive the vitrified waste from private vendors and plans to dispose of the low-activity fraction in the Hanford Site 200 East Area. The high-level fraction will be stored at Hanford until a national repository is approved.

This report provides the site-specific long-term environmental information needed by the DOE to issue a Disposal Authorization Statement that would allow the

- Modification of the four existing concrete disposal vaults to provide better access for emplacement of the immobilized low-activity waste (ILAW) containers,
- Filling of the modified vaults with the approximately 5,000 ILAW containers and filler material with the intent to dispose of the containers,
- Construction of the first set of next-generation disposal facilities
- Filling of the first set of next-generation facilities.

The performance assessment activity will continue beyond this assessment. The activity will collect additional data on the geotechnical features of the disposal sites, the disposal facility design and construction, and the long-term performance of the waste form. This activity also will perform analyses to determine the impact of these new data or information collected from other programs. Better estimates of long-term performance will be produced and reviewed on a regular basis. Performance assessments supporting closure of filled facilities will be issued seeking approval of those actions necessary to conclude active disposal facility operations.

This report also analyzes the long-term performance of the currently planned disposal system as a basis to

[1] DOE/RL-97-69, Rev. 0, 1998, *Hanford Immobilized Low-Activity Tank Waste Performance Assessment*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

- Set requirements on the waste form and the facility design that will protect the long-term public health and safety and protect the environment
- Demonstrate that such requirements can be met.

The calculations in this performance assessment show that a "reasonable expectation" exists that the disposal of the immobilized low-activity fraction of tank waste from the Hanford Site can meet environmental and health performance objectives.

C1.0 BACKGROUND

The Hanford Site in south-central Washington State has been used extensively as a location for defense materials production by DOE and its predecessor agencies. Over the last 50 years, radioactive and mixed waste from materials production and related activities have been stored on the Hanford Site, primarily in underground single- and double-shell tanks in 18 tank farms.

As part of the Hanford Site's environmental restoration and waste management mission, DOE is proceeding with plans to retrieve the waste from the tanks, some of which have already leaked part of their contents, to accomplish the following:

- Separate the waste into a small quantity of high-level waste and a much larger quantity of low-activity waste
- Immobilize both waste streams
- Store the immobilized high-level waste until it can be sent to a federal geologic repository
- Dispose of the immobilized low-activity waste on-site in near-surface low-activity waste disposal facilities.

This plan is based on Revision 6 of the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement)[2] and on the *Record of Decision for the Tank Waste Remediation Systems, Hanford Site, Richland, Washington*[3]. More than 200,000 m^3 (7,000,000 ft^3) of immobilized low-activity waste will be disposed of under this plan. This large volume will contain one of the largest inventories of long-lived radionuclides in the DOE complex to be disposed of in a near-surface, low-activity waste facility.

2 Ecology, DOE, and EPA, 1996, *Hanford Facility Agreement and Consent Order*, Sixth Amendment, Washington State Department of Ecology, United States Environmental Protection Agency, United States Department of Energy. The document is available from any of the parties.

3 62 FR 8693. "Record of Decision for the Tank Waste Remediation System, Hanford Site, Richland Washington", Federal Register, Volume 62, page 8693, February 26, 1997.

By source definition, most of the waste in the Hanford Site tanks is considered high-level radioactive waste. The staff of the U.S. Nuclear Regulatory Commission (NRC) has indicated[4] that the low-activity waste would be considered "incidental waste" if DOE follows its program plan for separating and immobilizing the waste to the maximum extent possible that is technically and economically practical, if the wastes meet the Class C standards of 10 CFR 61[5], and if the performance assessments continue to indicate that public health and safety would be protected to standards comparable to those established by the NRC for the disposal of low-level waste. Disposal of DOE's incidental waste does not fall under the licensing authority of the NRC.

The current program plan is to use existing disposal vaults and construct additional facilities for ILAW disposal. An earlier program to dispose of the tank waste built four large concrete subsurface vaults with a total usable volume of about 15,000 m^3. These vaults will be modified to accept the first waste to be immobilized in the second half of the year 2002. Based on planned ILAW production schedules, additional disposal facilities will be needed in 2005. The new disposal facilities will be of a different design from the existing facilities. ILAW production is scheduled to continue until 2024, with closure later in the decade. Closing the tanks is a separate program that will occur between 2010 and 2030.

DOE and its contractors are currently obligated to meet DOE Order on radioactive waste management, currently DOE Order 5820.2A[6]. It is anticipated that DOE Order 435.1[7] will become the primary regulation governing management and disposal of radioactive waste at DOE facilities. Before low-level radioactive waste can be disposed of, DOE-Headquarters must issue a Disposal Authorization Statement to the Richland Operations Office. Draft DOE Order 435.1 also requires that the Disposal Authorization Statement be issued before the construction of a new disposal facility. The issuance of this Disposal Authorization Statement is predicated on many analyses, including the performance assessment, which investigates the ability of the disposal system to provide long-term environmental, public health, and safety protection. DOE and its contractors will also meet the requirements of the State of Washington in its regulation of dangerous waste.

---

4 C.J. Paperiello, *Classification of Hanford Low-Activity Tank Waste Fraction*, letter to Jackson Kinzer, Assistant Manager, Office of Tank Waste Remediation System, dated June 9, 1997. Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C.

5 10 CFR 61, Section 55, "Licensing Requirements for the Land Disposal of Radioactive Waste," *Code of Federal Regulations*, as amended.

6 DOE Order 5820.2A, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C., September 26, 1988.

7 DOE Order 435.1, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C. This order is expected to become effective in 1999.

C2.0 APPROACH

Because of the duration of the production program, the variability of the ILAW produced over those many years, and the likelihood of different disposal facility designs, this performance assessment takes a three-step approach:

- Understand the important principles, data, and requirements
- Set requirements based on long-term environmental and human health impacts
- Demonstrate that such requirements can be reasonably expected to be met.

The first step is to understand the important principles, data, and requirements that affect the impact of this disposal action on the public and the environment. Based on applicable regulations and earlier performance assessments, performance objectives were established[8] to protect the following:

- The general public
- The inadvertent intruder
- Groundwater resources
- Surface water resources
- Air resources.

Protection of Hanford Site workers is assumed to be the same as that for the general public. The performance objectives included not only the peak impact that would be acceptable but also the time period ("time of compliance") over which the impacts would be determined. Data and models were selected based on previous Hanford studies. The data are summarized and the assumptions are listed in Table C-1. Analyses of likely conditions as well as sensitivity scenarios provide the range of impacts to be expected.

The second step involved using this understanding to set requirements on the disposal facility design and the ILAW product quality. Finally, to show that public health and the environment will be protected with reasonable expectation, this document shows that the requirements are likely to be met.

As more data are collected through performance assessment activity data collection, tank retrieval sampling, ILAW production experience, disposal facility operation history, and other research, this performance assessment will be modified. Because of the requirements of the DOE Order and to follow good business practices, this performance assessment will be revised to reflect our growing knowledge and understanding.

This commitment to iterative analysis is demonstrated by noting that this performance assessment is actually the third set of environmental analyses performed for the program. The

8 F.M. Mann, *Performance Objectives of the Tank Waste Remediation Systems Low-Level Waste Disposal Program*, WHC-EP-0826, Revision 0, Westinghouse Hanford Company, Richland, Washington, December 1994.

first set[9] provided the background for disposal facility conceptual design and waste form quality. The second set of documents, the *Hanford Low-Level Tank Waste Interim Performance Assessment*[10], which provided a set of analyses based on DOE Order 5820.2A showed that the disposal of ILAW would likely meet its performance objectives based on DOE's current plans and on current knowledge. The present document builds on the analyses presented in the interim performance assessment.

Table C-1. Major Source of Information for the Base Analysis Case.

Data Type	Major Source
Location	The existing four disposal vaults at the eastern edge of the Hanford Site 200 East Area will be used first, followed by the new facilities just southwest of the PUREX Facility (also in the 200 East Area).
Waste	Immobilized low-activity contents of Hanford Site single- and double-shell tanks in the 200 East and 200 West Areas.
Inventory	**ASSUMED** to be average values calculated from modeling Hanford Site production reactors corrected for off-site transfers, discharges to the ground, separations into high- and low-activity fractions, and off-gas generation.
Long-term waste form performance	**ASSUMED** to be equal in value to the short-term performance required in the request for proposals for all non-Tc radionuclides. Tc release in the RFP is smaller.
Disposal facility design:	**ASSUMED** from preconceptual ideas.
Recharge	For the first 1,000 years, taken from specifications of the Hanford Site Surface Barrier. Thereafter, taken from the analysis of current natural conditions.
Geotechnical	Taken from geotechnical measurements studies of other locations in the Hanford Site 200 East Area.
Exposure	Taken from past Hanford Site documents and experience.

9 F.M. Mann, C.R. Eiholzer, N.W. Kline, B.P. McGrail, and M.G. Piepho, *Impacts of Disposal System Design Options on Low-Level Glass Waste Disposal System Performance*, WHC-EP-0810, Rev. 1, Westinghouse Hanford Company, Richland, Washington, September 1995.

10 F.M. Mann, C.R. Eiholzer, A.H. Lu, P.D. Rittmann, N.W. Kline, Y. Chen, B.P. McGrail, G.F. Williamson, J.A. Voogd, N.R. Brown, and P.E. LaMont, *Hanford Low-Level Tank Waste Interim Performance Assessment*, HNF-EP-0884, Rev. 1, Lockheed Martin Hanford Company, Richland, Washington, September 1997.

C3.0 RESULTS OF COMPUTER SIMULATIONS

C3.1 Introduction

The data used in this performance assessment are documented in *Data Packages for the Hanford Low-Level Tank Waste Interim Performance Assessment*[11]. The base analysis and sensitivity cases are provided in *Definition of the Base Analysis Case of the Interim Performance Assessment*[12].

Disposal will occur at two facility locations approximately 2 kilometers (1.5 miles) apart. The first facility to be used consists of four existing concrete vaults located just east of the Hanford Site 200 East Area. These vaults, which have an outer layer of asphalt approximately 1 meter thick, were constructed around 1990 as the first of 34 vaults for the disposal of double-shell tank waste in a grouted waste form. The other disposal facility is to the southwest in a previously unused area. This disposal facility is expected also to consist of concrete vaults, but without the asphalt layer. Current planning for the disposal facilities include a surface cover to minimize the flow of water or other potential intrusions into the facility and a sand-gravel capillary barrier to divert water around the waste form.

Geologic, hydraulic, geochemical, and water infiltration data obtained for the 200 Area plateau were used in this analysis and are considered to be representative of the disposal areas. Additional site-specific data are being collected.

The inventory of contaminants in the waste form is based on estimates for the tank waste inventory and uses a conservative estimate to project the low-activity fraction of radionuclides immobilized in the waste form after the separation and immobilization processes. The tank waste inventory estimate is based on computer simulations of the production reactor history and the known reprocessing histories.

The release rate of contaminants from the waste form used in the base analysis case, 4.4 parts per million per year, is based on the request for proposal[13] issued by the Richland Operations Office for the separation and immobilization of tank waste. Sensitivity cases also were performed for an extensively studied low-level waste glass using a computer simulation code to estimate the rate at which this glass would release the contaminants over time.

---

11 F. M. Mann, *Data Packages for the Hanford Low-Level Tank Waste Interim Performance Assessment*, HNF-SD-WM-RPT-166, Revision 0, Westinghouse Hanford Company, Richland, Washington, July 1995.

12 F. M. Mann, C. R. Eiholzer, R. Khaleel, N. W. Kline, A. H. Lu, B. P. McGrail, P. D. Rittmann, and F. Schmittroth, *Definition of the Base Analysis Case of the Interim Performance Assessment*, WHC-SD-WM-RPT-200, Revision 0, Westinghouse Hanford Company, Richland, Washington, December 1995.

13 *Request for Proposals (RFP) No. DE-RP06-96RL13308*, letter from J. D. Wagoner to Prospective Offerors, U.S. Department of Energy, Richland Operations Office, Richland, Washington, February 20, 1996. These conditions have now been incorporated into contracts with British Nuclear Fuels Limited and with Lockheed Martin Advanced Environmental Services, Incorporated.

A three-dimensional computer code was used to simulate moisture flow and the transport of contaminants from the waste form through the vadose zone to the groundwater. Another three-dimensional computer code simulated the flow and transport in the groundwater. The results from these two codes were combined with inventory and dosimetry data to provide radionuclide concentrations in groundwater and dose rates. Explicit calculations were conducted to 100,000 years after disposal with extrapolations used to extend the results to longer times. For inadvertent intruder analyses, a spreadsheet was used with calculations extending from 100 to 1,000 years.

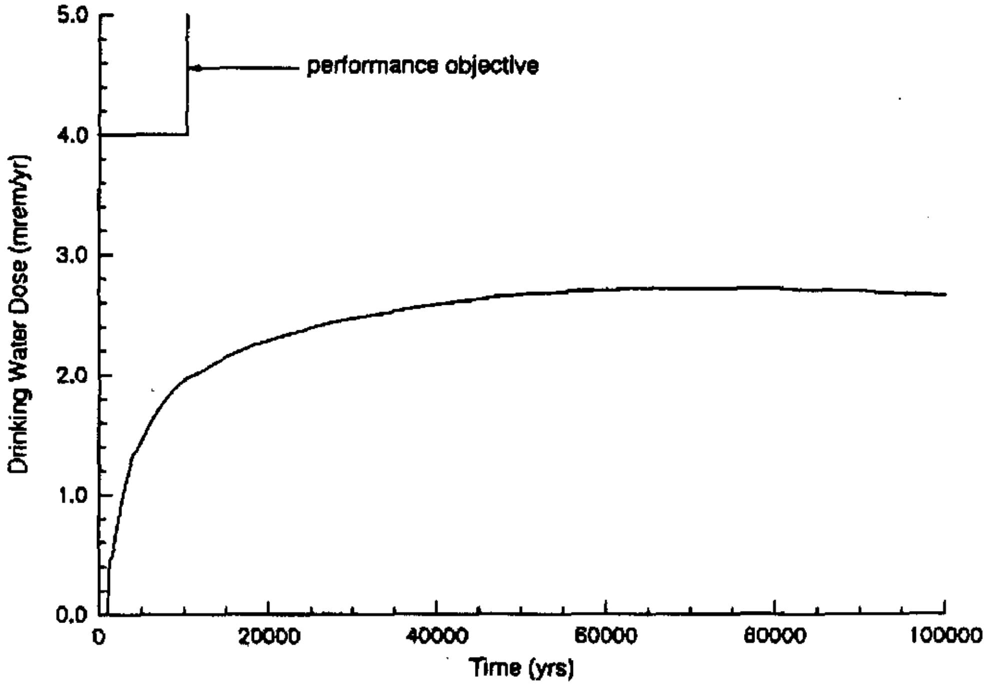
Because of the very slow predicted release of contaminants from the waste form (hundreds of thousands of years), the estimated concentration of radionuclides in the groundwater does not show a peak, but rather a broad plateau (see, for example, the beta/photon drinking water dose rate shown in Figure C-1). This contrasts with most other environmental assessments, where the contaminant release time is short compared to the contaminant travel time, resulting in a peaked response.

C3.2 Protection of the General Public

Table C-2 compares the performance objectives for protecting the general public with the results from the base analysis case calculations over the time of compliance (10,000 years). The estimated all-pathways doses are significantly lower than the performance objectives. The sensitivity cases show that the all-pathways performance objective would be exceeded if one or more of the following conditions exist for the actual waste disposal action:

- A waste form having a long-term release rate significantly larger than the short-term release rate specified in the Request for Proposal[12]
- A high infiltration rate and a disposal facility design without a sand-gravel diverter
- A significantly larger inventory of selenium, technetium, or uranium.

Figure C-1. Beta/photon drinking water dose rates for the base analysis case at a well 100 meters downgradient from the disposal facility. The performance objective is less than 4.0 mrem in a year for the first 10,000 years.



During the first 10,000 years (the period of compliance), the estimated doses are at most one-third of the performance objective (25 mrem in a year as stated in the DOE order). A time of compliance of 10,000 years was chosen instead of the DOE recommended value of 1,000 years because the NRC[3] has indicated for the ILAW product to be ruled "incidental waste" that the performance assessment must also meet their requirements. Technetium-99 is estimated to contribute 58 percent of this dose. The peak all-pathways dose (23 mrem in a year) is estimated to occur at about 50,000 years. At the peak, uranium and its daughters are the main contributors.

The other two performance measures (all-pathways including other actions at the Hanford Site and a design that produces doses as low as reasonably achievable [ALARA]) are not expected to exceed 100 mrem in a year or 500 persons-rem per year at any time.

Table C-2. Comparison of estimated impacts with performance objectives for protecting the public. The time of compliance is 10,000 years. The place of compliance is a well 100 meters downgradient of the facility.

Performance Measure	Performance Objective	Estimated Impact
All-pathways [mrem in a year]	25.0	6.4
All-pathways, including other Hanford Site sources [mrem in a year]	100.0	<19.0
As low as reasonably achievable (ALARA) (all-pathways) [persons-rem/y]	500.0	5.0

C3.3 Protection of Inadvertent Intruders

Table C-3 compares the estimated impacts to the performance objectives for protecting the inadvertent intruder. A one-time dose (an acute exposure) scenario as well as a continuous exposure scenario (a chronic exposure) are defined. Both performance objectives are met.

The acute dose, estimated by assuming that a person drills a well through the disposal facility, is much less than the performance objective. The continuous dose, which includes the ingestion of contaminated food and water, the inhalation of air, and direct radiation exposure, is over a factor of 3 lower than the performance objective. At the time of compliance, 500 years, ^{126}Sn contributes more than 95 percent of the dose.

Table C-3. Comparison of estimated impacts with performance objectives for protecting the inadvertent intruder. The time of compliance is 500 years.

Performance Measure	Performance Objective	Estimated Impact
Acute exposure [mrem]	500.0	5.5
Continuous exposure [mrem in a year]	100.0	27.5

C3.4. Protection of Groundwater Resources

Table C-4 compares the estimated impacts to the performance objectives for protecting the groundwater resources. These performance objectives are based on the federal drinking water standards. The time of compliance is 10,000 years and the point of compliance is at a well 100 meters down gradient of the disposal facility. The estimated impact from beta emitters is a factor of 2 less than the performance objective and the estimated impact from alpha emitters is a factor of 5 less than the performance objective. The concentration of radium is insignificant.

The most important drivers for determining peak groundwater concentrations are the inventory of technetium for beta/photon emitters and uranium for alpha emitters, the release rate from the waste form, the amount of mixing in the aquifer, and the geometry of the disposal facility relative to the direction of groundwater flow.

For the most part, other geotechnical data (water infiltration rate, hydraulic parameters, and geochemical factors) are less important because they mainly affect the time at which the plateau is reached. The two exceptions are as follows. First, if the water infiltration rate is 0.1 mm/year (a factor of 5 lower than assumed), the most mobile radionuclides do not reach the groundwater in significant quantities during the compliance period. Second, if both the infiltration rate is 100 mm/year and no capillary barrier is in place to divert the infiltration, the uranium group arrives in significant amounts at the water table during the compliance period, causing the drinking water and all-pathways performance objectives to be exceeded. Similarly, if the uranium group is unretarded, significant amounts will reach the point of compliance.

The beta/gamma drinking water dose rate is not estimated to exceed 4 mrem in a year for 750,000 years, reaching a maximum value of 14 mrem in a year at the end of the simulation period (65 million years). The concentration of alpha emitters is estimated never to exceed 15.0 pCi/ℓ, reaching a maximum of 8.2 pCi/ℓ at 50,000 years.

Table C-4. Comparison of estimated impacts with performance objectives for protecting groundwater resources. The time of compliance is 10,000 years. The place of compliance is a well 100 meters downgradient of the facility.

Performance Measure	Performance Objective	Estimated Impact
Beta/photon emitters [mrem in a year]	4.0	2.0
Alpha emitters [pCi/ℓ]	15.0	1.7
Radon [pCi/ℓ]	3.0	<0.001

C3.5 Protection of Surface Water Resources

Table C-5 compares the estimated impacts to the performance objectives for protecting the surface water resources. The time of compliance is 10,000 years and the point of compliance is at a well intersecting the groundwater just before the groundwater mixes with the Columbia River. The estimated impacts are over an order of magnitude lower than the performance objectives. The calculations indicate that the impacts never reach the values given as performance objectives. Because of the large flow of the Columbia River, mixing occurs in the river and the predicted impacts actually would be far lower.

Table C-5. Comparison of estimated impacts with performance objectives for protecting surface water resources. The time of compliance is 10,000 years. The point of compliance is a well located just before the groundwater mixes with the Columbia River.

Performance Measure	Performance Objective	Estimated Impact
Beta/photon emitters [mrem in a year]	1.0	0.070
Alpha emitters [pCi/ℓ]	15.0	0.058
Radon [pCi/ℓ]	3.0	<0.001

C3.6 Protection of Air Resources

Table C-6 compares the estimated impacts to the performance objectives for protecting air resources (the values for which are given in federal clean air regulations). The time of compliance is 10,000 years and the point of compliance is just above the disposal facility. The estimated impacts are significantly lower than the values prescribed in the performance objectives.

Table C-6. Comparison of estimated impacts with performance objectives for protecting air resources. The time of compliance is 10,000 years. The place of compliance is just above the disposal facility.

Performance Measure	Performance Objective	Estimated Impact
Radon [pCi m^{-2} s^{-1}]	20.0	<0.001
Other radionuclides [mrem in a year]	10.0	$<10^{-8}$

C4.0 SETTING REQUIREMENTS

Based on the computer simulations, relatively simple requirements on disposal facility design and operation and on waste form characteristics can be set. The requirements are more complex than those normally set, but they are similar.

C4.1 Intruder Protection

For the protection of the homesteader, the following equations were used to establish waste concentration and stacking height limits for the disposal facilities:

$$\Sigma\Sigma\ [I_{ij} / V_j]\ d_i^h\ k_i^h\ H_j < D^h \qquad \text{(C.1)}$$

or

$$\Sigma\Sigma\,[I_{ij} / V_j]\, H_j / Y_i < 1.0 \qquad (C.2)$$

where the first sum is over contaminants i, the second sum is over containers j in a vertical column emplaced within the disposal facility, and where

I_{ij} = the inventory of contaminant i in container j (Ci)
V_j = the volume of container j (m^3)
d_i^h = the dosimetry factor relating response to concentration of contaminant i in the homesteader scenario [(mrem/yr)/(Ci/m^3)]
k_i^h = the factor that accounts for the fraction of waste exhumed during drilling, the mixing of the waste in the soil, then transport to point of exposure (1/m)

H_j = the height of container j (m)
D^h = the maximum dose allowable in the homesteader scenario (100 mrem in a year)
Y_i = $[D^h / (d_i^h k_i^h)]$ (Ci/m^2).

The parameters d_i^h and D^h can be specified and the parameters k_i^h can be calculated from data presented in this performance assessment. The TWRS Immobilized Waste Program will place restrictions on the concentration of contaminants (I_{ij} / V_j). Although the height of an individual container is known, the number of containers in a stack has not been determined. Therefore, the program also will restrict the total amount of key radionuclides in a vertical column.

The TWRS Immobilized Waste Program also has decided to place additional restrictions on waste concentrations. To satisfy the NRC[3] in their determination that the immobilized low-activity waste is not high-level waste, the concentration of all radionuclides will be below the Class C limits set in Title 10 Code of Federal Regulations (CFR) Part 61[4].

The DOE has mandated[12] concentration limits for ^{90}Sr, ^{99}Tc, and ^{137}Cs for the first phase of waste form production. All waste slated to be placed in the existing disposal vaults will be produced under this contract. Therefore, these contract requirements also will be imposed on the waste to be placed in the existing disposal vaults. Although most of the waste in the first set of units in the new disposal facilities also is expected to be produced under this contract, overall, most of the waste that will be contained in the new disposal facilities will be produced under a different contract. Therefore, to provide maximum flexibility in future decisions, these contract limitations are not placed on this analysis of waste disposed in the new disposal facilities.

The waste to be disposed of must meet both the NRC Class C limits and the requirements set by this analysis. For the nominal stacking heights of six containers (about 7.2 meters), the NRC Class C limits will be more restrictive for most of the isotopes. This is because the glass waste form makes the radioisotopes very difficult to ingest or inhale even after they are brought to the surface. A few isotopes (mainly actinides) may be more restricted by this analysis than by the NRC restriction.

- ^{137}Cs, if the stack of containers is higher than 15 meters (unlikely)
- ^{226}Ra, if the stack of containers is higher than 1 meter (very likely)
- ^{229}Th, if the stack of containers is higher than 5 meters (likely)
- ^{232}Th, if the stack of containers is higher than 0.6 meter (very likely)

- ^{231}Pa, if the stack of containers is higher than 3 meters (very likely)
- ^{235}U, if the stack is higher than 9.9 meters (possible)
- ^{237}Np, if the stack is higher than 7.2 meters (likely)
- ^{243}Am, if the stack is higher than 10.9 meters (unlikely).

Note that the radioisotope of greatest concern for intruder protection (^{126}Sn) is not addressed by the NRC regulation.

C4.2 Groundwater Protection

The computer analysis shows that for groundwater protection the main factors in meeting the requirement are the contaminant flux leaving the disposal facility and the amount of groundwater into which the flux eventually flows. Unlike most environmental analyses where the rate of release is a relatively minor concern, in this analysis it is a driving concern. The groundwater scenario places the restriction that

$$\Sigma\, I_i\, R_i\, d_i^{gw}\, k_i^{gw} / L < D^{gw} \qquad (C.3)$$

or

$$\Sigma\, (I_i\, R_i / L) / X_i < 1.0 \qquad (C.4)$$

where the sum is over all contaminations i and where

I_i = the inventory of contaminant i (Ci)
R_i = the fractional release rate of contaminant i from the waste form (1/yr)
d_i^{gw} = the dosimetry factor relating response to concentration of contaminant i in the groundwater scenario [(mrem/yr)/(Ci/m^3)]
k_i^{gw} = the factor that accounts for vadose zone and aquifer transport for contaminant i (m^2/yr)
L = the effective length of the disposal facility perpendicular to groundwater flow (m). L is obtained by dividing the volume of the waste by the product of the waste column height and of the disposal facility extent parallel to the path of groundwater flow. When the groundwater flow is parallel to an edge of the facility (which it is in this instance), then L is the length of the disposal facility perpendicular to groundwater flow
D^{gw} = the maximum dose allowable in the groundwater scenario (mrem/yr)
X_i = $[D^{gw} / (d_i^{gw}\, k_i^{gw})]$ [Ci / (yr m)]

The parameter I_i accounts for radioactive decay. The parameters d_i^{gw} and D^{gw} can be specified and the parameters k_i^{gw} can be calculated from data presented in this performance assessment. The drinking water scenario and the all-pathways scenario are considered in establishing the requirements. Also, the plume overlap caused by the upgradient facility is taken into account. The TWRS Immobilized Waste Program will place restrictions on the inventory (I_i) and the release rate (R_i). The effective disposal facility length (L) is a special case. For the existing disposal vaults, L can be calculated. Because the new disposal facilities have not been designed, the program will use the results of this analysis for the design of new facilities.

The isotopes facing the greatest restrictions relative to the expected performance are ^{99}Tc and ^{79}Se. This is not surprising because these are the most mobile, because most of the uranium and transuranic elements have been separated from the low-activity waste form, and because other fission products (e.g. ^{14}C and ^{129}I) found to be important in other wastes are volatile and are not captured in this waste form. The values for required long-term release limits found here are larger than the values for short-term release limits found in the privatization request for proposal.[12]

C4.3 Requirements on the Disposal Facility

The major requirements on the disposal facility deal with subsidence, recharge rate, layout, interactions with the waste form, and intruder protection.

The performance assessment assumes that subsidence is small based on the slow degradation of the waste form and the lack of voids in the disposal facility. Thus, the facility must be constructed without significant void space. In addition, after waste is placed inside the facility, the spaces between the waste containers must be filled with a dry material that limits subsidence.

Because the waste form releases contaminants so slowly (on the order of 1 part per million per year), the time dependence of the exposures show more of a plateau structure than a peaked shaped. Therefore, the major effect of the recharge rate is to delay the arrival of contaminants to the groundwater. If the slightly retarded contaminants (for example, uranium) were to arrive before 10,000 years, the all-pathways dose performance objective would be violated and restrictions would have to be placed on the recharge rate. Based on the sensitivity analyses, the recharge rate must be limited to about 3.0 mm/year (i.e., the natural rate) if no hydraulic diverter is included in the design. If a hydraulic diverter is included, a recharge rate of 100 mm/year would not violate performance objectives. Gravel-rich and vegetation-free surfaces such as those used in the Hanford Site tank farms would not be suitable. The surface barrier also must deter the inadvertent intruder.

The requirement for groundwater protection [$\Sigma (I_i R_i / L) / X_i < 1$] is actually on the disposal system. The designers of the disposal structures must ensure that materials are not used that would accelerate waste form degradation and that the vault layout in relationship to groundwater flow has a sufficient effective length (L). Alternatively, the designers can add components such as hydraulic diverters and getters to minimize the requirements on the waste form.

Designers of the engineered system also may decide to add components to provide greater defense-in-depth. The major components would be a surface barrier to reduce recharge, a hydraulic barrier to divert moisture away from the waste, concrete pads to trap uranium, and other getter materials to trap important radionuclides such as technetium. The recharge rate is the main driving function for the system. With a surface barrier that could reduce this rate, the contaminants would take even longer to reach the groundwater. Diverting water away from the waste by including a sand-gravel capillary barrier would likely reduce the contaminant release rate from the waste form and also would create a greater moisture shadow under the disposal system, which would delay contaminant travel. Concrete is known to highly retard uranium isotopes and so would reduce its impact during the time of compliance. If an inexpensive getter could be found for technetium, the material also could have important impacts.

C5.0 COMPLIANCE

Not only must the performance assessment establish the basis for controls to provide a reasonable expectation that the environment and the public health and safety will be protected, but the document also must show that these restrictions can be expected to be met. The major restrictions deal with inventory concentrations, long-term waste form release rates, and disposal facility design.

If the waste packages have the maximum concentrations estimated from the best basis tank by tank inventories[14] and anticipated separation efficiencies[15], then almost all the radionuclides will meet the requirements imposed by equations C.1 through C.4. However, the producers of the immobilized waste packages are required to meet NRC Class C limits[4], which for the remaining radionuclides are more restrictive than the limits found here. Thus, the immobilized waste accepted by DOE will meet the requirements set here.

The only other radionuclide of concern in meeting the acceptance requirements based on inadvertent intruder protection is ^{126}Sn. This radionuclide does not have a Class C limit, so its waste acceptance limit is based on this performance assessment. If the ILAW containers having only wastes from the three tanks believed to have large ^{126}Sn concentrations (tanks A-105, A-106, or AX-104) were stacked on top of each other, then the intruder dose would exceed the 100 mrem in a year limit. However, a number of alternatives exist. This performance assessment conservatively assumes that all of the tin would go to the ILAW product. However, a significant fraction may be diverted to the high-level waste stream during separations and treatment. The three tanks of concern have small volumes of waste (19,000 gallons, 125,000 gallons, and 7,000 gallons, respectively). During retrieval the tank contents are likely to be blended with the contents of other tanks that have significantly lower ^{126}Sn concentrations. In addition, the operators of the disposal facility have the option of placing containers with low concentrations of ^{126}Sn on top of a container with a high concentration which would make the stack compliant with the disposal requirements. Finally, because these tanks are likely to be processed during the second phase of immobilization, the DOE could, by contract, have the ILAW producers separate the ^{126}Sn from the low-activity waste and ensure that the ^{126}Sn is below the acceptance limits.

When the restrictions arising from the protection of groundwater are considered, the analyses suggest that compliance will be achievable. Even if the entire ILAW inventory were placed in each set of disposal facilities, for each radionuclide, the (I_i R_i / L) product is less than the

14 "Contract Number DE-AC06-96RL13200; Completion of Milestone T24-97-158, Contractor Letter to Department of Energy, Richland Operations Office, Reporting Completion of Standard Inventory Estimates for all Tanks" letter FDH-9757750 from D.J. Washenfelder to J.K. McClusky, dated August 29, 1997.

15 L.W. Shelton, *DSI to F. Schmittroth and A.L. Boldt*, Westinghouse Hanford Company, Richland, Washington, May 22, 1995.

requirement. The sum for the new disposal facility is 0.34 of the limit. Using the fact that the amount of Tc to be placed in the existing disposal vaults is limited (by concentrations specified in the RFP and by the volume of the vaults), the sum for the existing disposal vaults is 0.54 of the limit.

Given these conservative assumptions, expecting groundwater to be protected is reasonable. In particular, the analysis is based on the conservative assumption of a constant release rate from the disposal facility whose value is the maximum observed in detailed waste form calculations. However, these calculated maximum rates do not occur until 8,000 to 16,000 years after closure. Therefore, since it takes many thousands of years for the contaminants to go from the disposal facility to the groundwater, the contamination level in the groundwater will be lower than presented here.

The information in this performance assessment also can be used to back out the maximum allowable contaminant release rate from each facility. For the new disposal facility, the maximum allowable release rate is 2.4 ppm/year assuming that all the inventory of ^{99}Tc is placed in that facility. For the existing disposal vaults, the maximum allowable contaminant release rate is higher, being 3.8 ppm/year assuming that the maximum amount of ^{99}Tc is placed in this facility.

The restrictions on the disposal facility design are relatively few and can be easily met. The major facility requirements deal with subsidence, recharge rate, layouts, interactions with the waste form, and intruder protection. Whether a sand-gravel hydraulic moisture diverter actually is used will depend on engineering and cost tradeoffs.

C6.0 CONCLUSIONS

Because this project is in its early stages, conservative assumptions have been used. Given such assumptions, it is gratifying that all the estimated impacts meet the performance objectives. Restrictions placed on the waste product and the disposal facility design will not require heroic efforts to produce a compliant waste form or design a compliant facility.

The numerous sensitivity cases that were run show that the results presented in this assessment are quite robust. The computer simulations of long-term dissolution rates for low-level glass (LD6-5412) show that the rate of 4.4 parts per million per year can be met. The calculations are most sensitive to the total inventory of technetium and to the peak concentration of ^{126}Sn. For the base analysis case no credit is taken for enhanced chemical separation or separation occurring during immobilization. Computer simulations of flow and transport under a wide variety of conditions show that slightly increased impacts may occur, but that most expected changes would result in larger decreases in estimated impacts.

Future performance assessments, which are required by DOE policy and draft DOE Order 435.1, will benefit from increased knowledge of the waste inventory, the waste form, and the disposal facility design as well as from an extensive data collection activity for the generation of site-specific estimates for geochemical data, hydraulic parameters, and water infiltration and waste form release rates. These performance assessments are expected to confirm this analysis that the on-site disposal of the low-activity waste from Hanford Site tanks can meet the performance objectives with a high degree of assurance.

This page intentionally left blank.

APPENDIX D

KEY DELIVERABLES AND PERFORMANCE MEASUREMENTS

This page intentionally left blank.

APPENDIX D

KEY DELIVERABLES AND PERFORMANCE MEASUREMENTS

Table D-1 summarizes the key milestones (Level 5 or above) for the immobilized low-activity waste (ILAW) Disposal Project and indicates due dates and Work Breakdown Structure (WBS) element associations. A brief description of milestone activity and completion criteria is also given.

Table D-1. ILAW Disposal Project Deliverables and Performance Measures. (4 Sheets)

Milestone Title	Due Date	Activity Description
Issue DRD for ILAW Interim Storage Facility	31Jan97 Complete	Prepare, review, incorporate comments, and transmit PHMC-approved DRD for ILAW interim storage facilities to RL for approval.
Issue SOW - for ILAW ISF Conceptual Design	31Jan97 Complete	Prepare the SOW for ILAW storage conceptual design. Obtain contractor approval and transmit to RL for review and approval.
Submit final PBS to RL	30May97 Complete	PBS for this subproject will be prepared in final form for submittal to RL and forwarded as the subproject budget request to Congress. The submittal will incorporate RL comments and those from stakeholders and DOE-HQ.
Issue draft AGA-ILAW Add'l S&D Fac for review	30May97 Complete	Develop and issue a draft engineering study that evaluates options for safe disposal of packaged ILAW. Draft report to be issued to RL for information.
Issue SOW - FY 1998 to FY 2003	13Jun97 Complete	Revise SOW for Hanford Low-Level Tank Waste PA Project to reflect current direction. This report will be an update of the FY 1995 document. Project office acceptance will reflect RL and PHMC guidance.
Submit Final MYWP to RL for Approval	26Sep97 Complete	Prepare MYWP baseline documentation including resource loaded schedules, WBS dictionary sheets, Activity Planning Forms, Estimating Worksheets and Milestone Description Sheets. Completion dependent of resolution of RL and stakeholder comments and resubmittal as part of TWRS MYWP.
Reissue Hanford Low-Level Tank Waste Interim PA	30Sep97 Complete	Reissue the "Hanford Low-Level Waste Interim Performance Assessment" after incorporation of comments of external review board and other Hanford reviewers. Project office accepts report as addressing all comments received.
Issue 90% Conceptual Design for Review - ILAW ISF	30Sep97 Complete	Submittal of conceptual design and cost estimate for ILAW storage by A-E to contractor for formal 90% design review. Complete submittal includes conceptual design, cost estimate, and narrative.
(M-90-01) Submit Project Management Plans to Ecology	31Dec97 complete	Submit ILAW additional storage/disposal facility and interim storage IHLW Project Management Plans to Ecology pursuant to Tri-Party Agreement section 11.5. Completion includes PMP approval by PHMC and RL and submittal to Ecology.
Issue 1998 PA	31Mar98 complete	Issue PA for both grout vaults (W-465) and ILAW disposal complex (W-520) disposal systems for review.

Table D-1. ILAW Disposal Project Deliverables and Performance Measures. (4 Sheets)

Milestone Title	Due Date	Activity Description
Submit final PBS to RL	31Aug98 complete	Submit final subproject PBS to RL for forwarding as subproject budget request to congress. Describe subproject scope, budget scenarios, impacts of less-than-planned amounts. Incorporate comments from RL, stakeholders, and DOE-HQ.
Issue SOW - FY 1999 to FY 2004	15Jun98 complete	Revise the "Statement of Work for FY 1999 to 2004" for the Hanford LLW PA Project to reflect current direction. The report will be an update of the FY 1997 document.
(M-90-02T) Compl Conceptual Design - ILAW ISF	30Jun98 complete	A CDR prepared for ILAW ISF project scope and cost estimate. A-E Services in place by April 1997 to complete CDR needed for project validation in March 1998. CDR will be submitted by A-E, approved by PHMC and A-E, issued to RL.
Submit Final MYWP to RL for approval	24Sep98 complete	Prepare MYWP baseline documentation. Include resource loaded schedules, WBS dictionary sheets, APF's, Estimating Worksheets, and Milestone Description Sheets. Completion includes RL and stakeholder comment resolution and resubmittal as part of TWRS MYWP.
Submit final PBS to RL	31Aug99	Prepare ADS for Storage and Disposal and Subprojects in final form for submittal to RL for forwarding as subproject budget request to Congress. Describe scope of subprojects, budget scenarios, impact of less than planning amount. Incorporate RL, stakeholder, and DOE-HQ comments.
Issue SOW - FY 2000 to FY 2005	15Jun99 complete	Revise "Statement of Work for FY 2000 - 2005" for the Hanford LLW PA Project to reflect current directions. This is an update of the document published in FY 1998.
Submit final MYWP to RL for approval	24Sep99	Prepare MYWP baseline including resource loaded schedules and supporting documentation (Dictionary Sheets, APF, MDS, etc.) and submit to RL for approval. Resolve comments from RL and stakeholders; resubmit to RL for approval.
Key Decision ½ Initiate Design - ILAW ISF	04Jan00	A CDR will be prepared by an A-E firm meeting requirements of RLIP 4700.1A "Project Management System". The CDR will be approved by the PHMC and RL and provide a basis for RL decision to start preliminary and detailed design. Acceptance criteria includes PHMC revised baseline and request for directive authorization to spend capital funds.
ISS Data Pkgs - for 2001 PA	31Jan00	A document with all data to be used in the PA analysis of the long-term environmental and safety impacts on disposal of ILAW in the existing disposal facility (Grout Vaults) and ILAW Disposal Complex will be prepared. This will supersede existing data packages (WHC-SD-WM-RPT-166, Rev 0).
(M-90-07T) Compl Conceptual Design - ILAW Add'l S&D Fac	30Jun00	A CDR will be prepared to develop the ILAW additional storage/disposal facility project scope, schedule, and budget cost estimate. A-E services ready to work by June 1997 to complete CDR needed for project validation and PA support. Submitted CDR requires approval by PHMC/A-E and issued to RL.

Table D-1. ILAW Disposal Project Deliverables and Performance Measures. (4 Sheets)

Milestone Title	Due Date	Activity Description
CD ½-Initiate Prelim Design - ILAW Add'l S&D Fac	02Oct00	A CDR will be prepared by an A-E firm that meets requirements of RLIP 4700.1A, *Project Management System*. The CDR requires approval by PHMC and RL and provides a basis for RL decision to commence preliminary and detail design. A PHMC revised baseline and request for authorization to spend capital funds will be submitted to RL.
(M-90-04T) Compl Detailed Design - ILAW ISF	30Mar01	A-E completes detail design (Title II) of the LAW Interim Storage Facility. Detailed design approved by PHMC through a series of design review meetings.
Issue final PA for existing TWRS Disposal Vaults and ILAW Disposal Complex	30Mar01	Issue final PA for existing TWRS disposal vaults and ILAW disposal complex describing long-term environmental and health impacts of disposal of ILAW TWRS disposal complex. Project office accepts report as suitable for transmittal to DOE-HQ for PRP review, and approval by DOE-HQ.
(M-90-03) KD 3 - Initiate Construction - ILAW ISF	29Jun01	Activities include completion of: definitive design, preliminary SAR, environmental documentation, and project management documentation per DOE Order 4700.1. Acceptance includes dated project plan for DOE Acquisition Executive approval of key decision 3. Initiate construction is defined as award of contract.
(M-90-06) Initiate hot ops - ILAW ISF Phase I	31Dec02	Complete all construction, startup, permitting, and preoperational activities necessary to begin radioactive operations for the first portion of the ILAW interim storage facility. DOE approval of ORE and authorization to operating contractor to receive radioactive materials at facility.
(M-90-09T) Compl Detailed Design – ILAW Add'l S&D	31Mar03	A-E completes detailed design (Title II) of the LLW Disposal Facility. Detailed design approval by PHMC through a series of design review meetings throughout the design phase.
(M-90-08) KD 3 - Init Construction ILAW Add'l S&D	30Jun03	Activities include completion of definitive design, preliminary SAR, environmental documentation, and project management documentation per DOE Order 4700.1. Prepare dated project plan for DOE Acquisition Executive approval of key decision 3. Initiate construction defined as award of contract for modification or installation of structural components.
(M-90-10) Init hot ops - ILAW Disposal - Module 1	30Dec05	Complete all construction, startup, permitting, preop activities necessary to begin radioactive operations of the first module of the ILAW Disposal Facility. DOE approval of ORR and authorization to operating contractor to begin receiving radioactive materials.
Complete hot ops - ILAW S&D Phase I facilities	30Dec11	Perform activities to operate ILAW ISF systems during ILAW production; system operations, maintenance, production and maintenance planning, materials and parts procurement, training, safety and QA, engineering support, scheduling, budgeting. Receipt and storage of ILAW from production facilities in accordance with DOE contractual obligations.

Table D-1. ILAW Disposal Project Deliverables and Performance Measures. (4 Sheets)

Milestone Title	Due Date	Activity Description
Init hot ops - ILAW S&D Phase II facilities	03Jan12	Complete activities needed to begin hot operations of ILAW Disposal Facility; procedure prep., training prep., personnel qualifications, ops and maintenance planning, materials and parts, and ORA complete preop testing of system. Approval of pre-op test results by ILAW disposal facility operations mgr., approval of ORA by RL.
Comp Deactivation - ILAW S&D Phase I facilities	31Dec12	Perform activities needed to deactivate facility. Remove process and hazardous materials, housekeeping, establish minimum system condition. Comply with approved deactivation plan.
Comp hot ops - ILAW S&D Phase II facilities	31Jul25	Perform activities needed to operate ILAW Disposal Facilities during ILAW production; system operations, maintenance, materials and spare parts procurement, training, safety and QA support, engineering support, scheduling and budgeting. Receive/dispose ILAW from production facility in accordance with DOE contractual obligations.
Comp long-term monitoring - ILAW S&D facilities	01Feb35	Perform activities needed for long-term monitoring of the ILAW disposal facility; monitor system operations, preventive/corrective maintenance, documentation. Comply with long-term monitoring plan.

A-E = architect-engineer
ADS = activity data sheet
AGA = American Gas Association
APF = assigned protection factor
CDR = critical design review
DOE = U.S. Department of Energy
DOE-HQ = U.S. Department of Energy, Headquarters
DRD = design requirements document
Ecology = Washington State Department of Ecology
FY = fiscal year
IHLW = immobilized high-level wate
ILAW = immobilized low-activity waste
ISF = intermediate-scale facility
ISS = interim-status standards
KD = key decision
LAW = low-activity waste
LLW = low-level waste
MDS = material data sheet
MYPP = multi-year program plan
MYWP = multi-year work plan
ORA = operational readiness assessment
ORE = operational readiness evaluation
ORR = operational readiness review
PA = performance assessment
PBS = Project Baseline Summary
PHMC = Project Hanford Management Contract
PMP = program management plan
PRP = potentially responsible party
QA = quality assurance
RL = Richland Operations Office
RLIP = RL Implementing Procedure
S&D = storage and disposal
SAR = safety analysis report
SOW = statement of work
TWRS = Tank Waste Retrieval System
WBS = work breakdown structure

APPENDIX E

DIVISION OF RESPONSIBILITY MATRIX— IMMOBILIZED LOW-ACTIVITY WASTE STORAGE/DISPOSAL SUBPROJECT

This page intentionally left blank.

APPENDIX E

DIVISION OF RESPONSIBILITY MATRIX— IMMOBILIZED LOW-ACTIVITY WASTE STORAGE/DISPOSAL SUBPROJECT

Table E-1. Division of Responsibility Matrix - ILAW Storage/Disposal Subproject. (2 Sheets)

Organization Activity	ILAW Storage/ Disposal Project Office (DOE WDD)	PHMC ILAW Storage/Disposal Project	Phase I ILAW Storage/Disposal Subproject (PHMC/ subcontractors)	Design Agent
Preconceptual Phase Activities				
Program functions and requirements (DOE approval)	A	PI/C	R	R
Design authority during Subproject definition		P		
Engineering trade studies (Subproject definition)	I	A	R	P
Integrated flowsheet	I	P/A	R	
Subproject design requirements document (DOE approval)	A	P/C	C	R
Justification of mission need	A	P/A	PI	
Multi-year program plan	A	P/A	PI	
Conceptual Phase Activities				
Subproject-specific budget documentation	I	I	P/A	PI
Status reporting	I		P(1)	PI
Define program and Subproject changes	A	P/A	PI/C(4), A(1)	PI
Subproject budget validation	A	R	P	PI
Subproject Level 1 schedule	R	R	P/A	PI
Design authority during Subproject (after CD 1)		PI	P	PI
Design statement of work and letter of instruction	I	PI/R	P/A	R
Design agent during Subproject				P
Conceptual design	A	R	PI	P
Performance Assessment	A	P	P	
Subproject-specific technology development needs and dates	C	P/A	PI/A(1)	PI
Subproject-specific engineering development needs and dates	I	PI	P/A(1)	PI

Table E-1. Division of Responsibility Matrix - ILAW Storage/Disposal Subproject. (2 Sheets)

Organization Activity	ILAW Storage/ Disposal Project Office (DOE WDD)	PHMC ILAW Storage/Disposal Project	Phase I ILAW Storage/Disposal Subproject (PHMC/ subcontractors)	Design Agent
Subproject supplemental design requirements, design specification	I	PI/R	P/A	PI
Total project cost estimate details	I		P/A	PI
Project management plan (PHMC)	A	R	P/A	PI
Execution Phase Activities				
Definitive design	R		A	P
Design reviews (design agent)	R	(6)(2)	A	P
Construction (contracted constructor)			P/A	PI
Operating and maintenance procedures	R	PI	PI, P/A(3)	PI
Technical safety requirements	R	PI/R	P	
Acceptance Phase Activities				
System startup testing (cold)	R	PI	P/A(5)(3)	
Operational testing	R	PI	P/A(5)(3)	PI
Readiness review for hot operations	P/A	PI	PI	PI

Key:
- A - Responsibility and authority to commit contractor (or the government for DOE "A")
- C - Concur with adequacy; documents cannot be issued or actions taken without concurrence (formal resolution of comments required)
- R - Review to assure vested interest is addressed (formal resolution of comments is not required)
- P - Responsibility to prepare product or perform action
- PI - Provide specific (or specialized) support to preparer (may include majority of preparation activities)
- I - Receive for information or implementation

Notes:
(1) For Subproject-specific activities only.
(2) Perform reviews of selected design items in Title II; drawing-by-drawing reviews are not intended.
(3) Could be scope of turnkey contractor, if contracted in that manner.
(4) For assigned responsibilities/milestones.
(5) Startup testing will be performed using personnel who are assumed to transition to plant operations.
(6) Process engineers and operations personnel are assumed to be members of the project team. Specific responsibilities will be detailed in project documents.

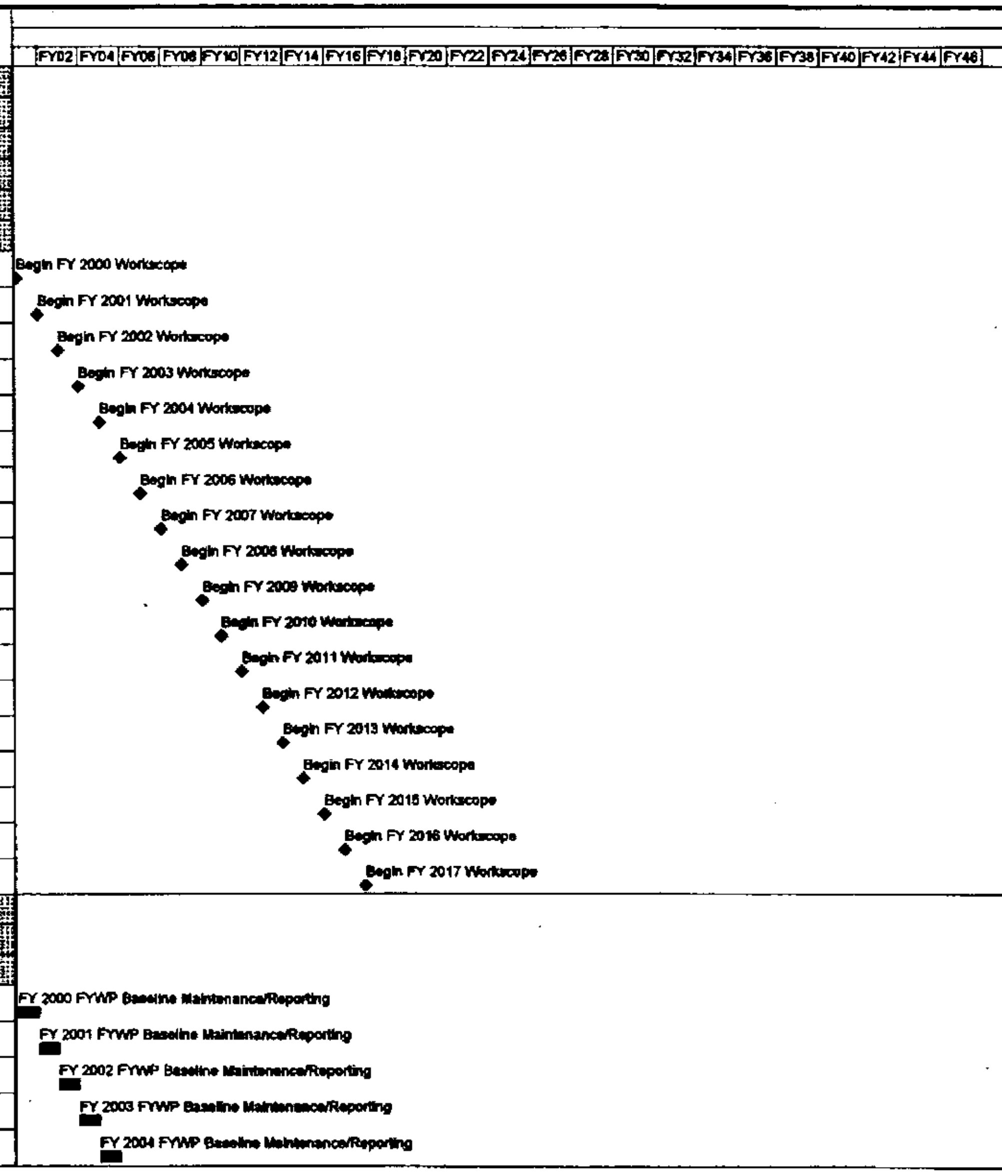
CD = critical decision
DOE = U.S. Department of Energy
LAW = low-activity waste
ILAW = immobilized low-activity waste
PHMC = Project Hanford Management Contractor
WDD = Waste Disposal Division

APPENDIX F

IMMOBILIZED LOW-ACTIVITY WASTE SUBPROJECT SCHEDULE

This page intentionally left blank.

Activity ID	Activity Description	Early Start	Early Finish
1 Hanford Site			
1.01 Tank Waste Remediation System			
1.01.09 Immobilized Waste (TWRS)			
1.01.09.01 Immobilized LAW Disposal Facility			
1.01.09.01.01 Dispose Immobilized LAW On-Site			
1.01.09.01.01.01 LAW Project Management			
T946005Z1	Begin FY 2000 Workscope	01OCT99	
T946005Z2	Begin FY 2001 Workscope	02OCT00	
T946005Z3	Begin FY 2002 Workscope	01OCT01	
T946005Z4	Begin FY 2003 Workscope	01OCT02	
T946005Z5	Begin FY 2004 Workscope	01OCT03	
T946005Z6	Begin FY 2005 Workscope	01OCT04	
T946005Z7	Begin FY 2006 Workscope	03OCT05	
T946005Z8	Begin FY 2007 Workscope	02OCT06	
T946005Z9	Begin FY 2008 Workscope	01OCT07	
T946005ZA	Begin FY 2009 Workscope	01OCT08	
T946005ZB	Begin FY 2010 Workscope	01OCT09	
T946005ZC	Begin FY 2011 Workscope	01OCT10	
T946005ZD	Begin FY 2012 Workscope	03OCT11	
T946005ZE	Begin FY 2013 Workscope	01OCT12	
T946005ZF	Begin FY 2014 Workscope	01OCT13	
T946005ZG	Begin FY 2015 Workscope	01OCT14	
T946005ZH	Begin FY 2016 Workscope	01OCT15	
T946005ZI	Begin FY 2017 Workscope	03OCT16	
1.01.09.01.01.01.01 LAW Project Management [illegible]			
1.01.09.01.01.01.01.01 LAW Baseline Maintenance/Reporting			
1.01.09.01.01.01.01.01.01 FY 1999 FYWP Baseline Maintenance/Reporting			
T946005A2	FY 2000 FYWP Baseline Maintenance/Reporting	01OCT99	29SEP00
T946005A3	FY 2001 FYWP Baseline Maintenance/Reporting	02OCT00	28SEP01
T946005A4	FY 2002 FYWP Baseline Maintenance/Reporting	01OCT01	30SEP02
T946005A5	FY 2003 FYWP Baseline Maintenance/Reporting	01OCT02	30SEP03
T946005A6	FY 2004 FYWP Baseline Maintenance/Reporting	01OCT03	30SEP04



Project Start 01OCT98 Early Bar
Project Finish 30SEP46 Progress Bar
Data Date 01OCT98 Critical Activity
Run Date 31AUG99

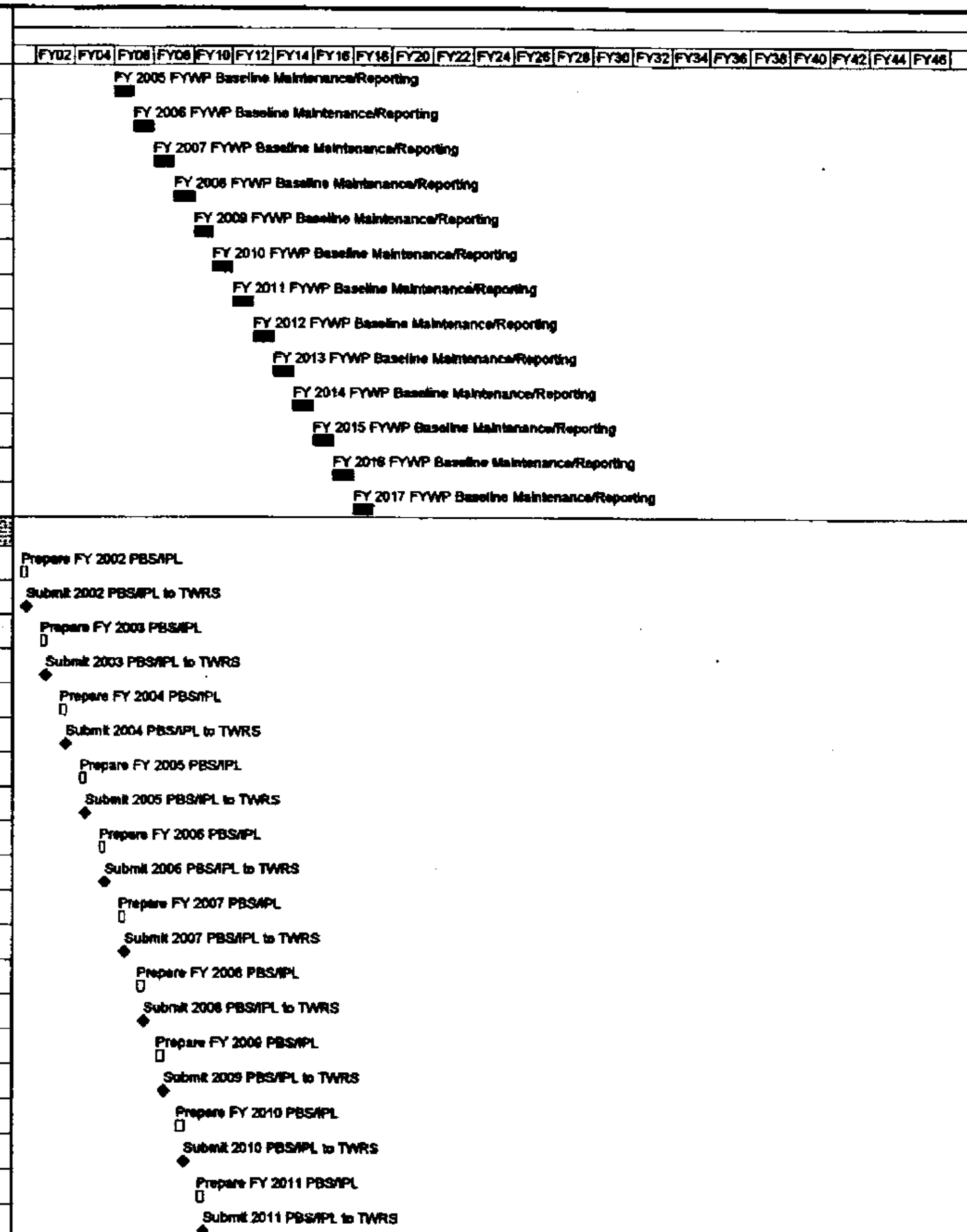
© Primavera Systems, Inc.

T908 Sheet 1 of 28

Immobilized Waste - MYWP
#HLW 90% Case - T908
July 14, 1999

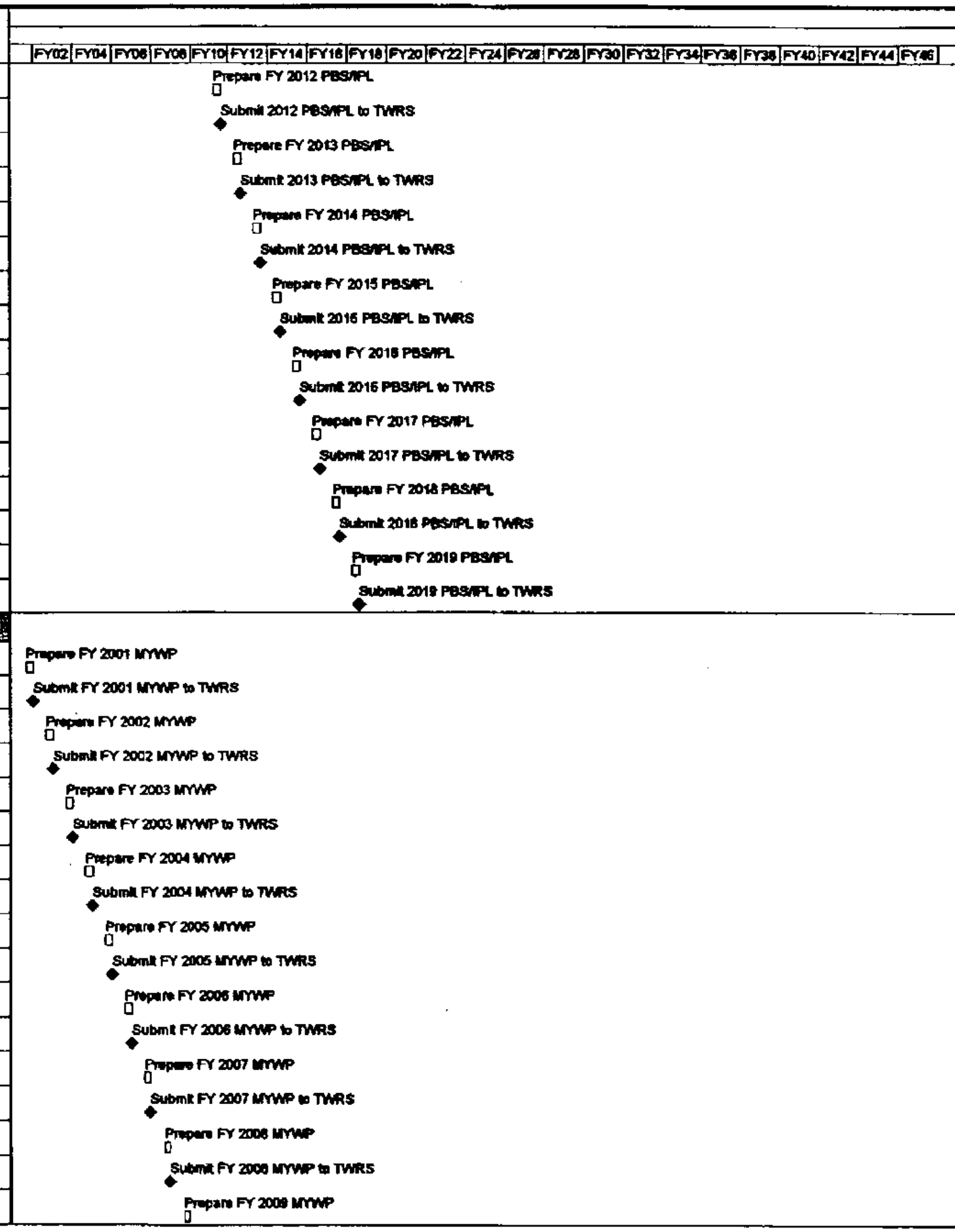
Date	Revision	Checked	Approved

Activity ID	Activity Description	Early Start	Early Finish
T946005A7	FY 2005 FYWP Baseline Maintenance/Reporting	01OCT04	30SEP05
T946005A8	FY 2006 FYWP Baseline Maintenance/Reporting	03OCT05	29SEP06
T946005A9	FY 2007 FYWP Baseline Maintenance/Reporting	02OCT06	28SEP07
T946005AA	FY 2008 FYWP Baseline Maintenance/Reporting	01OCT07	30SEP08
T946005AB	FY 2009 FYWP Baseline Maintenance/Reporting	01OCT08	30SEP09
T946005AC	FY 2010 FYWP Baseline Maintenance/Reporting	01OCT09	30SEP10
T946005AD	FY 2011 FYWP Baseline Maintenance/Reporting	01OCT10	30SEP11
T946005AE	FY 2012 FYWP Baseline Maintenance/Reporting	03OCT11	28SEP12
T946005AF	FY 2013 FYWP Baseline Maintenance/Reporting	01OCT12	30SEP13
T946005AG	FY 2014 FYWP Baseline Maintenance/Reporting	01OCT13	30SEP14
T946005AH	FY 2015 FYWP Baseline Maintenance/Reporting	01OCT14	30SEP15
T946005AI	FY 2016 FYWP Baseline Maintenance/Reporting	01OCT15	30SEP16
T946005AJ	FY 2017 FYWP Baseline Maintenance/Reporting	03OCT16	29SEP17
[illegible]			
T946005B2	Prepare FY 2002 PBS/IPL	04JAN00	28APR00
T946005B2A	Submit 2002 PBS/IPL to TWRS		28APR00
T946005B3	Prepare FY 2003 PBS/IPL	02JAN01	30APR01
T946005B3A	Submit 2003 PBS/IPL to TWRS		30APR01
T946005B4	Prepare FY 2004 PBS/IPL	02JAN02	30APR02
T946005B4A	Submit 2004 PBS/IPL to TWRS		30APR02
T946005B5	Prepare FY 2005 PBS/IPL	02JAN03	30APR03
T946005B5A	Submit 2005 PBS/IPL to TWRS		30APR03
T946005B6	Prepare FY 2006 PBS/IPL	02JAN04	30APR04
T946005B6A	Submit 2006 PBS/IPL to TWRS		30APR04
T946005B7	Prepare FY 2007 PBS/IPL	04JAN05	29APR05
T946005B7A	Submit 2007 PBS/IPL to TWRS		29APR05
T946005B8	Prepare FY 2008 PBS/IPL	03JAN06	28APR06
T946005B8A	Submit 2008 PBS/IPL to TWRS		28APR06
T946005B9	Prepare FY 2009 PBS/IPL	02JAN07	30APR07
T946005B9A	Submit 2009 PBS/IPL to TWRS		30APR07
T946005BA	Prepare FY 2010 PBS/IPL	02JAN08	30APR08
T946005BAA	Submit 2010 PBS/IPL to TWRS		30APR08
T946005BB	Prepare FY 2011 PBS/IPL	02JAN09	30APR09
T946005BBA	Submit 2011 PBS/IPL to TWRS		30APR09



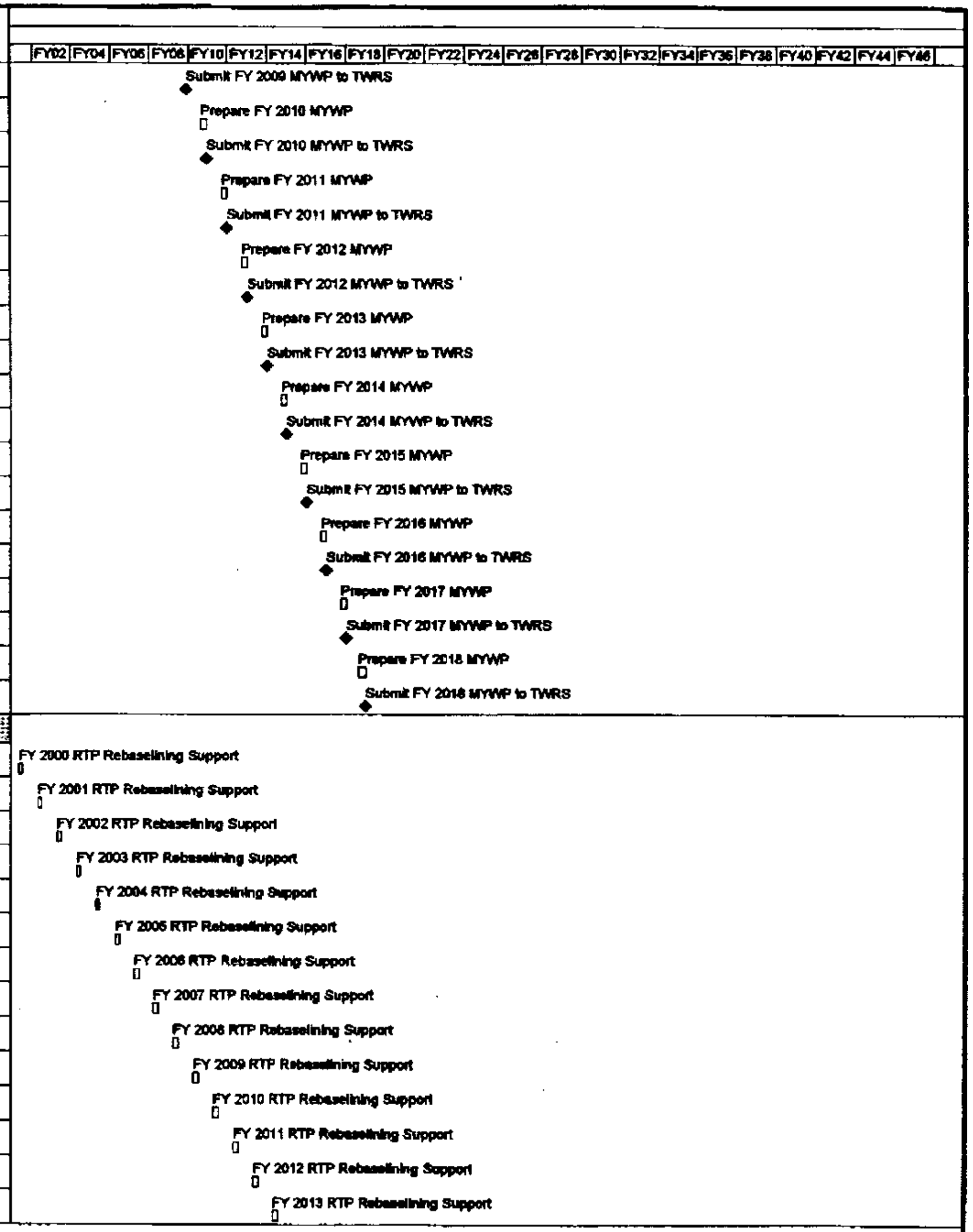
Sheet 2 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946005BC	Prepare FY 2012 PBS/IPL	04JAN10	30APR10
T946005BCA	Submit 2012 PBS/IPL to TWRS		30APR10
T946005BD	Prepare FY 2013 PBS/IPL	04JAN11	29APR11
T946005BDA	Submit 2013 PBS/IPL to TWRS		29APR11
T946005BE	Prepare FY 2014 PBS/IPL	03JAN12	30APR12
T946005BEA	Submit 2014 PBS/IPL to TWRS		30APR12
T946005BF	Prepare FY 2015 PBS/IPL	02JAN13	30APR13
T946005BFA	Submit 2015 PBS/IPL to TWRS		30APR13
T946005BG	Prepare FY 2016 PBS/IPL	02JAN14	30APR14
T946005BGA	Submit 2016 PBS/IPL to TWRS		30APR14
T946005BH	Prepare FY 2017 PBS/IPL	02JAN15	30APR15
T946005BHA	Submit 2017 PBS/IPL to TWRS		30APR15
T946005BI	Prepare FY 2018 PBS/IPL	04JAN16	29APR16
T946005BIA	Submit 2018 PBS/IPL to TWRS		29APR16
T946005BJ	Prepare FY 2019 PBS/IPL	03JAN17	28APR17
T946005BJA	Submit 2019 PBS/IPL to TWRS		28APR17
[illegible]			
T946005D2	Prepare FY 2001 MYWP	01JUN00	26SEP00
T946005D2A	Submit FY 2001 MYWP to TWRS		26SEP00
T946005D3	Prepare FY 2002 MYWP	01JUN01	26SEP01
T946005D3A	Submit FY 2002 MYWP to TWRS		26SEP01
T946005D4	Prepare FY 2003 MYWP	03JUN02	26SEP02
T946005D4A	Submit FY 2003 MYWP to TWRS		26SEP02
T946005D5	Prepare FY 2004 MYWP	02JUN03	26SEP03
T946005D5A	Submit FY 2004 MYWP to TWRS		26SEP03
T946005D6	Prepare FY 2005 MYWP	01JUN04	24SEP04
T946005D6A	Submit FY 2005 MYWP to TWRS		24SEP04
T946005D7	Prepare FY 2006 MYWP	01JUN05	26SEP05
T946005D7A	Submit FY 2006 MYWP to TWRS		26SEP05
T946005D8	Prepare FY 2007 MYWP	01JUN06	26SEP06
T946005D8A	Submit FY 2007 MYWP to TWRS		26SEP06
T946005D9	Prepare FY 2008 MYWP	01JUN07	26SEP07
T946005D9A	Submit FY 2008 MYWP to TWRS		26SEP07
T946005DA	Prepare FY 2009 MYWP	02JUN08	26SEP08



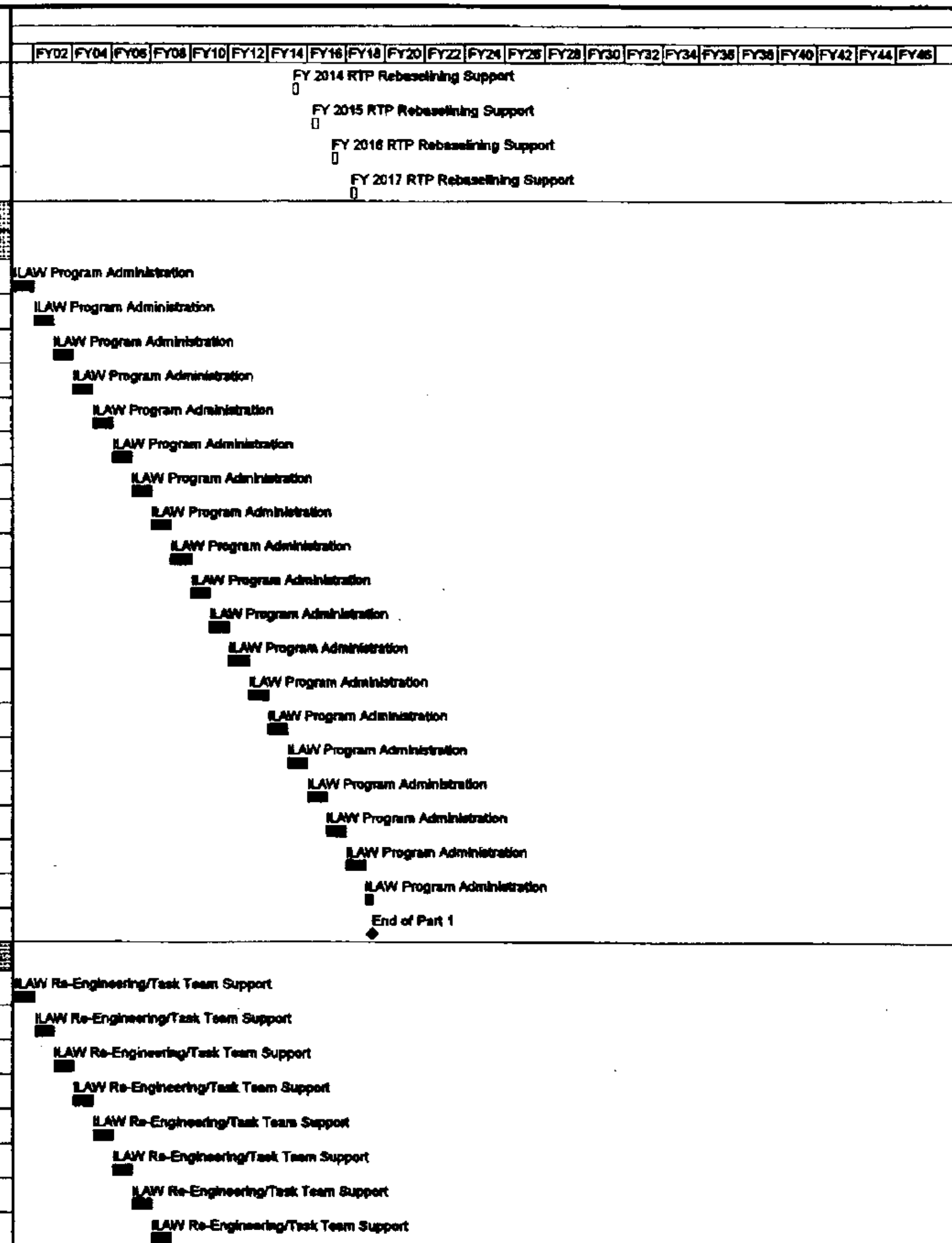
Sheet 3 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946005DAA	Submit FY 2009 MYWP to TWRS		26SEP08
T946005DB	Prepare FY 2010 MYWP	01JUN09	25SEP09
T946005DBA	Submit FY 2010 MYWP to TWRS		25SEP09
T946005DC	Prepare FY 2011 MYWP	01JUN10	27SEP10
T946005DCA	Submit FY 2011 MYWP to TWRS		27SEP10
T946005DD	Prepare FY 2012 MYWP	01JUN11	26SEP11
T946005DDA	Submit FY 2012 MYWP to TWRS		26SEP11
T946005DE	Prepare FY 2013 MYWP	01JUN12	26SEP12
T946005DEA	Submit FY 2013 MYWP to TWRS		26SEP12
T946005DF	Prepare FY 2014 MYWP	03JUN13	26SEP13
T946005DFA	Submit FY 2014 MYWP to TWRS		26SEP13
T946005DG	Prepare FY 2015 MYWP	02JUN14	26SEP14
T946005DGA	Submit FY 2015 MYWP to TWRS		26SEP14
T946005DH	Prepare FY 2016 MYWP	01JUN15	25SEP15
T946005DHA	Submit FY 2016 MYWP to TWRS		25SEP15
T946005DI	Prepare FY 2017 MYWP	01JUN16	26SEP16
T946005DIA	Submit FY 2017 MYWP to TWRS		26SEP16
T946005DJ	Prepare FY 2018 MYWP	01JUN17	26SEP17
T946005DJA	Submit FY 2018 MYWP to TWRS		26SEP17
1.01.09.01.01.01.01.05 FY 1999 RTP Rebaselining Support			
T946005K2	FY 2000 RTP Rebaselining Support	04JAN00	31MAR00
T946005K3	FY 2001 RTP Rebaselining Support	02JAN01	30MAR01
T946005K4	FY 2002 RTP Rebaselining Support	02JAN02	29MAR02
T946005K5	FY 2003 RTP Rebaselining Support	02JAN03	31MAR03
T946005K6	FY 2004 RTP Rebaselining Support	02JAN04	31MAR04
T946005K7	FY 2005 RTP Rebaselining Support	04JAN05	31MAR05
T946005K8	FY 2006 RTP Rebaselining Support	03JAN06	31MAR06
T946005K9	FY 2007 RTP Rebaselining Support	02JAN07	30MAR07
T946005KA	FY 2008 RTP Rebaselining Support	02JAN08	31MAR08
T946005KB	FY 2009 RTP Rebaselining Support	02JAN09	31MAR09
T946005KC	FY 2010 RTP Rebaselining Support	04JAN10	31MAR10
T946005KD	FY 2011 RTP Rebaselining Support	04JAN11	31MAR11
T946005KE	FY 2012 RTP Rebaselining Support	03JAN12	30MAR12
T946005KF	FY 2013 RTP Rebaselining Support	02JAN13	29MAR13



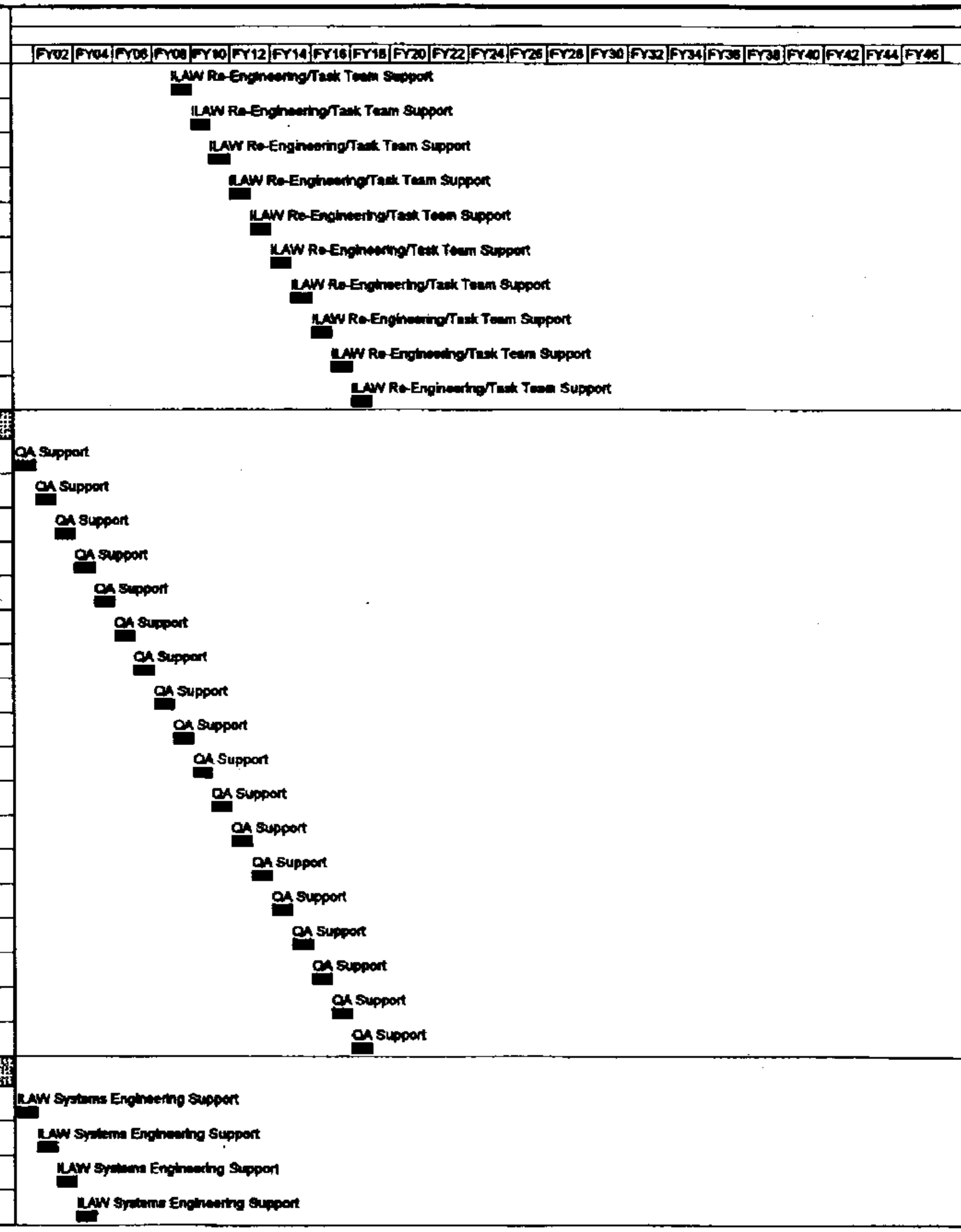
Sheet 4 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946005KG	FY 2014 RTP Rebaselining Support	02JAN14	31MAR14
T946005KH	FY 2015 RTP Rebaselining Support	02JAN15	31MAR15
T946005KI	FY 2016 RTP Rebaselining Support	04JAN16	31MAR16
T946005KJ	FY 2017 RTP Rebaselining Support	03JAN17	31MAR17
1.01.09.01.01.01.01.02 ILAW Program Office Support			
1.01.09.01.01.01.01.02.01 ILAW Program Administration			
T946005F2	ILAW Program Administration	01OCT99	29SEP00
T946005F3	ILAW Program Administration	02OCT00	28SEP01
T946005F4	ILAW Program Administration	01OCT01	30SEP02
T946005F5	ILAW Program Administration	01OCT02	30SEP03
T946005F6	ILAW Program Administration	01OCT03	30SEP04
T946005F7	ILAW Program Administration	01OCT04	30SEP05
T946005F8	ILAW Program Administration	03OCT05	29SEP06
T946005F9	ILAW Program Administration	02OCT06	28SEP07
T946005FA	ILAW Program Administration	01OCT07	30SEP08
T946005FB	ILAW Program Administration	01OCT08	30SEP09
T946005FC	ILAW Program Administration	01OCT09	30SEP10
T946005FD	ILAW Program Administration	01OCT10	30SEP11
T946005FE	ILAW Program Administration	03OCT11	28SEP12
T946005FF	ILAW Program Administration	01OCT12	30SEP13
T946005FG	ILAW Program Administration	01OCT13	30SEP14
T946005FH	ILAW Program Administration	01OCT14	30SEP15
T946005FI	ILAW Program Administration	01OCT15	30SEP16
T946005FJ	ILAW Program Administration	03OCT16	29SEP17
T946005FK	ILAW Program Administration	02OCT17	31JAN18
T946005Z	End of Part 1		31JAN18
1.01.09.01.01.01.01.02.02 ILAW Re-Engineering/Task Team Support			
T946005G2	ILAW Re-Engineering/Task Team Support	01OCT99	29SEP00
T946005G3	ILAW Re-Engineering/Task Team Support	02OCT00	28SEP01
T946005G4	ILAW Re-Engineering/Task Team Support	01OCT01	30SEP02
T946005G5	ILAW Re-Engineering/Task Team Support	01OCT02	30SEP03
T946005G6	ILAW Re-Engineering/Task Team Support	01OCT03	30SEP04
T946005G7	ILAW Re-Engineering/Task Team Support	01OCT04	30SEP05
T946005G8	ILAW Re-Engineering/Task Team Support	03OCT05	29SEP06
T946005G9	ILAW Re-Engineering/Task Team Support	02OCT06	28SEP07



Sheet 5 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946005GA	ILAW Re-Engineering/Task Team Support	01OCT07	30SEP08
T946005GB	ILAW Re-Engineering/Task Team Support	01OCT08	30SEP09
T946005GC	ILAW Re-Engineering/Task Team Support	01OCT09	30SEP10
T946005GD	ILAW Re-Engineering/Task Team Support	01OCT10	30SEP11
T946005GE	ILAW Re-Engineering/Task Team Support	03OCT11	28SEP12
T946005GF	ILAW Re-Engineering/Task Team Support	01OCT12	30SEP13
T946005GG	ILAW Re-Engineering/Task Team Support	01OCT13	30SEP14
T946005GH	ILAW Re-Engineering/Task Team Support	01OCT14	30SEP15
T946005GI	ILAW Re-Engineering/Task Team Support	01OCT15	30SEP16
T946005GJ	ILAW Re-Engineering/Task Team Support	03OCT16	29SEP17
1.01.00.01.01.01.01.02.05 ILAW Quality Assurance Support			
T946005L2	QA Support	01OCT99	29SEP00
T946005L3	QA Support	02OCT00	28SEP01
T946005L4	QA Support	01OCT01	30SEP02
T946005L5	QA Support	01OCT02	30SEP03
T946005L6	QA Support	01OCT03	30SEP04
T946005L7	QA Support	01OCT04	30SEP05
T946005L8	QA Support	03OCT05	29SEP06
T946005L9	QA Support	02OCT06	28SEP07
T946005LA	QA Support	01OCT07	30SEP08
T946005LB	QA Support	01OCT08	30SEP09
T946005LC	QA Support	01OCT09	30SEP10
T946005LD	QA Support	01OCT10	30SEP11
T946005LE	QA Support	03OCT11	28SEP12
T946005LF	QA Support	01OCT12	30SEP13
T946005LG	QA Support	01OCT13	30SEP14
T946005LH	QA Support	01OCT14	30SEP15
T946005LI	QA Support	01OCT15	30SEP16
T946005LJ	QA Support	03OCT16	29SEP17
1.01.00.01.01.01.01.02.06 ILAW Systems Engineering Support			
T946005I2	ILAW Systems Engineering Support	01OCT99	29SEP00
T946005I3	ILAW Systems Engineering Support	02OCT00	28SEP01
T946005I4	ILAW Systems Engineering Support	01OCT01	30SEP02
T946005I5	ILAW Systems Engineering Support	01OCT02	30SEP03



Sheet 8 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946005I6	ILAW Systems Engineering Support	01OCT03	30SEP04
T946005I7	ILAW Systems Engineering Support	01OCT04	30SEP05
T946005I8	ILAW Systems Engineering Support	03OCT05	29SEP06
T946005I9	ILAW Systems Engineering Support	02OCT06	28SEP07
T946005IA	ILAW Systems Engineering Support	01OCT07	30SEP08
T946005IB	ILAW Systems Engineering Support	01OCT08	30SEP09
T946005IC	ILAW Systems Engineering Support	01OCT09	30SEP10
T946005ID	ILAW Systems Engineering Support	01OCT10	30SEP11
T946005IE	ILAW Systems Engineering Support	03OCT11	28SEP12
T946005IF	ILAW Systems Engineering Support	01OCT12	30SEP13
T946005IG	ILAW Systems Engineering Support	01OCT13	30SEP14
T946005IH	ILAW Systems Engineering Support	01OCT14	30SEP15
T946005II	ILAW Systems Engineering Support	01OCT15	30SEP16
T946005IJ	ILAW Systems Engineering Support	03OCT16	29SEP17
[illegible] ILAW Buyer Support [illegible]			
T946005J2	ILAW Buyer Support	01OCT99	29SEP00
T946005J3	ILAW Buyer Support	02OCT00	28SEP01
T946005J4	ILAW Buyer Support	01OCT01	30SEP02
T946005J5	ILAW Buyer Support	01OCT02	30SEP03
T946005J6	ILAW Buyer Support	01OCT03	30SEP04
T946005J7	ILAW Buyer Support	01OCT04	30SEP05
T946005J8	ILAW Buyer Support	03OCT05	29SEP06
T946005J9	ILAW Buyer Support	02OCT06	28SEP07
T946005JA	ILAW Buyer Support	01OCT07	30SEP08
T946005JB	ILAW Buyer Support	01OCT08	30SEP09
T946005JC	ILAW Buyer Support	01OCT09	30SEP10
T946005JD	ILAW Buyer Support	01OCT10	30SEP11
T946005JE	ILAW Buyer Support	03OCT11	28SEP12
T946005JF	ILAW Buyer Support	01OCT12	30SEP13
T946005JG	ILAW Buyer Support	01OCT13	30SEP14
T946005JH	ILAW Buyer Support	01OCT14	30SEP15
T946005JI	ILAW Buyer Support	01OCT15	30SEP16
T946005JJ	ILAW Buyer Support	03OCT16	29SEP17

Sheet 7 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.01.02 ILAW Systems Definition			
1.01.09.01.01.02.01 Maintain Interface w/Priv. Contractor (460.015)			
1.01.09.01.01.02.01.01 Maintain Interface with Private Contractor			
T946015A1	Maintain Interface with Private Contractor	01OCT99	29SEP00
1.01.09.01.01.02.01.02 W-465 Determine Melter Disposition			
T946015A2	W-465 Determine Melter Disposition	04JAN00	29SEP00
T946015A2A	Issue Letter Report for W-465 Melter Disposition		29SEP00
1.01.09.01.01.02.01.04 Sample Transport Study			
T946015A4	Sample Transport Study	04JAN00	29SEP00
T946015A4A	Issue Letter Report for Product Sample Transport		29SEP00
1.01.09.01.01.02.01.05 Waste Acceptance Test			
T946015A5	Waste Acceptance Test	04JAN00	29SEP00
T946015A5A	Issue Eng Study for Waste Acceptnce Test Reqmnts		29SEP00
1.01.09.01.01.02.01.06 Out of Specification Product Disposition			
T946015A6	Out of Specification Product Disposition	01OCT99	29SEP00
[illegible]			
T946030A2	W-465 Study Tech Parameter Implementation	01OCT99	31DEC99
T946030A2A	Assessment of Contract Changes	30NOV99	
T946030A2B	Impact Evaluation		31DEC99
1.01.09.01.01.02.02.03 W-465 Revise ILAW SE Documents/DNFSB Support			
T946030A3	W-465 Revise ILAW SE Documents/DNFSB Support	04JAN00	29SEP00
T946030A3A	Issue Level 1 Specification Markup	27JUN00	
1.01.09.01.01.02.02.04 W-465 Convert to Level 1 Specification			
T946030A4	W-465 Convert to Level 1 Specification	01OCT99	31DEC99
1.01.09.01.01.02.02.05 W-465 PA Team Interface/Provide Inventory Basis			
T946030A5	W-465 PA Team Interface/Provide Inventory Basis	01OCT99	14JUL00
T946030A5A	Issue Draft Inventory Update	01MAY00	
1.01.09.01.01.02.02.06 Life Cycle Waste Management Plan Per 435.1			
T946030A6	Prepare Life Cycle Waste Mgmt Plan Per 435.1	02APR01	28SEP01
1.01.09.01.01.02.02.07 Waste Acceptance Criteria Per 435.1			
T946030A7	Prepare Waste Acceptance Criteria Per 435.1	02APR01	28SEP01
1.01.09.01.01.02.02.08 Maintain Closure Plan			
T946030A8	Maintain Closure Plan	01OCT99	29SEP00
1.01.09.01.01.02.02.09 Maintain Technical Requirements			
T946030A9	Maintain Technical Requirements	01OCT01	31JAN18

FY02 FY04 FY06 FY08 FY10 FY12 FY14 FY16 FY18 FY20 FY22 FY24 FY26 FY28 FY30 FY32 FY34 FY36 FY38 FY40 FY42 FY44 FY46

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.01.02.04 [illegible] Tech Reqmts for Disposal (460,085)			
1.01.09.01.01.02.04.01 W-520 TWRS-P Contract Technical Implications			
T946095A1	W-520 TWRS-P Contract Technical Implications	02OCT00	28SEP01
1.01.09.01.01.02.04.02 W-520 Revise Systems Engineering Documents			
T946095A2	W-520 Revise Systems Engineering Documents	02OCT00	28SEP01
1.01.09.01.01.02.04.03 W-520 Convert to Level 1 Specification			
T946095A3	W-520 Convert to Level 1 Specification	02OCT00	28SEP01
1.01.09.01.01.02.04.04 W-520 PA Team Interface/Design Impacts Assessment			
T946095A4	W-520 PA Team Interface/Design Impacts Assessmnt	02OCT00	28SEP01
1.01.09.01.01.03 ILAW Performance Assessment			
1.01.09.01.01.03.02 Data Collectn for 2001 Perf Assessment (460,135)			
1.01.09.01.01.03.02.01 Waste Form Data for 2001 Performance Assessment			
1.01.09.01.01.03.02.01.05 Document Preparation			
T946145G1	Prepare Waste Form Data Package	01OCT99	31DEC99
T946145G1A	Issue Waste Form Data Package for 2001 PA		31DEC99
[illegible]			
T946145F6	Procure Workstation for Glass Calcls-CENRTC	01SEP00	29SEP00
[illegible]			
[illegible]			
T946145J3	Prepare Geology Data Package	01OCT99	31DEC99
T946145J3A	Reissue Geology Data Package		31DEC99
1.01.09.01.01.03.02.02.03 Provide Recharge Rate Information			
T946145K7	Write Recharge Data Package	01OCT99	31DEC99
T946145K7A	Reissue Recharge Data Package		31DEC99
1.01.09.01.01.03.02.02.[illegible] Provide Far-Field Hydraulic Information			
T946145L5	Prepare Far-Field Hydraulic Data Package	01OCT99	31DEC99
T946145L5A	Reissue Far-Field Hydraulic Data Package		31DEC99
1.01.09.01.01.03.02.02.[illegible] Provide Near-Field Hydraulic Information			
T946145M3	Document Near-Field Hydraulic Data Package	01OCT99*	31DEC99
T946145M3A	Reissue Near-Field Hydraulic Data Document		31DEC99
1.01.09.01.01.03.02.02.[illegible] Provide Far-Field Geochemical Information			
T946145N5	Document Far-Field Chemical Data Package	01OCT99	31DEC99
T946145N5A	Reissue Far-Field Chemical Data Document		31DEC99
1.01.09.01.01.03.02.02.[illegible] Provide Near-Field Geochemical Information			
T946145O3	Document Near-Field Chemical Data Package	01OCT99	31DEC99
T946145O3A	Reissue Near-Field Chemical Data Package		31DEC99

FY02 FY04 FY06 FY08 FY10 FY12 FY14 FY16 FY18 FY20 FY22 FY24 FY26 FY28 FY30 FY32 FY34 FY36 FY38 FY40 FY42 FY44 FY46

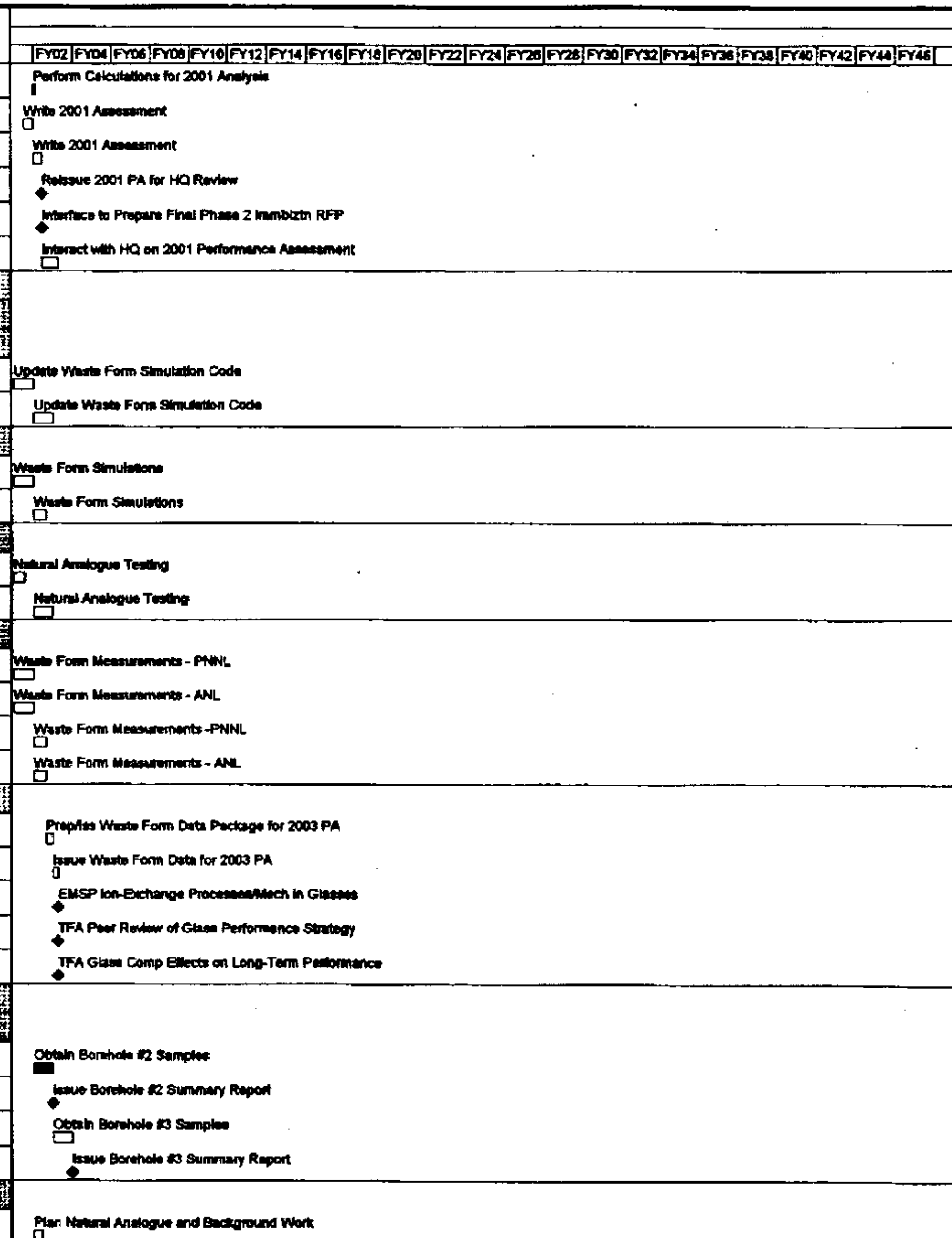
Sheet 9 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.01.03.02.02.06 Obtain Contaminant Transport Codes			
T946145P2	Upgrade Selected Vadose Zone Code	01OCT99	31DEC99
T946145P2A	Issue V&V Report for Vadose Zone Simulation Code		31DEC99
1.01.09.01.01.03.02.02.20 Procure Workstation for Vadose Zone - CENRTC			
T946145P5	Procure Workstation for Vadose Zone - CENRTC	01SEP00	29SEP00
1.01.09.01.01.03.02.03 Obtain Other Data			
1.01.09.01.01.03.02.03.01 Obtain Inventory Information			
T946145Q2	Create Inventory Document	01OCT99	31DEC99
T946145Q2A	Release PPA Inventory Document		31DEC99
1.01.09.01.01.03.02.03.02 Create Conceptual Model			
T946145R2	Create Facility Data Package	01OCT99	31DEC99
T946145R2A	Release Facility Data Package		31DEC99
1.01.09.01.01.03.02.03.03 Obtain Dosimetry Information			
T946145S2	Document Dosimetry Data	01OCT99	31DEC99
T946145S2A	Release Dosimetry Data Package		31DEC99
[illegible]			
T946145T1	Document Performance Objectives	01OCT99	31DEC99
T946145T1A	Release Performance Objectives		31DEC99
[illegible]			
T946145U1	Document Scenarios	01OCT99	31DEC99
T946145U1A	Release Scenarios		31DEC99
1.01.09.01.01.03.02.04 Coordination and Support			
T946145V1	Provide Administrative Support	01OCT99	29SEP00
T946145W2	Prepare SOWs	03APR00	15JUN00
T946145W2C	Issue SOW for FY 2001-FY 2006		15JUN00
T946145X3	CA Interaction	01OCT99	29SEP00
T946145X4	CA Interaction	02OCT00	28SEP01
T946145Y2	Provide Support to WIT	01OCT99	29SEP00
T946145Y3	Provide Support to WIT	02OCT00	28SEP01
T946145Z2	Interface with VZ/GW/CR Project	01OCT99	29SEP00
T946145Z3	Interface with VZ/GW/CR Project	02OCT00	28SEP01
1.01.09.01.01.03.03 2001 Performance Assessment (460.155)			
T946155A0	Create Data Packages for 2001 PA	04JAN00	31JAN00
T946155A0B	Issue Data Packages for 2001 PA		31JAN00
T946155A1	Estab 2001 PA Base Analy Case/Sensitivity Cases	01FEB00	28APR00
T946155B0	Perform Calculations for 2001 Analysis	01MAY00	29SEP00

FY02 FY04 FY06 FY08 FY10 FY12 FY14 FY16 FY18 FY20 FY22 FY24 FY26 FY28 FY30 FY32 FY34 FY36 FY38 FY40 FY42 FY44 FY46

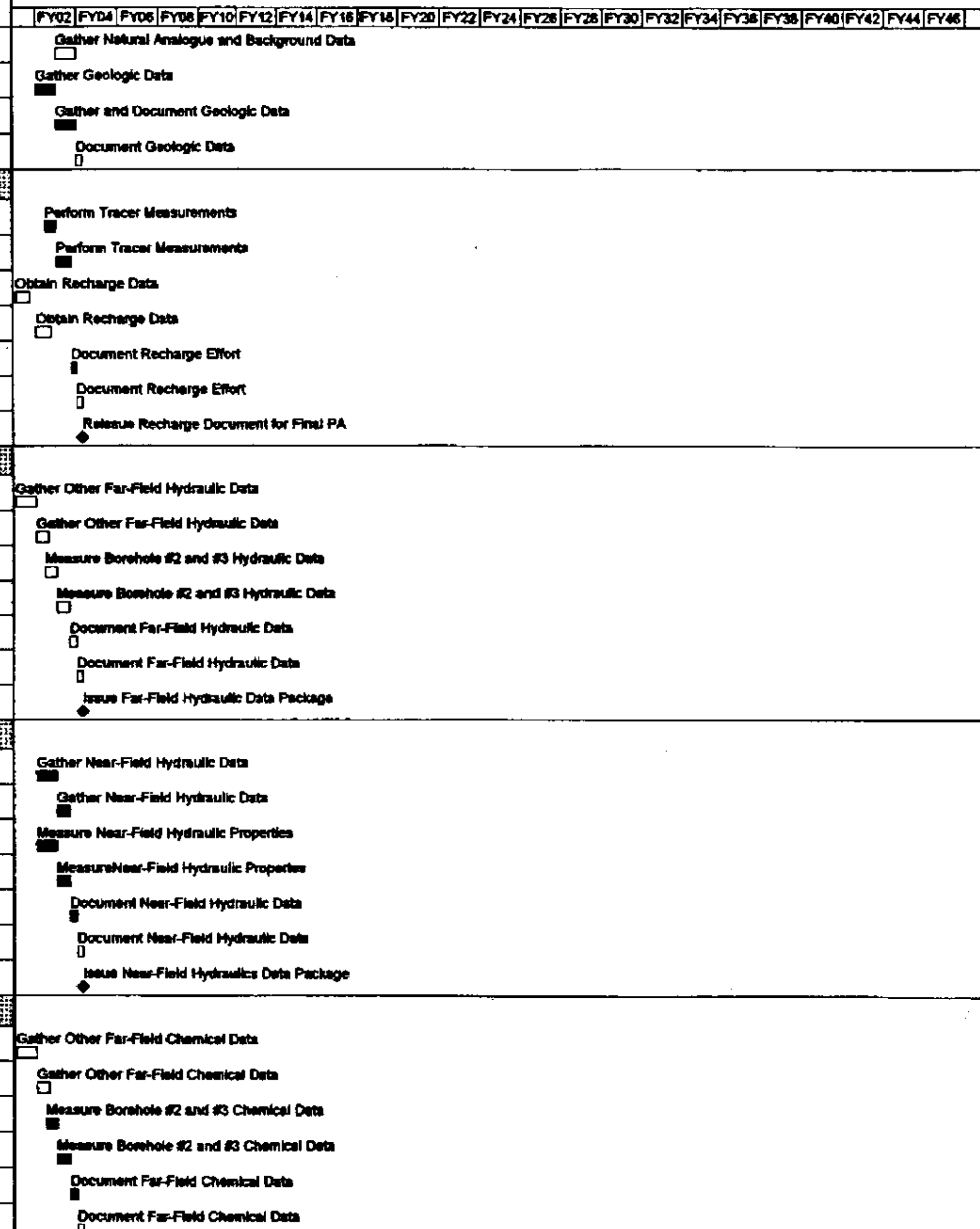
Sheet 10 of 34

Activity ID	Activity Description	Early Start	Early Finish
T946155B1	Perform Calculations for 2001 Analysis	02OCT00	31OCT00
T946155C0	Write 2001 Assessment	01MAY00	29SEP00
T946155C1	Write 2001 Assessment	02OCT00	30MAR01
T946155C1A	Reissue 2001 PA for HQ Review		30MAR01
T946155CFM	Interface to Prepare Final Phase 2 Immblzin RFP		30MAR01
T946155D0	Interact with HQ on 2001 Performance Assessment	02APR01	31DEC01
1.01.09.01.01.03.04 Data Collectn for Perf Assessment [illegible]			
1.01.09.01.01.03.04.01 Waste Form Data for Performance Assessment			
1.01.09.01.01.03.04.01.01 [illegible] Waste Form Simulation			
T946160B1	Update Waste Form Simulation Code	01OCT99	29SEP00
T946160B2	Update Waste Form Simulation Code	02OCT00	28SEP01
1.01.09.01.01.03.04.01.02 Perform Waste Form Simulations			
T946160C1	Waste Form Simulations	01OCT99	29SEP00
T946160C2	Waste Form Simulations	02OCT00	31MAY01
[illegible]			
T946160D0	Natural Analogue Testing	01OCT99	28APR00
T946160D2	Natural Analogue Testing	02OCT00	28SEP01
[illegible]			
T946160F2	Waste Form Measurements - PNNL	01OCT99	29SEP00
T946160F3	Waste Form Measurements - ANL	01OCT99	29SEP00
T946160F4	Waste Form Measurements -PNNL	02OCT00	31MAY01
T946160F5	Waste Form Measurements - ANL	02OCT00	31MAY01
1.01.09.01.01.03.04.01.05 Document Preparation			
T946160G0	Prep/Iss Waste Form Data Package for 2003 PA	01JUN01	28SEP01
T946160G1	Issue Waste Form Data for 2003 PA	01OCT01	31DEC01
T946160G1A	EMSP Ion-Exchange Processes/Mech in Glasses		31DEC01
T946160G1B	TFA Peer Review of Glass Performance Strategy		31DEC01
T946160G1C	TFA Glass Comp Effects on Long-Term Performance		31DEC01
1.01.09.01.01.03.04.02 Create Geochemical Data Packages			
1.01.09.01.01.03.04.02.01 Obtain Borehole Samples			
T946160H0	Obtain Borehole #2 Samples	02OCT00	28SEP01
T946160H0B	Issue Borehole #2 Summary Report		28SEP01
T946160H2	Obtain Borehole #3 Samples	01OCT01	30SEP02
T946160H2A	Issue Borehole #3 Summary Report		30SEP02
1.01.09.01.01.03.04.02.02 Provide [illegible] Information			
T946160J0	Plan Natural Analogue and Background Work	02OCT00	30MAR01



Sheet 11 of 34

Activity ID	Activity Description	Early Start	Early Finish
T946160J1	Gather Natural Analogue and Background Data	01OCT01	30SEP02
T946160J2	Gather Geologic Data	02OCT00	28SEP01
T946160J3	Gather and Document Geologic Data	01OCT01	30SEP02
T946160J4	Document Geologic Data	01OCT02	31DEC02
1.01.09.01.01.03.04.02.03: Provide Recharge Rate Information			
T946160K0	Perform Tracer Measurements	02APR01	28SEP01
T946160K2	Perform Tracer Measurements	01OCT01	28JUN02
T946160K4	Obtain Recharge Data	01OCT99	30JUN00
T946160K5	Obtain Recharge Data	02OCT00	29JUN01
T946160K6	Document Recharge Effort	01JUL02	30SEP02
T946160K7	Document Recharge Effort	01OCT02	31DEC02
T946160K7A	Release Recharge Document for Final PA		31DEC02
1.01.09.01.01.03.04.02.04: Provide Far-Field Hydraulic Information			
T946160L1	Gather Other Far-Field Hydraulic Data	01OCT99	29SEP00
T946160L2	Gather Other Far-Field Hydraulic Data	02OCT00	31MAY01
T946160L3	Measure Borehole #2 and #3 Hydraulic Data	02APR01	28SEP01
T946160L4	Measure Borehole #2 and #3 Hydraulic Data	01OCT01	31MAY02
T946160L6	Document Far-Field Hydraulic Data	03JUN02	30SEP02
T946160L7	Document Far-Field Hydraulic Data	01OCT02	31DEC02
T946160L7A	Issue Far-Field Hydraulic Data Package		31DEC02
1.01.09.01.01.03.04.02.05: Provide Near-Field Hydraulic Information			
T946160M1	Gather Near-Field Hydraulic Data	02OCT00	28SEP01
T946160M2	Gather Near-Field Hydraulic Data	01OCT01	31MAY02
T946160M4	Measure Near-Field Hydraulic Properties	02OCT00	28SEP01
T946160M5	MeasureNear-Field Hydraulic Properties	01OCT01	31MAY02
T946160M6	Document Near-Field Hydraulic Data	03JUN02	30SEP02
T946160M7	Document Near-Field Hydraulic Data	01OCT02	31DEC02
T946160M7A	Issue Near-Field Hydraulics Data Package		31DEC02
1.01.09.01.01.03.04.02.06: Provide Far-Field Geochemical Information			
T946160N1	Gather Other Far-Field Chemical Data	01OCT99	29SEP00
T946160N2	Gather Other Far-Field Chemical Data	02OCT00	31MAY01
T946160N3	Measure Borehole #2 and #3 Chemical Data	02APR01	28SEP01
T946160N4	Measure Borehole #2 and #3 Chemical Data	01OCT01	31MAY02
T946160N6	Document Far-Field Chemical Data	03JUN02	30SEP02
T946160N7	Document Far-Field Chemical Data	01OCT02	31DEC02



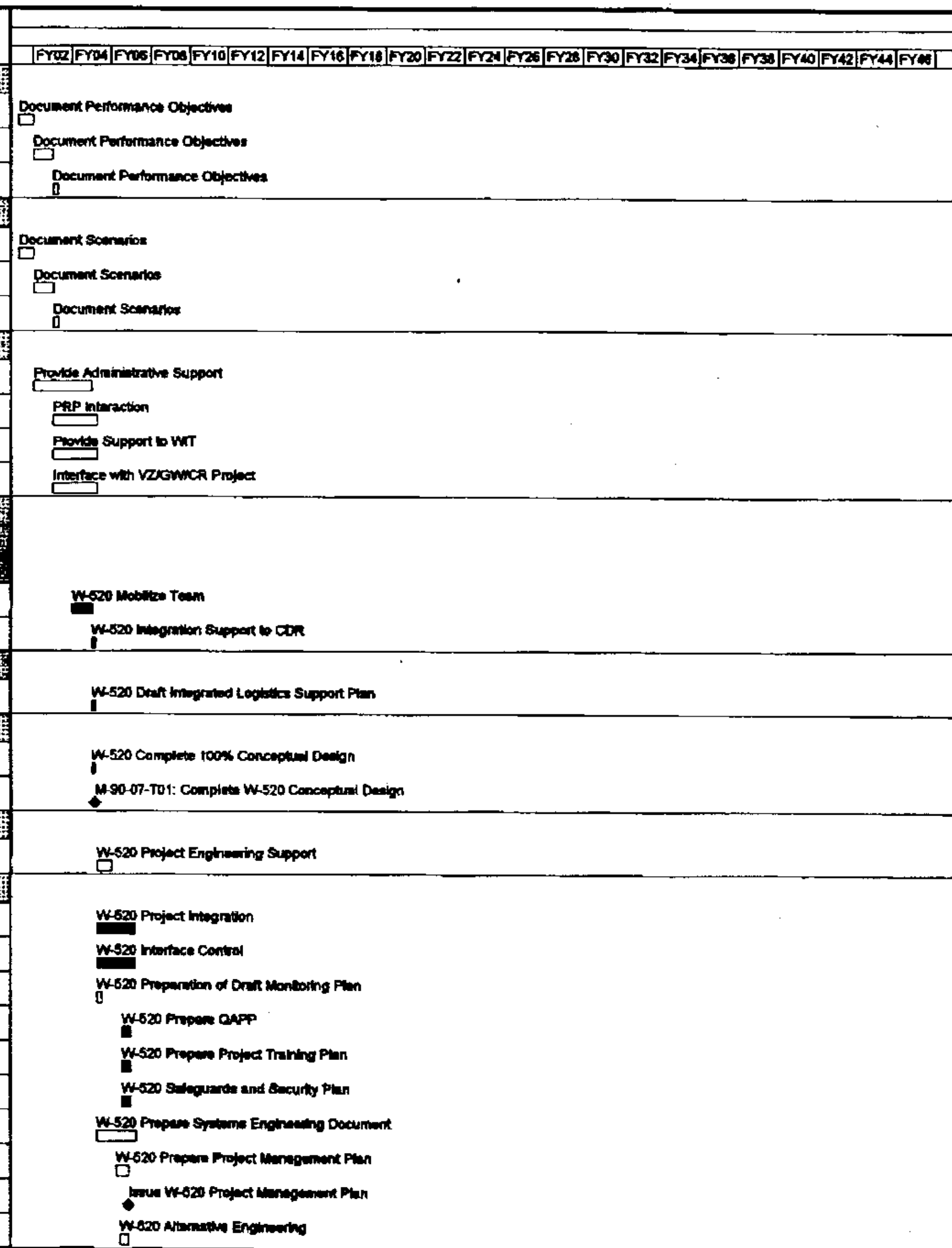
Sheet 12 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946160N7A	Issue Far-Field Chemical Data Packages		31DEC02
1.01.09.01.01.03.04.02.07 Provide Near-Field Geochemical Information			
T946160O01	Gather Getter Chemical Data - PNNL	01OCT99	29SEP00
T946160O06	Gather Getter Chemical Data - SANDIA	01OCT99	29SEP00
T946160O11	Gather Getter Chemical Data - PNNL	02OCT00	28SEP01
T946160O16	Gather Getter Chemical Data - SANDIA	02OCT00	28SEP01
T946160O4	Other Near-Field Chemical Data	01OCT99	29SEP00
T946160O5	Other Near-Field Chemical Data	02OCT00	31MAY01
T946160O6	Document Near-Field Chemical Data	01JUN01	28SEP01
T946160O7	Document Near-Field Chemical Data	01OCT01	31DEC01
T946160O7A	Document Near-Field Chemical Data		31DEC01
1.01.09.01.01.03.04.[illegible] Obtain Contaminant Transport Codes			
T946160P0	Vadose Zone Transport Code	04JAN00	29SEP00
T946160P1	Vadose Zone Transport Code	02OCT00	28SEP01
T946160P2	Vadose Zone Transport Code	01OCT01	31DEC01
[illegible]			
T946160H1	Obtain Borehole #2 Samples - CENRTC (BHI)	02OCT00	30MAR01
T946160H1H	Supply Samples - Borehole #2		30MAR01
[illegible] Obtain Borehole #3 Samples - CENRTC			
T946160H3	Obtain Borehole #3 Samples - CENRTC (BHI)	01OCT01	29MAR02
T946160H3G	Supply Samples from Borehole #3		29MAR02
1.01.09.01.01.03.04.03 Obtain Other Data			
1.01.09.01.01.03.04.03.01 Obtain Inventory Information			
T946160Q0	Create Inventory Data Package	04JAN00	29SEP00
T946160Q1	Create Inventory Data Package	02OCT00	28SEP01
T946160Q2	Create Inventory Data Package	01OCT01	31DEC01
1.01.09.01.01.03.04.03.02 Create Conceptual Model			
T946160R0	Create Disposal Facility Data Package	01OCT99	29SEP00
T946160R1	Create Disposal Facility Data Package	02OCT00	28SEP01
T946160R2	Create Disposal Facility Data Package	01OCT01	31DEC01
1.01.09.01.01.03.04.03.03 Obtain Dosimetry Information			
T946160S0	Document Dosimetry Data	04JAN00	29SEP00
T946160S1	Document Dosimetry Data	02OCT00	28SEP01
T946160S2	Document Dosimetry Data	01OCT01	31DEC01

FY02 FY04 FY06 FY08 FY10 FY12 FY14 FY16 FY18 FY20 FY22 FY24 FY26 FY28 FY30 FY32 FY34 FY36 FY38 FY40 FY42 FY44 FY46

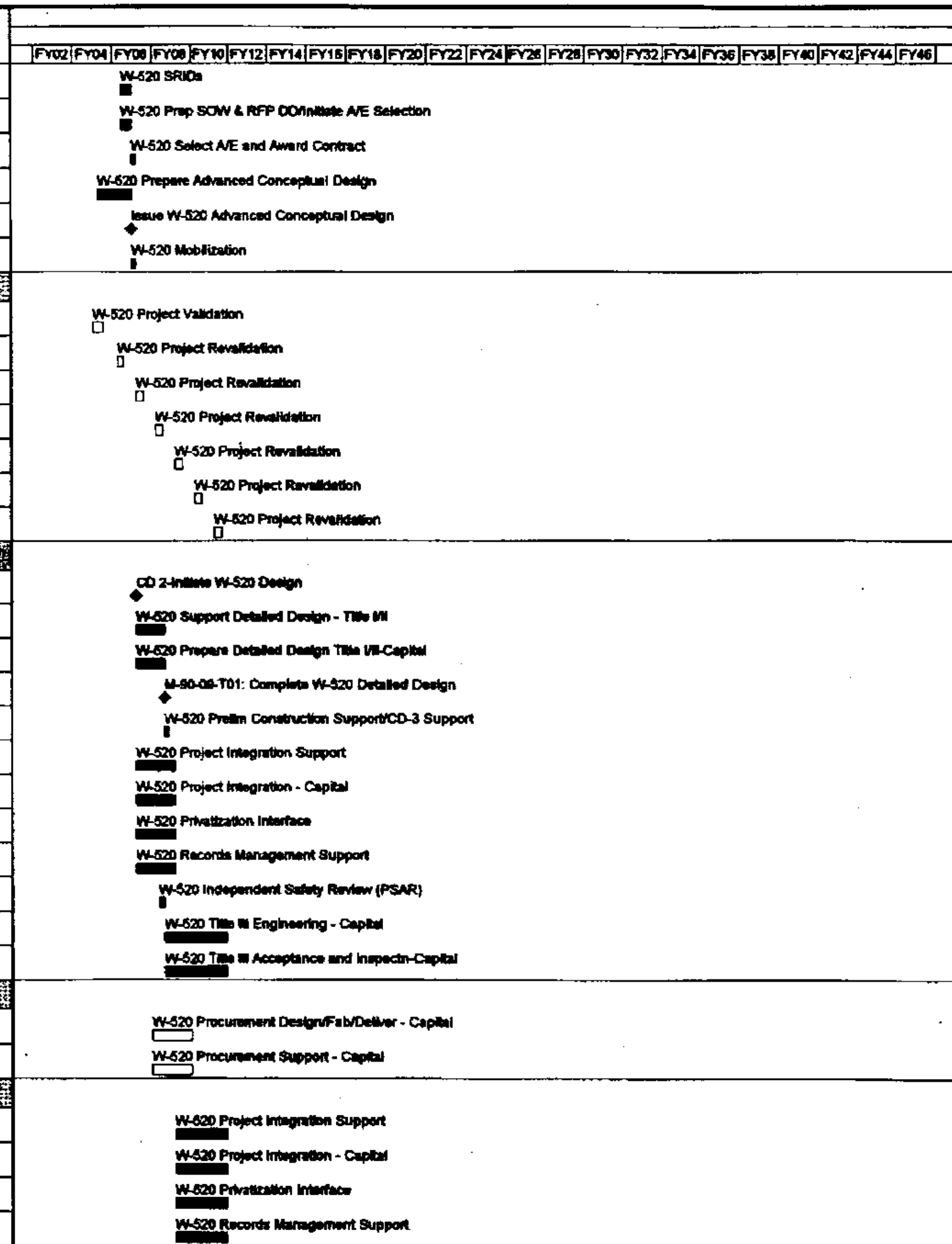
Sheet 13 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.01.03.04.03.04 Determine Performance Objectives			
T946160T0	Document Performance Objectives	04JAN00	29SEP00
T946160T1	Document Performance Objectives	02OCT00	28SEP01
T946160T2	Document Performance Objectives	01OCT01	31DEC01
1.01.09.01.01.03.04.03.05 Determine Scenarios			
T946160U0	Document Scenarios	04JAN00	29SEP00
T946160U1	Document Scenarios	02OCT00	28SEP01
T946160U2	Document Scenarios	01OCT01	31DEC01
1.01.09.01.01.03.04.04 Coordination and Support			
T946160V	Provide Administrative Support	02OCT00	30SEP03
T946160X	PRP Interaction	01OCT01	30JAN04
T946160Y	Provide Support to WIT	01OCT01	30JAN04
T946160Z	Interface with VZ/GW/CR Project	01OCT01	30JAN04
1.01.09.01.01.04 LAW [illegible] W-520 [illegible] LAW Dis. Complex [illegible]			
[illegible]			
[illegible]			
T946105A2	W-520 Mobilize Team	01OCT02	30SEP03
T946105A3	W-520 Integration Support to CDR	01OCT03	31DEC03
1.01.09.01.01.04.01.02 [illegible] Integrated Logistics Support Plan			
T946105A4	W-520 Draft Integrated Logistics Support Plan	01OCT03	31DEC03
1.01.09.01.01.04.01.03 W-520 Complete 95% Conceptual Design			
T946105A5	W-520 Complete 100% Conceptual Design	01OCT03	31DEC03
T946105A5A	M-90-07-T01: Complete W-520 Conceptual Design		31DEC03
1.01.09.01.01.04.01.04 W-520 Project Engineering Support			
T946105A6	W-520 Project Engineering Support	02JAN04	30SEP04
1.01.09.01.01.04.02 W-520 Advanced Conceptual Design (400,110)			
T946110A1	W-520 Project Integration	02JAN04	15DEC05
T946110A2	W-520 Interface Control	02JAN04	15DEC05
T946110A3	W-520 Preparation of Draft Monitoring Plan	02JAN04	30APR04
T946110A4	W-520 Prepare QAPP	02MAY05	30SEP05
T946110A5	W-520 Prepare Project Training Plan	02MAY05	30SEP05
T946110A6	W-520 Safeguards and Security Plan	02MAY05	30SEP05
T946110A7	W-520 Prepare Systems Engineering Document	02JAN04	31JAN06
T946110A8	W-520 Prepare Project Management Plan	04JAN05	31AUG05
T946110A8A	Issue W-520 Project Management Plan		31AUG05
T946110A9	W-520 Alternative Engineering	01APR05	31AUG06



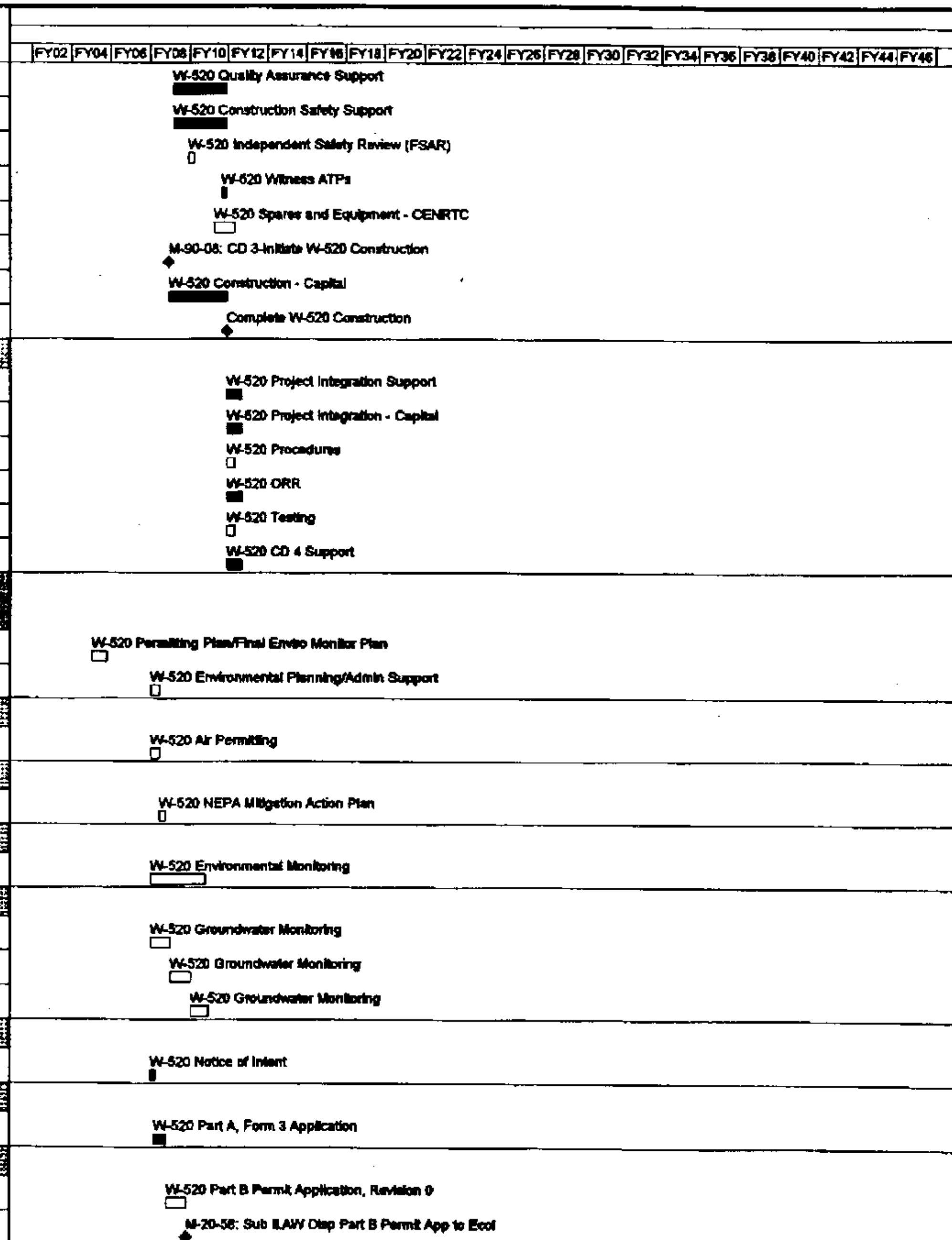
Sheet 14 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946110AA	W-520 SRIDs	01APR05	30SEP05
T946110AB	W-520 Prep SOW & RFP DD/Initiate A/E Selection	01APR05	30SEP05
T946110AC	W-520 Select A/E and Award Contract	03OCT05	15DEC05
T946110AD	W-520 Prepare Advanced Conceptual Design	02JAN04	30SEP05
T946110ADA	Issue W-520 Advanced Conceptual Design		30SEP05
T946110AE	W-520 Mobilization	03OCT05	15DEC05
1.01.09.01.01.04.03 W-520 Project Validation (460.112)			
T946112A1	W-520 Project Validation	02OCT03	30APR04
T946112A2	W-520 Project Revalidation	04JAN05	29APR05
T946112A3	W-520 Project Revalidation	03JAN06	28APR06
T946112A4	W-520 Project Revalidation	02JAN07	30APR07
T946112A5	W-520 Project Revalidation	02JAN08	30APR08
T946112A6	W-520 Project Revalidation	02JAN09	30APR09
T946112A7	W-520 Project Revalidation	04JAN10	30APR10
[illegible]			
T946115A1	CD 2-Initiate W-520 Design	16DEC05	
T946115A2	W-520 Support Detailed Design - Title I/II	16DEC05	15JUN07
T946115A3	W-520 Prepare Detailed Design Title I/II-Capital	16DEC05	15JUN07
T946115A3A	M-90-09-T01: Complete W-520 Detailed Design		15JUN07
T946115A4	W-520 Prelim Construction Support/CD-3 Support	18JUN07	24AUG07
T946115A5	W-520 Project Integration Support	16DEC05	31DEC07
T946115A6	W-520 Project Integration - Capital	16DEC05	31DEC07
T946115A7	W-520 Privatization Interface	16DEC05	31DEC07
T946115A8	W-520 Records Management Support	16DEC05	31DEC07
T946115A9	W-520 Independent Safety Review (PSAR)	23FEB07	15JUN07
T946115AA	W-520 Title III Engineering - Capital	18JUN07	09AUG10
T946115AB	W-520 Title III Acceptance and Inspectn-Capital	18JUN07	09AUG10
1.01.09.01.01.04.05 W-520 Equipment Procurement (460.118)			
T946118A1	W-520 Procurement Design/Fab/Deliver - Capital	02OCT06	29SEP08
T946118A2	W-520 Procurement Support - Capital	02OCT06	29SEP08
1.01.09.01.01.04.06 W-520 Construction (460.120)			
T946120A1	W-520 Project Integration Support	02JAN08	09AUG10
T946120A2	W-520 Project Integration - Capital	02JAN08	09AUG10
T946120A3	W-520 Privatization Interface	02JAN08	09AUG10
T946120A4	W-520 Records Management Support	02JAN08	09AUG10



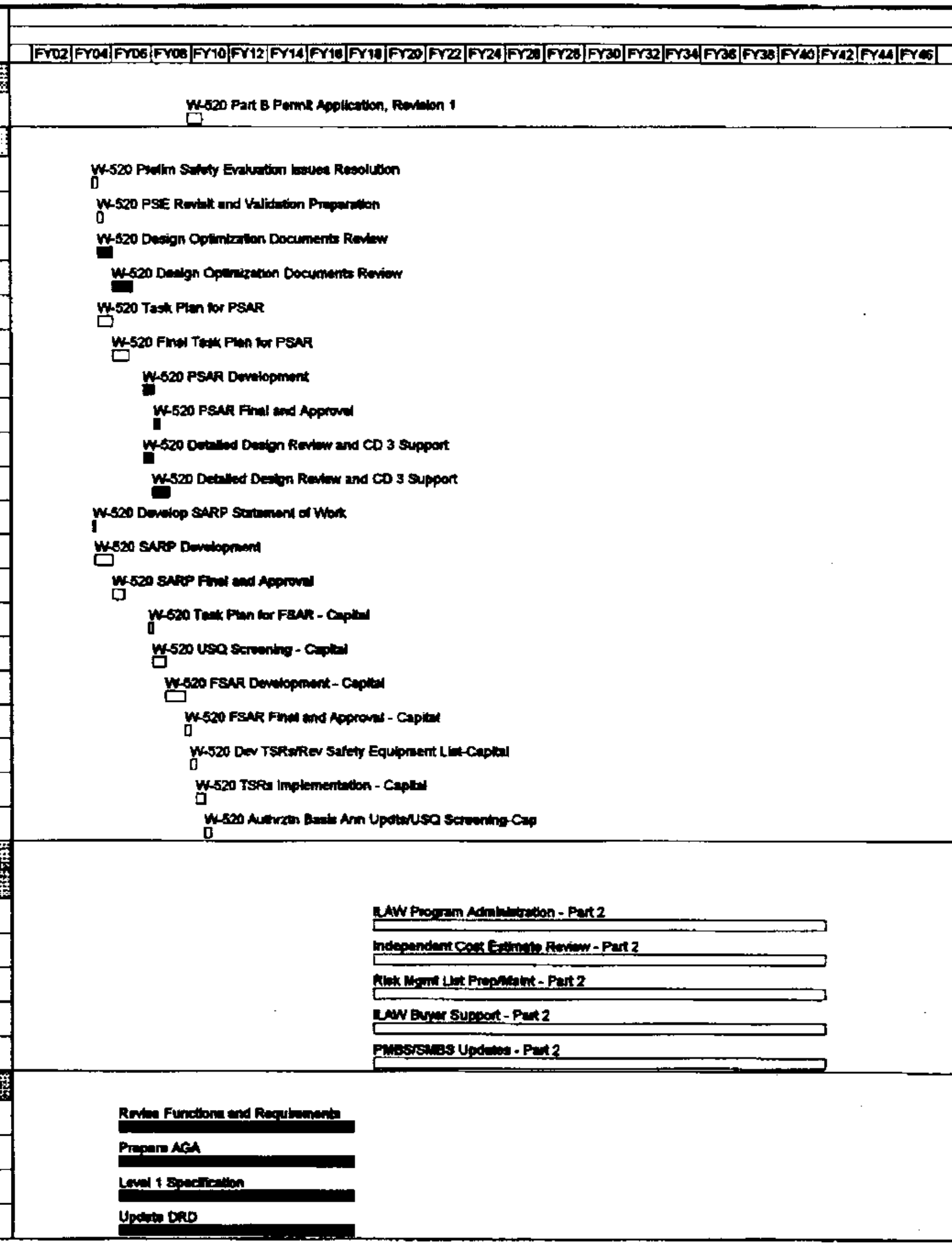
Sheet 15 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946120A5	W-520 Quality Assurance Support	02JAN06	09AUG10
T946120A6	W-520 Construction Safety Support	02JAN06	09AUG10
T946120A7	W-520 Independent Safety Review (FSAR)	16SEP08	16DEC08
T946120A8	W-520 Witness ATPs	17MAY10	09AUG10
T946120A9	W-520 Spares and Equipment - CENRTC	11DEC08	10DEC10
T946120AA	M-90-08: CD 3-Initiate W-520 Construction	27AUG07	
T946120AB	W-520 Construction - Capital	27AUG07	09AUG10
T946120ABA	Complete W-520 Construction		09AUG10
1.01.09.01.01.04.07 W-520 [illegible] (470.090)			
T947060A1	W-520 Project Integration Support	10AUG10	16MAY11
T947060A2	W-520 Project Integration - Capital	10AUG10	16MAY11
T947060A3	W-520 Procedures	10AUG10	28DEC10
T947060A4	W-520 ORR	10AUG10	16MAY11
T947060A5	W-520 Testing	10AUG10	28DEC10
T947060A6	W-520 CD 4 Support	10AUG10	16MAY11
[illegible]			
T946125A1	W-520 Permitting Plan/Final Enviro Monitor Plan	01OCT03	30JUN04
T946125A2	W-520 Environmental Planning/Admin Support	02OCT06	30MAR07
1.01.09.01.01.04.08.03 W-520 Air Permitting			
T946125B1	W-520 Air Permitting	02OCT06	30MAR07
1.01.09.01.01.04.08.05 W-520 NEPA Mitigation Action Plan			
T946125C1	W-520 NEPA Mitigation Action Plan	02APR07	29JUN07
1.01.09.01.01.04.08.06 W-520 Environmental Monitoring			
T946125D1	W-520 Environmental Monitoring	02OCT06	30JUN09
1.01.09.01.01.04.08.07 W-520 Groundwater Monitoring			
T946125E1	W-520 Groundwater Monitoring	02OCT06	28SEP07
T946125E2	W-520 Groundwater Monitoring	01OCT07	30SEP08
T946125E3	W-520 Groundwater Monitoring	01OCT08	30SEP09
1.01.09.01.01.04.08.08 W-520 Notice of Intent (NOI)			
T946125F1	W-520 Notice of Intent	02OCT06	31JAN07
1.01.09.01.01.04.08.09 W-520 Part A Permit Application			
T946125G1	W-520 Part A, Form 3 Application	27DEC06	23AUG07
1.01.09.01.01.04.08.10 W-520 Part B Permit Application Rev 0			
T946125H1	W-520 Part B Permit Application, Revision 0	24AUG07	25AUG08
T946125H1A	M-20-58: Sub ILAW Disp Part B Permit App to Ecol		25AUG08



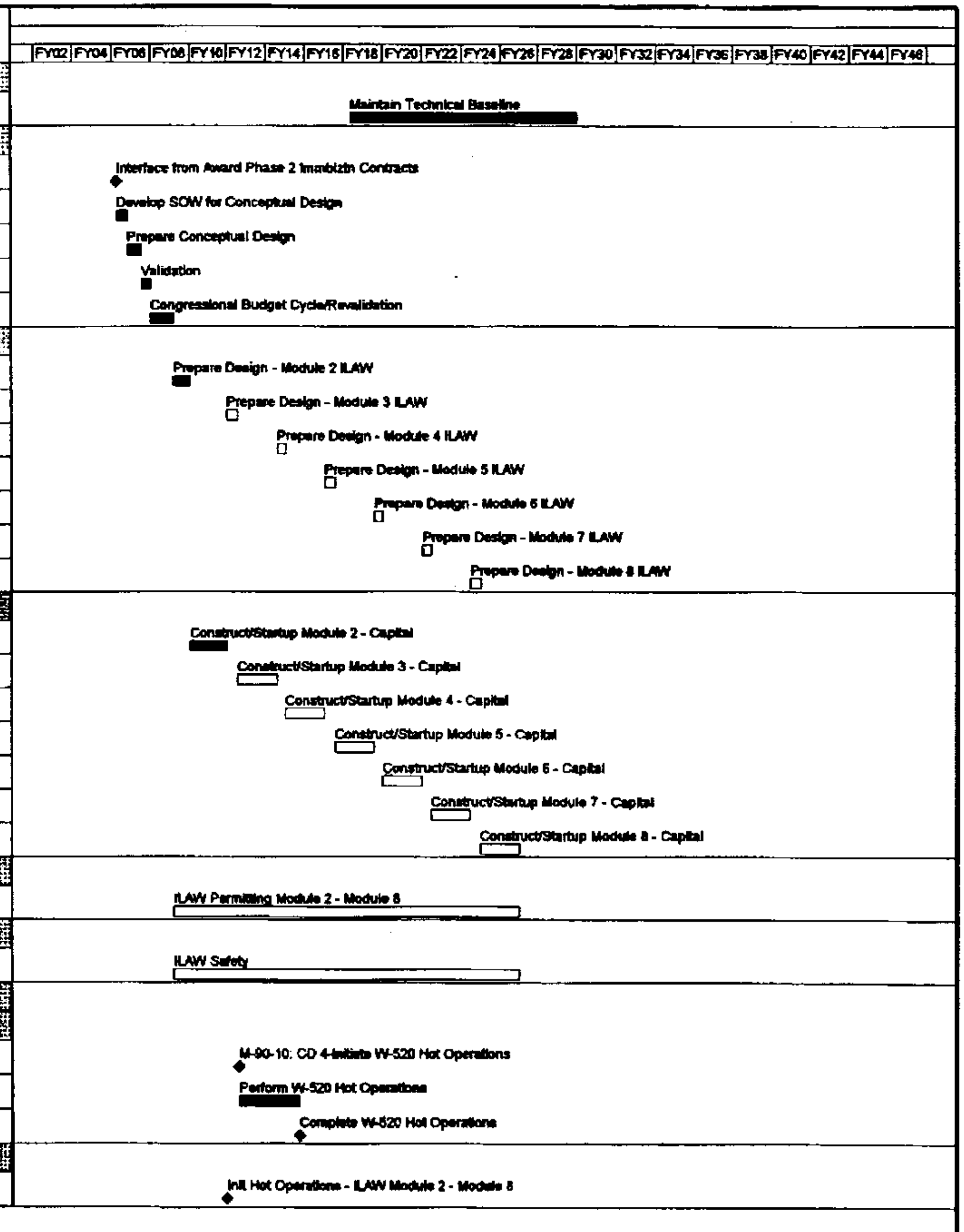
Sheet 10 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.08.01.01.04.08.11 W-520 Part B Permit Application, Rev 1			
T946125J1	W-520 Part B Permit Application, Revision 1	26AUG06	23APR09
1.01.08.01.01.04.09 W-520 Authorization Basis Dev/Approval (468.130)			
T946130A1	W-520 Prelim Safety Evaluation Issues Resolution	01OCT03	30JAN04
T946130B1	W-520 PSE Revisit and Validation Preparation	02JAN04	30APR04
T946130C1	W-520 Design Optimization Documents Review	02JAN04	30SEP04
T946130C2	W-520 Design Optimization Documents Review	01OCT04	29SEP05
T946130D1	W-520 Task Plan for PSAR	02JAN04	30SEP04
T946130D2	W-520 Final Task Plan for PSAR	01OCT04	08AUG05
T946130D3	W-520 PSAR Development	09MAY06	07NOV06
T946130D4	W-520 PSAR Final and Approval	08NOV06	22FEB07
T946130E1	W-520 Detailed Design Review and CD 3 Support	10MAY06	29SEP06
T946130E2	W-520 Detailed Design Review and CD 3 Support	02OCT06	23AUG07
T946130F1	W-520 Develop SARP Statement of Work	01OCT03	31OCT03
T946130F2	W-520 SARP Development	03NOV03	30SEP04
T946130F3	W-520 SARP Final and Approval	01OCT04	29APR05
T946130G1	W-520 Task Plan for FSAR - Capital	02AUG06	29SEP06
T946130G2	W-520 USQ Screening - Capital	02OCT06	18JUN07
T946130G3	W-520 FSAR Development - Capital	19JUN07	18JUN08
T946130G4	W-520 FSAR Final and Approval - Capital	17JUN08	15SEP08
T946130H1	W-520 Dev TSRs/Rev Safety Equipment List-Capital	16SEP08	16DEC08
T946130J1	W-520 TSRs Implementation - Capital	17DEC08	29MAY09
T946130K1	W-520 Authrztn Basis Ann Updte/USQ Screening-Cap	01JUN09	30SEP09
1.01.08.01.01.05 ILAW Future Projects			
1.01.08.01.01.05.01 ILAW Project Management (600.005)			
T960005A0	ILAW Program Administration - Part 2	01FEB18	31JAN41
T960005A1	Independent Cost Estimate Review - Part 2	01FEB18	31JAN41
T960005A2	Risk Mgmt List Prep/Maint - Part 2	01FEB18	31JAN41
T960005A3	ILAW Buyer Support - Part 2	01FEB18	31JAN41
T960005A4	PMBS/SMBS Updates - Part 2	01FEB18	31JAN41
1.01.08.01.01.05.02 Update Technical Baseline (600.010)			
T960010A1	Revise Functions and Requirements	31JAN05	31JAN17
T960010A2	Prepare AGA	31JAN05	31JAN17
T960010A3	Level 1 Specification	31JAN05	31JAN17
T960010A4	Update DRD	31JAN05	31JAN17



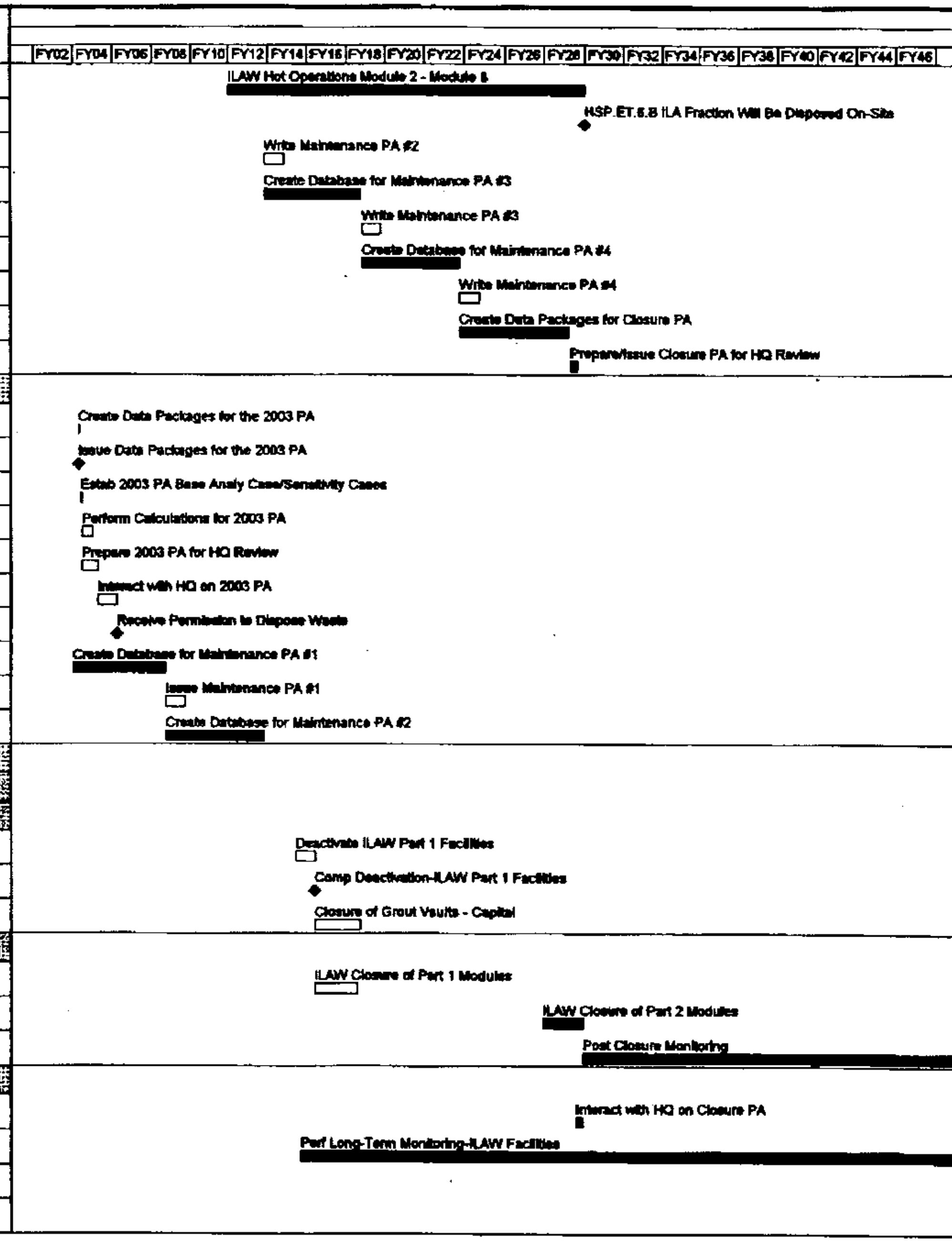
Sheet 17 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.01.05.03 Maintain Technical Baseline (600.015)			
T960015A1	Maintain Technical Baseline	01FEB17	29SEP28
1.01.09.01.01.05.04 CDR, ACDR, and Validation (600.020)			
T960020A1	Interface from Award Phase 2 Immblztn Contracts	31JAN05*	
T960020A2	Develop SOW for Conceptual Design	31JAN05	29JUL05
T960020A3	Prepare Conceptual Design	01AUG05	28APR06
T960020A4	Validation	01MAY06	29SEP06
T960020A5	Congressional Budget Cycle/Revalidation	02OCT06	31DEC07
1.01.09.01.01.05.05 Design (600.050)			
T960050A1	Prepare Design - Module 2 ILAW	02JAN08	30SEP08
T960050A2	Prepare Design - Module 3 ILAW	01OCT10	31MAR11
T960050A3	Prepare Design - Module 4 ILAW	01APR13	30SEP13
T960050A4	Prepare Design - Module 5 ILAW	01OCT15	31MAR16
T960050A5	Prepare Design - Module 6 ILAW	02APR18	28SEP18
T960050A6	Prepare Design - Module 7 ILAW	01OCT20	31MAR21
T960050A7	Prepare Design - Module 8 ILAW	03APR23	29SEP23
[illegible]			
T960060A1	Construct/Startup Module 2 - Capital	01OCT08	30SEP10
T960060A2	Construct/Startup Module 3 - Capital	01APR11	29MAR13
T960060A3	Construct/Startup Module 4 - Capital	01OCT13	30SEP15
T960060A4	Construct/Startup Module 5 - Capital	01APR16	30MAR18
T960060A5	Construct/Startup Module 6 - Capital	01OCT18	30SEP20
T960060A6	Construct/Startup Module 7 - Capital	01APR21	31MAR23
T960060A7	Construct/Startup Module 8 - Capital	02OCT23	30SEP25
1.01.09.01.01.05.07 Permits (600.030)			
T960030A1	ILAW Permitting Module 2 - Module 8	02JAN08	30SEP25
1.01.09.01.01.05.08 Authorization Basis (600.035)			
T960035A1	ILAW Safety	02JAN08	30SEP25
1.01.09.01.01.06 ILAW Operations			
1.01.09.01.01.06.01 W-520 Operations [illegible] (479.075)			
T947075A1	M-90-10: CD 4-Initiate W-520 Hot Operations	17MAY11	
T947075A2	Perform W-520 Hot Operations	17MAY11	24JUN14
T947075A3	Complete W-520 Hot Operations		24JUN14
1.01.09.01.01.06.02 Operations and Monitoring [illegible]			
T964040A1	Init Hot Operations - ILAW Module 2 - Module 8	01OCT10	



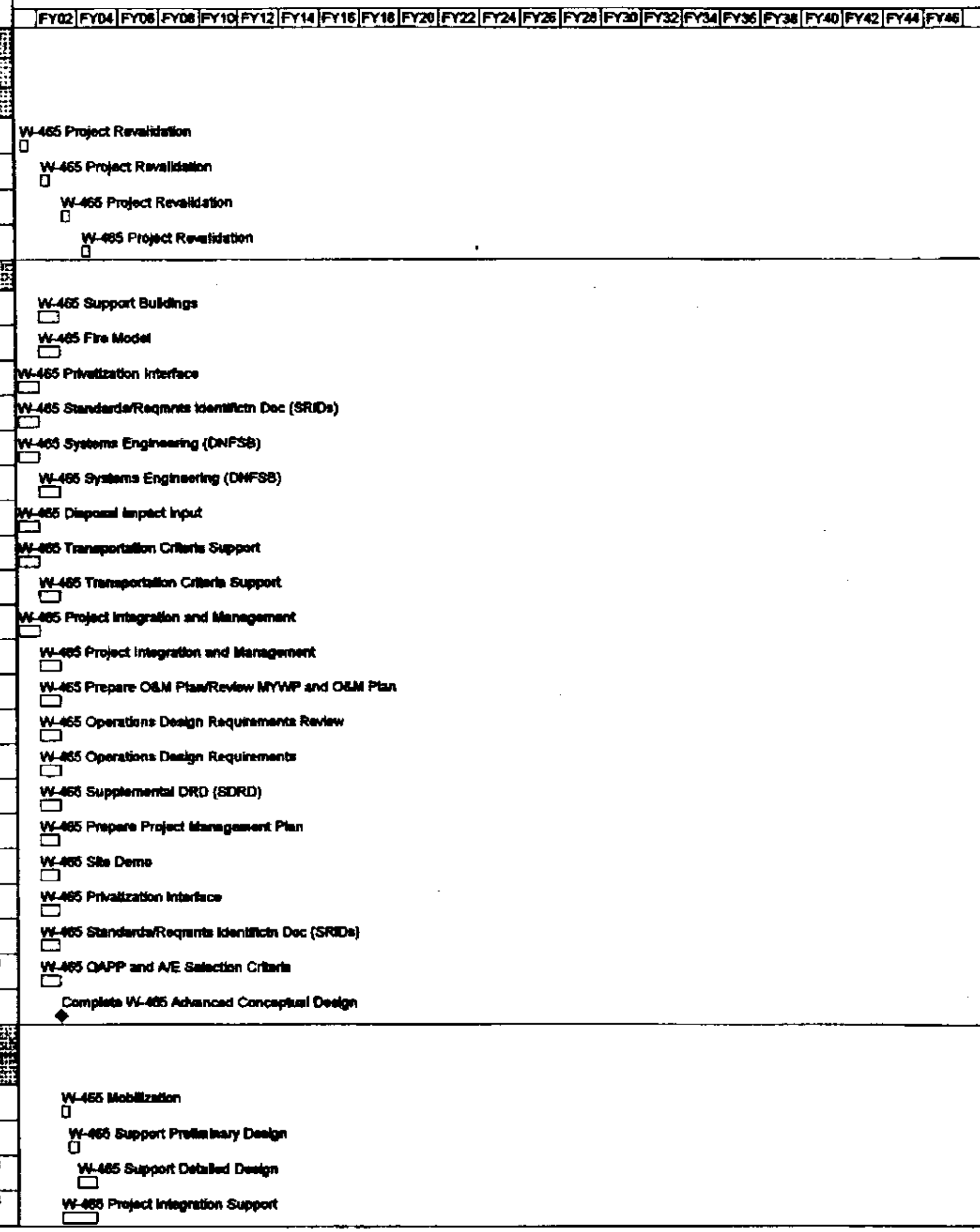
Sheet 18 of 24

Activity ID	Activity Description	Early Start	Early Finish
T964040A2	ILAW Hot Operations Module 2 - Module 8	01OCT10	29SEP28
T964040A2A	HSP.ET.6.B ILA Fraction Will Be Disposed On-Site		29SEP28
T964040B1	Write Maintenance PA #2	02JUL12	28JUN13
T964040B2	Create Database for Maintenance PA #3	02JUL12	30JUN17
T964040B3	Write Maintenance PA #3	05JUL17	29JUN18
T964040B4	Create Database for Maintenance PA #4	05JUL17	30JUN22
T964040B5	Write Maintenance PA #4	01JUL22	29JUN23
T964040B6	Create Data Packages for Closure PA	01JUL22	31DEC27
T964040B7	Prepare/Issue Closure PA for HQ Review	04JAN28	31MAY28
1.01.09.01.01.06.03 Maintain ILAW Part 1 Per Assessment (460.170)			
T946170A0	Create Data Packages for the 2003 PA	02JAN03	31JAN03
T946170A0A	Issue Data Packages for the 2003 PA		31JAN03
T946170A1	Estab 2003 PA Base Analy Case/Sensitivity Cases	03FEB03	31MAR03
T946170B	Perform Calculations for 2003 PA	01APR03	30SEP03
T946170C	Prepare 2003 PA for HQ Review	01APR03	30JAN04
T946170D	Interact with HQ on 2003 PA	02FEB04	31JAN05
T946170DA	Receive Permission to Dispose Waste		31JAN05
T946170I	Create Database for Maintenance PA #1	01OCT02	29JUN07
T946170J	Issue Maintenance PA #1	02JUL07	30JUN08
T946170K	Create Database for Maintenance PA #2	02JUL07	29JUN12
1.01.09.01.04 Close ILAW Disposal Facility			
1.01.09.01.04.01 ILAW D&D			
1.01.09.01.04.01.01 Close ILAW Disposal Facilities (470.060)			
T947060A1	Deactivate ILAW Part 1 Facilities	03MAR14	02MAR15
T947060A1A	Comp Deactivation-ILAW Part 1 Facilities		02MAR15
T947080B1	Closure of Grout Vaults - Capital	03MAR15	28JUN17
1.01.09.01.04.01.03 Closure/D&D (640.050)			
T964050A1	ILAW Closure of Part 1 Modules	03MAR15	31MAY17
T964050A2	ILAW Closure of Part 2 Modules	05OCT26	29SEP28
T964050A3	Post Closure Monitoring	02OCT28	30SEP48
1.01.09.01.04.01.04 Initiate Post-Closure Monitoring (550.020)			
T955020A1	Interact with HQ on Closure PA	01JUN28	29SEP28
T955020B1	Perf Long-Term Monitoring-ILAW Facilities	25JUN14	30SEP48
T955020B1A	Comp Long-Term Monitoring-ILAW Facilities		30SEP48
T955020B1B	END OF LLW DISPOSAL		30SEP48



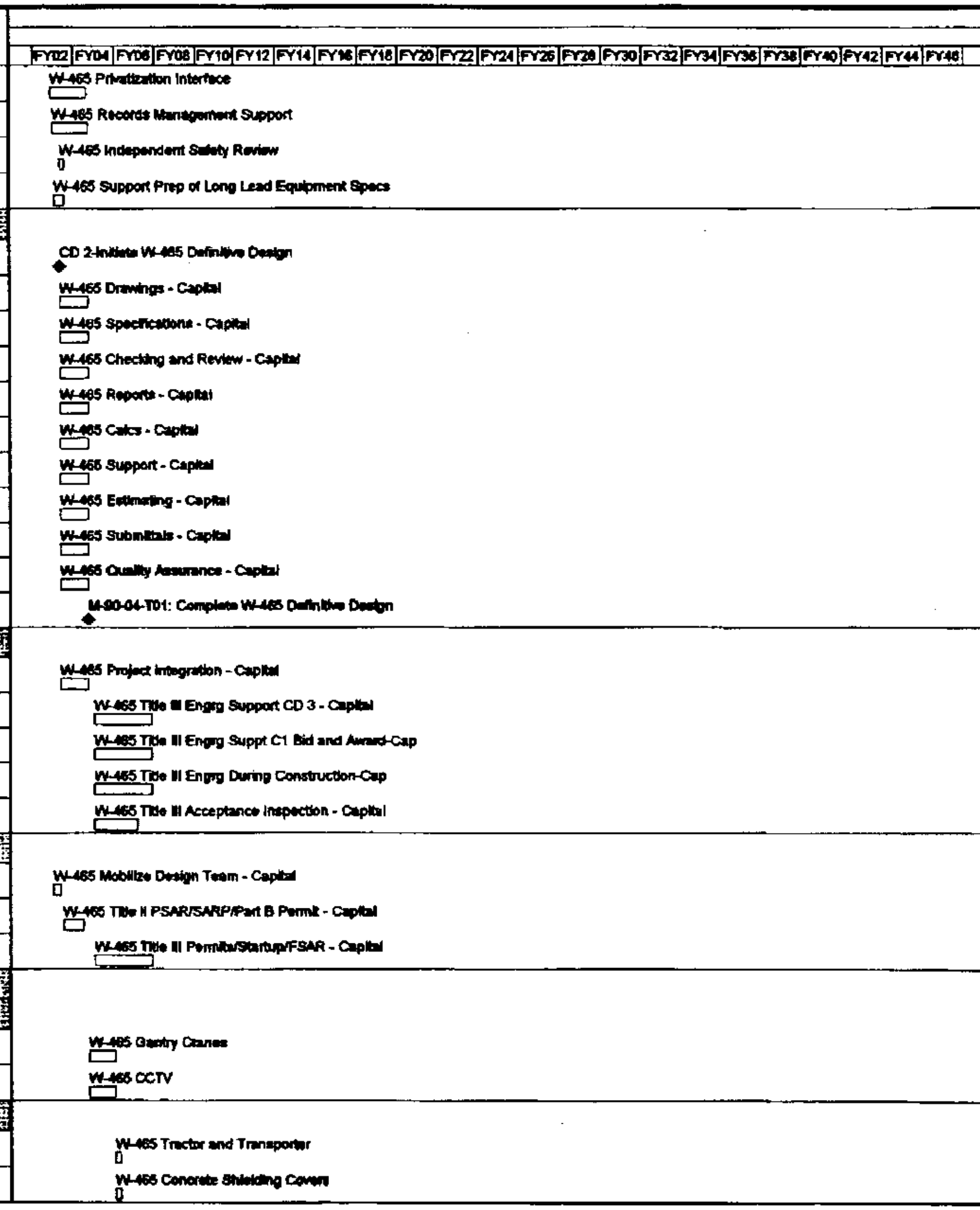
Sheet 19 of 24

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.05 Store LAW On-Site			
1.01.09.01.05.01 Project W-465, Immobilized LAW Interim Stor Fac			
1.01.09.01.05.01.01 W-465 Project Revalidation (460.060)			
T946060A2	W-465 Project Revalidation	16DEC99	28APR00
T946060A3	W-465 Project Revalidation	15DEC00	30APR01
T946060A4	W-465 Project Revalidation	17DEC01	30APR02
T946060A5	W-465 Project Revalidation	16DEC02	30APR03
1.01.09.01.05.01.02 W-465 Advanced Conceptual Design (460.045)			
T946045B1	W-465 Support Buildings	02OCT00	28SEP01
T946045B2	W-465 Fire Model	02OCT00	28SEP01
T946045B3	W-465 Privatization Interface	01OCT99	29SEP00
T946045B4	W-465 Standards/Reqmnts Identifictn Doc (SRIDs)	01OCT99	29SEP00
T946045B5	W-465 Systems Engineering (DNFSB)	01OCT99	29SEP00
T946045B5A	W-465 Systems Engineering (DNFSB)	02OCT00	28SEP01
T946045B6	W-465 Disposal Impact Input	01OCT99	29SEP00
T946045B7	W-465 Transportation Criteria Support	01OCT99	29SEP00
T946045B7A	W-465 Transportation Criteria Support	02OCT00	28SEP01
T946045B8	W-465 Project Integration and Management	01OCT99	29SEP00
T946045B8A	W-465 Project Integration and Management	02OCT00	28SEP01
T946045B9	W-465 Prepare O&M Plan/Review MYWP and O&M Plan	02OCT00	28SEP01
T946045BA	W-465 Operations Design Requirements Review	02OCT00	28SEP01
T946045BB	W-465 Operations Design Requirements	02OCT00	28SEP01
T946045BC	W-465 Supplemental DRD (SDRD)	02OCT00	28SEP01
T946045BD	W-465 Prepare Project Management Plan	02OCT00	31AUG01
T946045BE	W-465 Site Demo	02OCT00	31AUG01
T946045BF	W-465 Privatization Interface	02OCT00	31AUG01
T946045BG	W-465 Standards/Reqmnts Identifictn Doc (SRIDs)	02OCT00	31AUG01
T946045BH	W-465 QAPP and A/E Selection Criteria	02OCT00	31AUG01
T946045BHA	Complete W-465 Advanced Conceptual Design		28SEP01
1.01.09.01.05.01.03 W-465 Design (460.065)			
1.01.09.01.05.01.03.01 W-465 Project Integration [illegible]			
T946065A1	W-465 Mobilization	01OCT01	31JAN02
T946065A2	W-465 Support Preliminary Design	01FEB02	31JUL02
T946065A3	W-465 Support Detailed Design	01AUG02	30JUN03
T946065A4	W-465 Project Integration Support	01OCT01	30JUN03



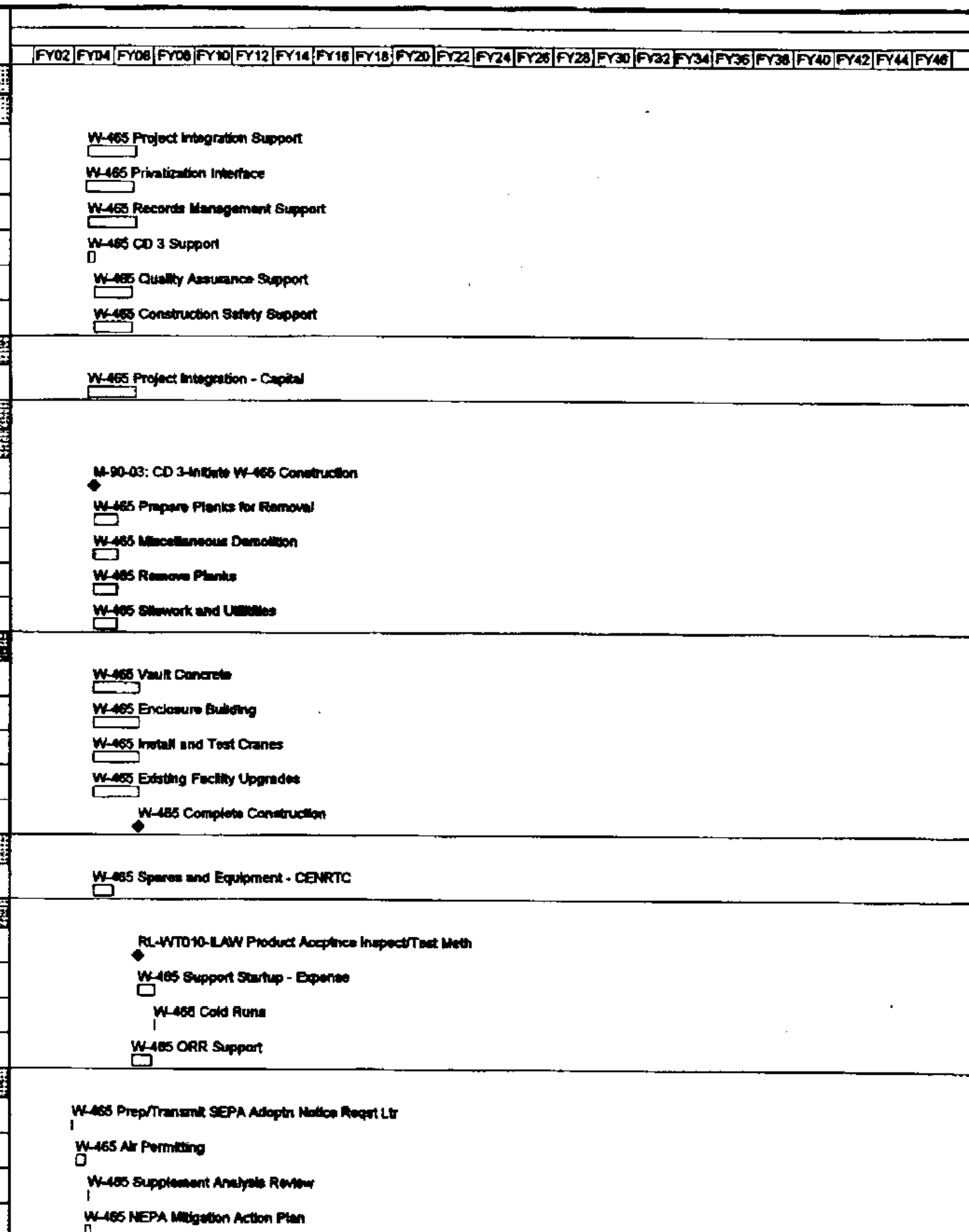
Sheet 20 of 34

Activity ID	Activity Description	Early Start	Early Finish
T946065A5	W-465 Privatization Interface	04SEP01	30MAY03
T946065A6	W-465 Records Management Support	01OCT01	30JUN03
T946065A7	W-465 Independent Safety Review	01FEB02	30APR02
T946065A8	W-465 Support Prep of Long Lead Equipment Specs	31OCT01	30APR02
1.01.09.01.05.01.03.02 W-465 Definitive Design (Title I and II)-Capital			
T946065B1	CD 2-Initiate W-465 Definitive Design	01FEB02	
T946065B2	W-465 Drawings - Capital	01FEB02	30JUN03
T946065B3	W-465 Specifications - Capital	01FEB02	30JUN03
T946065B4	W-465 Checking and Review - Capital	01FEB02	30JUN03
T946065B5	W-465 Reports - Capital	01FEB02	30JUN03
T946065B6	W-465 Calcs - Capital	01FEB02	30JUN03
T946065B7	W-465 Support - Capital	01FEB02	30JUN03
T946065B8	W-465 Estimating - Capital	01FEB02	30JUN03
T946065B9	W-465 Submittals - Capital	01FEB02	30JUN03
T946065BA	W-465 Quality Assurance - Capital	01FEB02	30JUN03
T946065BB	M-90-04-T01: Complete W-465 Definitive Design		30JUN03
[illegible]			
T946065C1	W-465 Project Integration - Capital	01FEB02	30JUN03
T946065E1	W-465 Title III Engrg Support CD 3 - Capital	01OCT03	31JUL06
T946065E2	W-465 Title III Engrg Suppt C1 Bid and Award-Cap	01OCT03	31JUL06
T946065E3	W-465 Title III Engrg During Construction-Cap	01OCT03	31JUL06
T946065E4	W-465 Title III Acceptance Inspection - Capital	01OCT03	31OCT05
1.01.09.01.05.01.03.04 W-465 Other Support Work-Capital			
T946065D1	W-465 Mobilize Design Team - Capital	01OCT01	31JAN02
T946065D2	W-465 Title II PSAR/SARP/Part B Permit - Capital	01APR02	31MAR03
T946065F1	W-465 Title III Permits/Startup/FSAR - Capital	01OCT03	31JUL06
1.01.09.01.05.01.04 W-465 Equipment Procurement (400.050)			
1.01.09.01.05.01.04.01 W-465 P-1 Early Procurement			
T946068A1	W-465 Gantry Cranes	01JUL03	30SEP04
T946068A2	W-465 CCTV	01JUL03	30SEP04
1.01.09.01.05.01.04.02 W-465 P-2 Line Procurement			
T946068A3	W-465 Tractor and Transporter	01OCT04	31JAN05
T946068A4	W-465 Concrete Shielding Covers	01OCT04	31JAN06



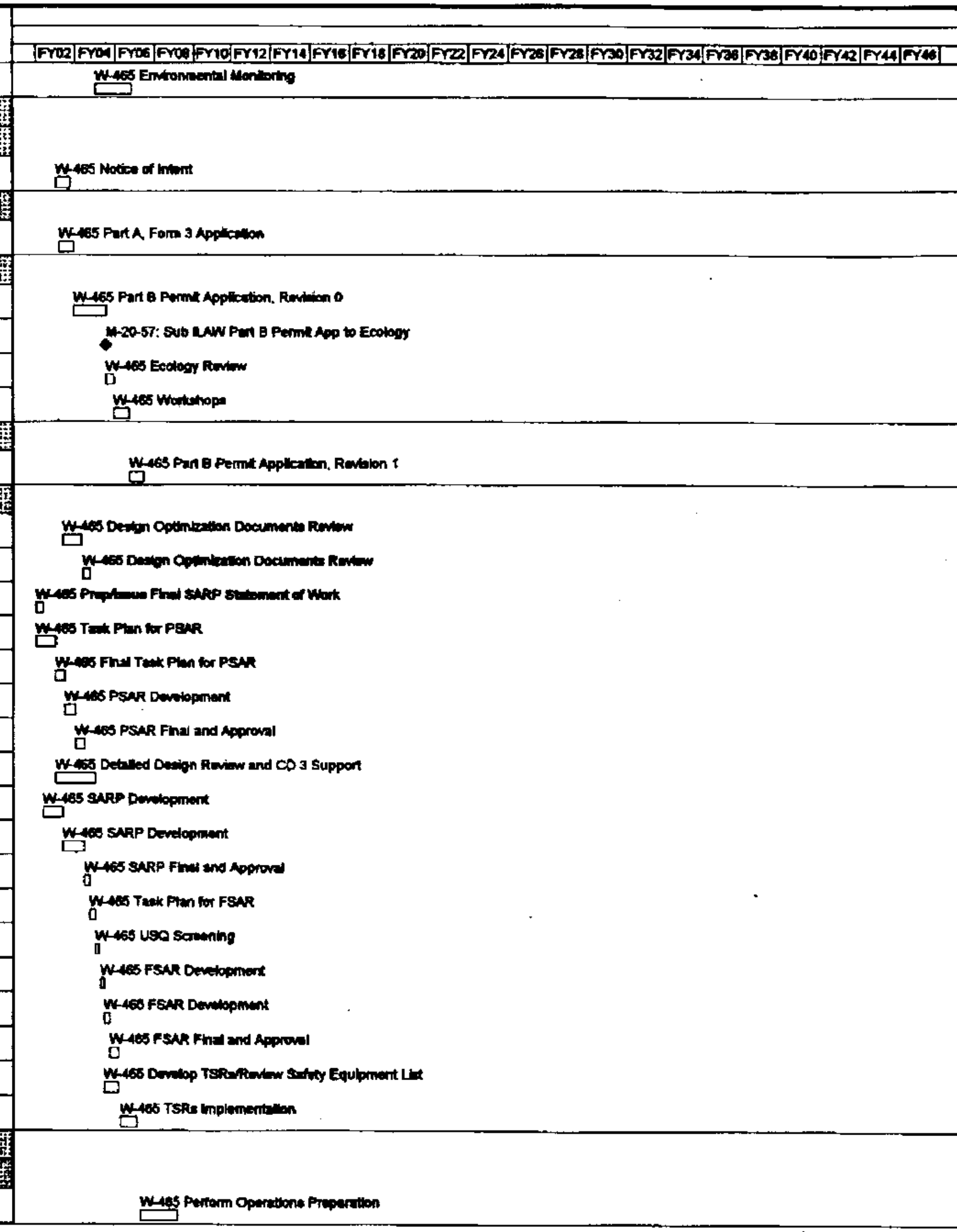
Sheet 21 of 26

Activity ID	Activity Description	Early Start	Early Finish
1.01.09.01.05.01.05 W-465 Modify Vaults (460.070)			
1.01.09.01.05.01.05.01 W-465 Project Integration-Expense			
T946070A1	W-465 Project Integration Support	01JUL03	31OCT05
T946070A2	W-465 Privatization Interface	02JUN03	30SEP05
T946070A3	W-465 Records Management Support	01JUL03	31OCT05
T946070A4	W-465 CD 3 Support	01JUL03	30SEP03
T946070A5	W-465 Quality Assurance Support	01OCT03	30AUG05
T946070A6	W-465 Construction Safety Support	01OCT03	30AUG05
1.01.09.01.05.01.05.02 W-465 Project Integration-Capital			
T946070B1	W-465 Project Integration - Capital	01JUL03	31OCT05
1.01.09.01.05.01.05.03 W-465 Construction-Capital			
1.01.09.01.05.01.05.03.01 W-465 C-1 Early Construction			
T946070C1	M-90-03: CD 3-Initiate W-465 Construction	01OCT03	
T946070C2	W-465 Prepare Planks for Removal	01OCT03	30NOV04
T946070C3	W-465 Miscellaneous Demolition	01OCT03	30NOV04
T946070C4	W-465 Remove Planks	01OCT03	30NOV04
T946070C5	W-465 Sitework and Utilities	01OCT03	30NOV04
[illegible]			
T946070D1	W-465 Vault Concrete	01OCT03	31JAN06
T946070D2	W-465 Enclosure Building	01OCT03	31JAN06
T946070D3	W-465 Install and Test Cranes	01OCT03	31JAN06
T946070D4	W-465 Existing Facility Upgrades	01OCT03	31JAN06
T946070D5	W-465 Complete Construction		31JAN06
1.01.09.01.05.01.05.04 Spares and Equipment - CENRTC			
T946070E1	W-465 Spares and Equipment - CENRTC	01OCT03	29SEP04
1.01.09.01.06.01.06 W-465 Proc/Trans/OTP/ORR (all Part B)(470.010)			
T947010A1	RL-WT010-ILAW Product Accptnce Inspect/Test Meth	01FEB06	
T947010A2	W-465 Support Startup - Expense	01FEB06	31OCT06
T947010A3	W-465 Cold Runs	01NOV06	30NOV06
T947010A4	W-465 ORR Support	03OCT05	31AUG06
1.01.09.01.05.01.07 W-465 NEPA Documentation (460.075)			
T946075A1	W-465 Prep/Transmit SEPA Adoptn Notice Reqst Ltr	01OCT02	14OCT02
T946075A2	W-465 Air Permitting	02DEC02	09JUN03
T946075A3	W-465 Supplement Analysis Review	31JUL03	08AUG03
T946075A4	W-465 NEPA Mitigation Action Plan	10JUN03	08SEP03



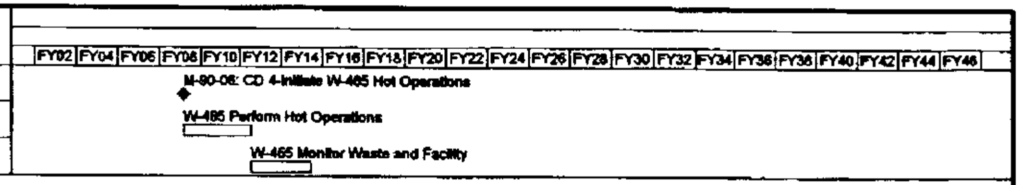
Sheet 22 of 24

Activity ID	Activity Description	Early Start	Early Finish
T946075A5	W-465 Environmental Monitoring	01OCT03	29JUL05
1.01.08.01.05.01.08 W-465 RCRA Permits (460.080)			
1.01.08.01.05.01.08.01 W-465 Notice of Intent (NOI)			
T946080A1	W-465 Notice of Intent	01OCT01	28JUN02
1.01.08.01.05.01.08.02 W-465 Part A Permit Application			
T946080B1	W-465 Part A, Form 3 Application	27DEC01	30AUG02
1.01.08.01.05.01.08.03 W-465 Part B Permit Application, Rev. 0			
T946080C1	W-465 Part B Permit Application, Revision 0	03SEP02	30APR04
T946080C1A	M-20-57: Sub ILAW Part B Permit App to Ecology		30APR04
T946080C2	W-465 Ecology Review	03MAY04	31AUG04
T946080C3	W-465 Workshops	01SEP04	30JUN05
1.01.08.01.05.01.08.04 W-465 Part B Permit Application, Rev. 1			
T946080D1	W-465 Part B Permit Application, Revision 1	01JUL05	31MAR06
[illegible]			
T946085A1	W-465 Design Optimization Documents Review	01FEB02	31JAN03
T946085B1	W-465 Design Optimization Documents Review	03FEB03	30JUN03
T946085C1	W-465 Preprfasus Final SARP Statement of Work	02OCT00	28FEB01
T946085D1	W-465 Task Plan for PSAR	02OCT00	28SEP01
T946085D2	W-465 Final Task Plan for PSAR	01OCT01	29MAR02
T946085D3	W-465 PSAR Development	01APR02	30SEP02
T946085D4	W-465 PSAR Final and Approval	01OCT02	31MAR03
T946085E1	W-465 Detailed Design Review and CD 3 Support	01OCT01	30SEP03
T946085F1	W-465 SARP Development	01MAR01	28FEB02
T946085F2	W-465 SARP Development	01MAR02	31MAR03
T946085F3	W-465 SARP Final and Approval	01APR03	30JUN03
T946085G1	W-465 Task Plan for FSAR	01JUL03	30SEP03
T946085G2	W-465 USQ Screening	01OCT03	31DEC03
T946085G3	W-465 FSAR Development	02JAN04	31MAR04
T946085G4	W-465 FSAR Development	01APR04	30JUN04
T946085G5	W-465 FSAR Final and Approval	01JUL04	31DEC04
T946085H1	W-465 Develop TSRs/Review Safety Equipment List	01APR04	31DEC04
T946085J1	W-465 TSRs Implementation	04JAN05	31OCT05
1.01.08.01.05.02 W-465 Operations			
1.01.08.01.05.02.01 W-465 Operations [illegible]			
T947D40A1	W-465 Perform Operations Preparation	01FEB06	31DEC07



Sheet 23 of 24

Activity ID	Activity Description	Early Start	Early Finish
T947040A2	M-90-06: CD 4-Initiate W-465 Hot Operations	02JAN08	
T947040A3	W-465 Perform Hot Operations	02JAN08	31MAR11
T947040A4	W-465 Monitor Waste and Facility	01APR11	28FEB14



Sheet 24 of 24

DISTRIBUTION

Number of Copies Onsite		
5	U.S. Department of Energy	
	C. A. Babel	A0-21
	P. E. Lamont	A0-21
	S. A. Sieracki	A7-08
	B. L. Williams	A0-21
	Reading Room	H2-53
8	Fluor Daniel Hanford, Inc.	
	J. C. Allen-Floyd	S7-40
	D. J. Ashley	A3-03
	S. K. Barnard	B3-70
	L. E. Borneman	A3-03
	J. L. Jacobsen	B3-70
	P. T. Jewell	H8-46
	T. B. Veneziano	S7-40
	D. J. Washenfelder	A3-03
14	Lockheed Martin Hanford Corporation	
	H. L. Boston	R2-53
	S. D. Brumley	H7-07
	D. A. Burbank	S4-45
	K. C. Burgard	S4-45
	P. A. Craig	R1-04
	M. L. Deffenbaugh	R1-51
	M. P. DeLozier	H7-07
	L. R. Dunbar	H7-07
	M. D. Ebben	H7-07
	M. P. Payne	R2-58
	C. J. Rice	R2-53
	R. W. Root	R2-53
	R. F. Wood	H7-07
	HLB/File LB	H7-07
5	Lockheed Martin Services, Inc.	
	Central Files	A3-88
	OSTI (2)	
	TFIC	
	EDMC	

DISTRIBUTION

Number of Copies		
1	Pacific Northwest National Laboratory Hanford Technical Library	P8-55