HNF-1517
Revision 0

TWRS Retrieval and Disposal Mission

Immobilized Low-Activity Waste Disposal Plan

Prepared for the U.S. Department of Energy
Assistance Secretary for Environmental Management

Fluor Daniel Hanford, Inc.
Richland, Washington

Hanford Management and Integration Contractor for the
U.S. Department of Energy under Contract DE-AC-0696-RL13200

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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
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
PA	performance assessment
PHMC	Project Hanford Management Contractor
PMP	project management plan
PSAR	preliminary safety analysis report
PSE	preliminary safety evaluation
QAPP	quality assurance project plan
RCRA	*Resource Conservation Recovery Act of 1976*
RFP	request for proposals
RL	U.S. Department of Energy, Richland Operations Office
ROD	record of decision
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

TERMS (cont)

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
WDD	Waste Disposal Division

TWRS RETRIEVAL AND DISPOSAL MISSION IMMOBILIZED LOW-ACTIVITY WASTE DISPOSAL PLAN

1.0 PURPOSE

This project plan has a twofold purpose. First, it provides a waste stream project plan specific to the Immobilized Low-Activity Waste (ILAW) Storage and 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. 1994). 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, *Project Management* (DOE 1992a), and 430.1, *Life Cycle Asset Management* (DOE 1995). 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 Tank Waste Remediation System (TWRS) Tank Waste Storage and Disposal Project is divided into four subprojects.

- The ILAW Storage and Disposal Subproject
- The Immobilized High-Level Waste (IHLW) Storage Subproject
- The Cesium/Strontium Capsule Disposal Subproject
- The IHLW Repository Interface Subproject.

This document discusses the project plan for the ILAW Storage and 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 and Tri-Party Agreement Elements
- Appendix B–Applicable Documents
- Appendix C–Summary of *Hanford Low-Level Tank Waste Interim Performance Assessment*, HNF-EP-0884, Rev. 1 (Mann et al. 1996)
- Appendix D–Key Deliverables and Performance Measurements

- Appendix E–Division of Responsibility Matrix—Immobilized Low-Activity Waste Storage/Disposal Subproject
- Appendix F–Immobilized Low-Activity Waste Subproject Schedule.

2.0 HANFORD SITE MISSION AND OBJECTIVES

The WHC-SD-WM-MAR-008, Rev. 0, *Tank Waste Remediation System Mission Analysis* (Knutson 1995) states

> "The TWRS mission is to store, treat, and immobilize highly radioactive Hanford waste (current and future tank waste and the encapsulated cesium and strontium) in a safe, environmentally sound, and cost-effective manner (TWRS JMN [justification for mission need]).
>
> "The mission includes retrieval, pretreatment, immobilization, interim storage and disposal, and tank closure."

As part of this mission, DOE has established the TWRS Office to manage all Hanford Site tank waste activities. The TWRS program has identified the need to store, treat, immobilize, and dispose of the highly radioactive Hanford Site tank waste and encapsulated cesium and strontium materials in an environmentally sound, safe, and cost-effective manner.

To support environmental remediation and restoration at the Hanford Site a two-phase approach to using private contractors to treat and immobilize the low-activity and high-level waste currently stored in underground tanks. 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 British Nuclear Fuels Ltd. and Lockheed-Martin Advanced Environmental Services were signed in September 1996. Phase 1 is a proof-of-concept and commercial demonstration effort to demonstrate the technical and business feasibility of using private facilities to treat Hanford Site waste; maintain radiological, nuclear, process, and occupational safety; and 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 2002 and could treat up to about 13 percent of the waste. Phase 1 production is expected to be completed in 2007 for minimum order quantities or 2011 for maximum order quantities. Phase 2 is a full-scale production effort that will begin after Phase 1 and treat and immobilize most of the waste. Phase 2 production is expected to be completed in 2025.

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. DOE will pay the private contractors for each ILAW package that meets the product specifications as stated in the RFP or subsequently negotiated. 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.

3.0 MISSION AND OBJECTIVES OF THE ILAW SUBPROJECT

3.1 MISSION

The mission of the ILAW Storage and Disposal Subproject is to receive the certified ILAW packages produced by private contractors, 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 in a manner that permits retrieval. 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 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 indicated that completion of ILAW disposal performance assessment work and disposal authorization was unlikely to be achieved before waste packages were received from private contractors. Replanning indicates the ILAW disposal performance assessment and disposal authorization can be achieved and the project baseline is changing accordingly. However, as a contingency, the grout vaults could be completed and operated as a storage facility pending approval of the performance assessment. The disposal action itself will be planned to include a period for product retrieval if circumstances make it necessary.

3.2 OBJECTIVES

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 an alternatives generation and analysis (AGA) study

- Select an appropriate site for the disposal system on the 200 Area plateau and obtain authorization designating the site for ILAW storage and disposal. Site authorization has been obtained from the RL Site Infrastructure Division [Letter 97-SID-285, *Approval of Tank Waste Remediation System Complex Site Evaluation Report* (Rutherford 1997)].

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

- 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.

- Prepare 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 will be issued in March 1998, and a final PA in January 2001. This is consistent with the use of the grout vaults as storage facilities starting in December 2002 and beginning construction of additional disposal facilities in June 2003.

- Develop and implement concepts for conversion of the grout vaults from a storage to a disposal function as a contingency plan.

- Maintain package retrievability for 50 years after disposal.

- Develop and implement all operational and closure plans including postclosure monitoring of ILAW facilities.

- Develop interfaces with privatization contractors, DOE, and Ecology as required for schedule, system operation, and regulatory compliance.

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

- Support environmental, safety, and health requirements [i.e., through compliance with the *National Environmental Policy Act of 1969* (NEPA) RCRA, Systems Engineering and test and evaluation].

4.0 SCOPE OF ILAW DISPOSAL SUBPROJECT

This project plan is intended to outline the activities and requirements for the receipt of packaged ILAW that has already been certified and accepted by DOE in containers with specified dimensions and properties. The packaged ILAW will be supplied by private contractors to DOE in accordance with contract specifications described in the TWRS privatization contracts with British Nuclear Fuels Ltd. (RL 1996a) and Lockheed Martin Advanced Environmental Systems (RL 1996b). 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. The ability to retrieve packages from these vaults during the first 50 years after beginning disposal will be maintained as a contingency that is not expected to be required.

4.1 DESCRIPTION OF DISPOSAL FACILITIES

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 Letter 96-WDD-149, *Milestone Completion Issue Low-Level Waste Engineering Evaluation* (Taylor 1996), at the eastern portion of the 200 East Area, as shown in Figure 1. The second site, shown in Figure 1, consists of 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 5,000 ILAW packages based on product specifications given in the Phase 1 Privatization Contract. These vaults, illustrated in Figure 2, will be modified for disposal of ILAW. Because up to 14,000 packages may be produced during the Phase 1 Privatization Contract, additional disposal space is required. The additional disposal facilities, designated as the Low-Activity Waste Disposal Complex, located in the south central portion of the 200 East Area (Figure 1) 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 inventory. Depending on the level of package radioactivity, some ILAW packages may require remote handling; others can 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, provided that *Resource Conservation and*

Figure 1. Site Plan for the Immobilized Low-Activity Waste Disposal Location.

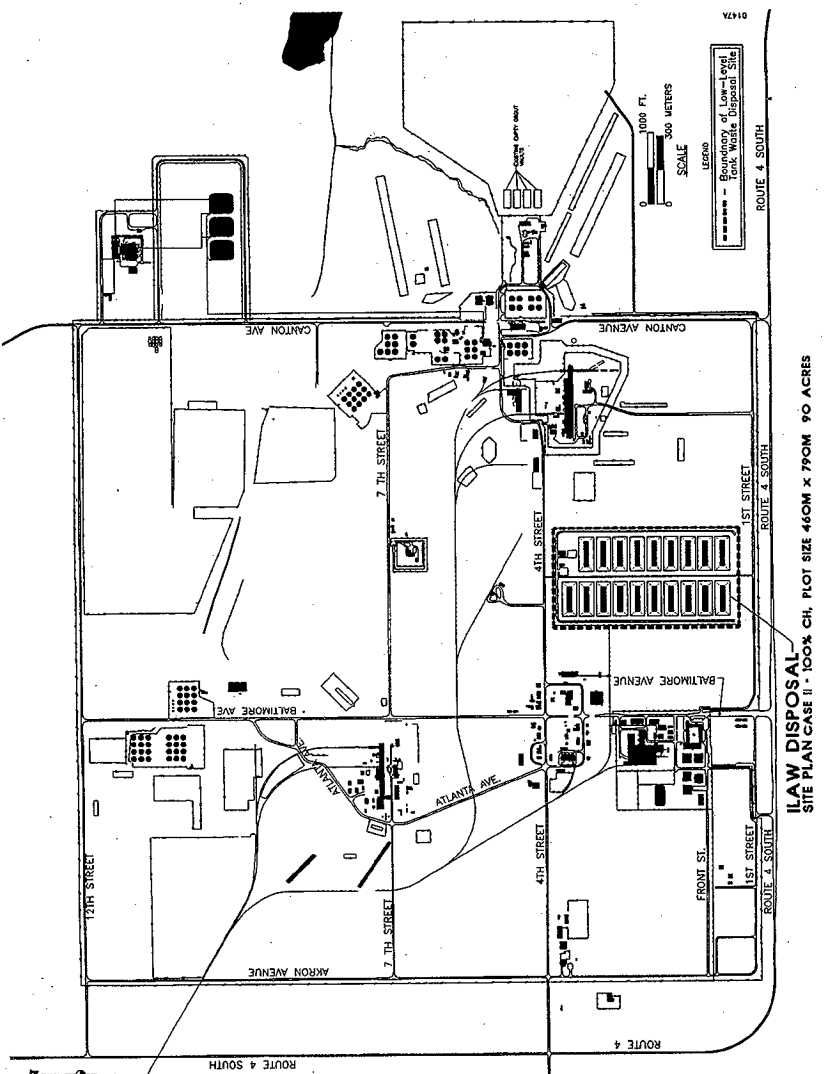
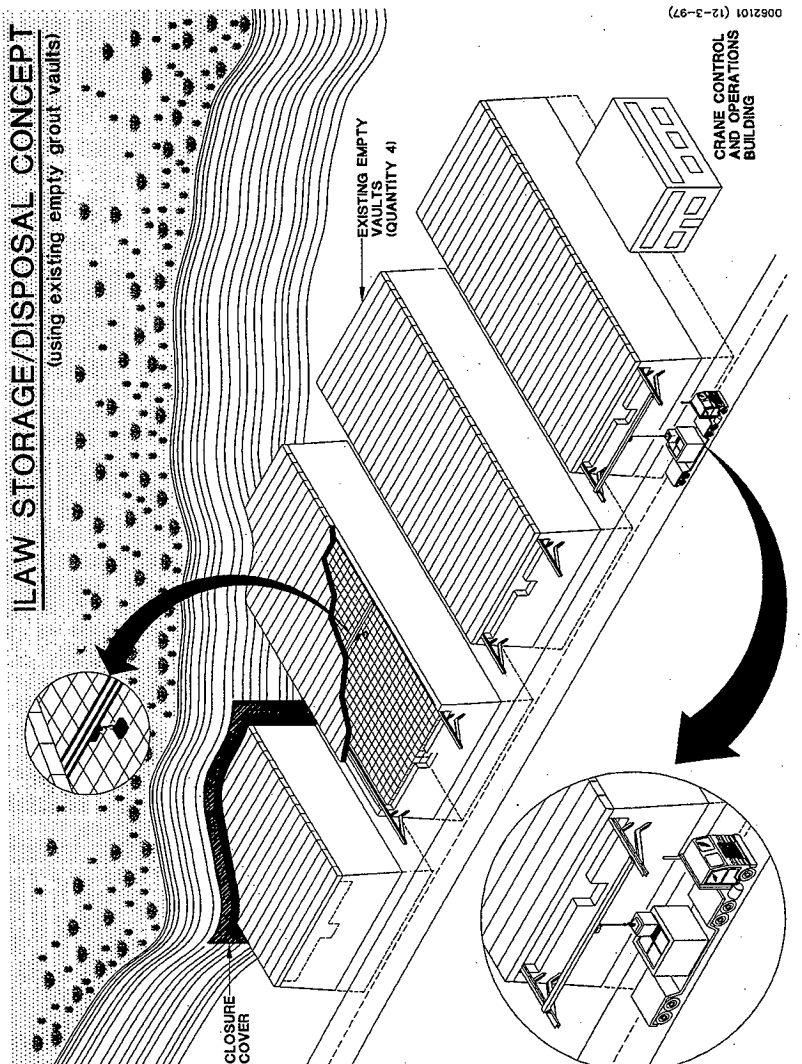


Figure 2. Immobilized Low-Activity Waste Storage Concept.



Recovery Act of 1976 (RCRA) delisting is granted. In either case, designing for a system that will allow for package retrievability for up to 50 years after emplacement is a requirement. About 95,000 [98,200 in WHC-SD-WM-TI-774, Rev. 0, *TWRS Privatization Process Technical Baseline* (Orme 1996)] ILAW packages may result from treatment of waste from all 177 tanks (Burbank 1997).

4.2 PHASE 1 AND PHASE 2 PRIVATIZATION IMPACTS

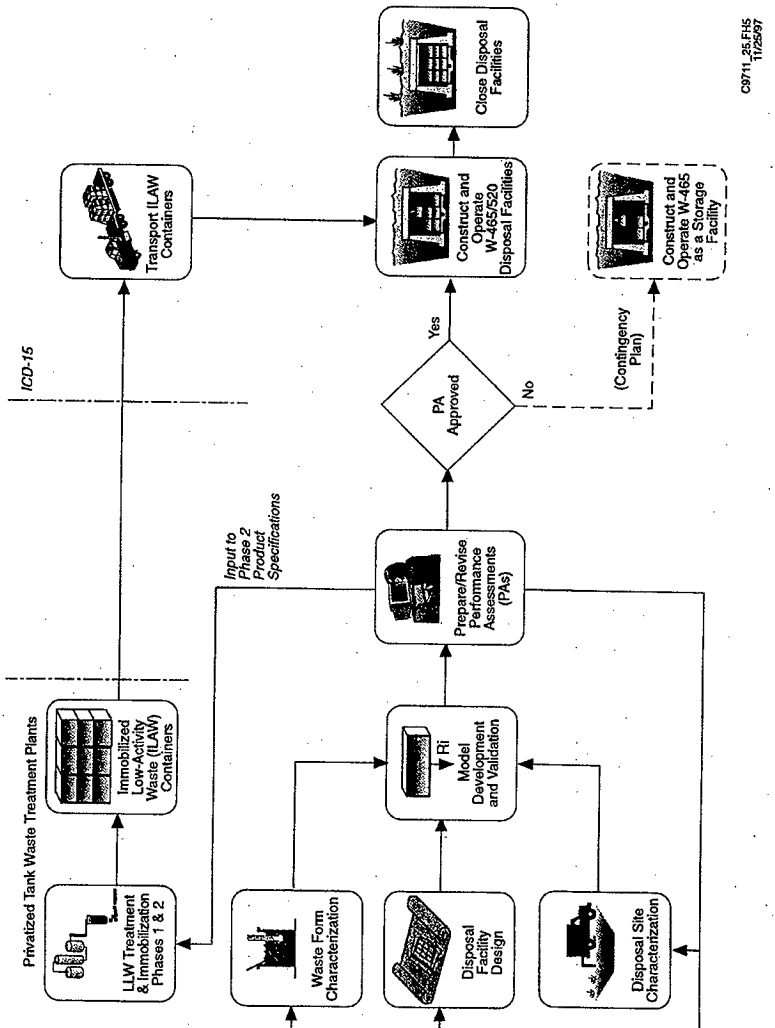
The TWRS RFP (Wagoner 1996) identifies the services that DOE will provide to the low-activity waste (LAW) contractors and specifies ILAW product requirements for Phase 1 privatization. These requirements were included in the Phase 1A contracts for the private vendors (RL 1996a, 1996b). Throughout this document, any reference to requirements in the RFP also refer to requirements in the contracts. 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 privatization treatment schedule anticipates Phase 2 production starting in either 2007 or 2011 and running to 2025. If this schedule is accelerated, 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 3 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 2002 and 2005 when the additional storage and disposal facilities must be made available. Performance assessments will be prepared to verify that both disposal system designs and sites meet long-term performance objectives.

4.3 INTERFACING ORGANIZATIONS AND APPROVAL AUTHORITIES

This project plan addresses the interfaces with DOE, the privatization contractors, 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 postclosure 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 (see Section 13.1). DOE reviews and approvals are required for conceptual design, definitive design, and construction stages. Performance assessment approval is required before construction authorization for disposal

Figure 3. Low-Activity Waste Storage and Disposal Subproject.



systems. Accordingly, performance assessment will be submitted to DOE-HQ in March 1998 for review and approval. Details of approval authorization requirements are given in Chapter 9 and Appendix B.

4.4 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 (ICD), 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 ICD 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. (A batch is an agreed-on number of ILAW packages based on similar physical, chemical, and radiological characteristics.) 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 Storage and Disposal Subproject, making it subject to DOE orders for radioactive waste management. The current DOE order, 5820.2A, *Radioactive Waste Management* (DOE 1988a) and its future replacement, 435.1, currently in draft form for review, 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.

4.5 TOP LEVEL WORK BREAKDOWN STRUCTURE

Table 1 is a work breakdown structure (WBS) for the Low-Level Waste (LLW) Disposal Project at the cost account level. The scope of these WBS activities is described in the following paragraphs. Additional details can be found in the multi-year work plan (MYWP), HNF-SP-1230, Rev.0, *Tank Waste Remediation System Fiscal Year 1998 Work Plan-WBS 1.1*, (Lenseigne 1997); Appendix F provides a schedule of MYWP activities. The scope of these WBS activities is described in the following paragraphs.

Table 1. LLW Disposal Project Work Breakdown Structure.

WBS Code	Activity Title	Start Date	End Date
1.1.1.3.4.01.01	Project Administration	1 October 1996	28 April 2034
1.1.1.3.4.01.02	Systems Definition	1 October 1996	30 September 2011
1.1.1.3.4.01.03	Performance Assessment	1 October 1996	28 September 2029
1.1.1.3.4.01.04	Facilities	2 January 1997	30 September 2020
1.1.1.3.4.01.05	Operations	1 June 2000	28 April 2034
1.1.1.3.4.01.06	Future Projects	1 October 2008	30 July 2021
1.1.1.3.4.01.07	Closure	1 April 2005	30 September 2037

Project Administration. Work scope for this activity will be for developing business-related planning documents, monitoring progress, guiding the project toward accomplishing its mission, and maintaining customer contact and support. It provides financial and scheduling support and tools for implementing project management control and developing short- and long-term plans. It also is the primary vehicle for requesting budget authority and work authority from RL and DOE-HQ. It provides expertise and technical leadership needed to manage the project, maintains the current baseline, develops annual multi-year program plans, prepares an annual project breakdown structure , provides monthly status information, and serves as the single focal point for customer deliverables and inquiries.

Systems Definition. This activity determines the requirements for receipt and transportation of ILAW from the privatization contractor, interim storage, and disposal of treated ILAW. It determines alternatives for storage facilities, handling and transportation systems, disposal systems, and recommends preferred options for each. It defines a strategy for implementing the preferred options. It develops a preliminary cost estimate to support conceptual design and outyear budget planning and prepares design requirements documents (DRD) to support design efforts for the selected options. It resolves the issue of U.S. Nuclear Regulatory Commission (NRC) classification of LLW and performs the required engineering analysis to resolve issues identified by privatization ICDs.

Performance Assessment. This activity is intended to lead to approval from DOE-HQ for critical decisions governing disposal of ILAW in Hanford Site disposal facilities as required by DOE Order 5820.2A and its proposed successor, DOE Order 435.1. It also is intended to provide estimates of the long-term environmental and health effects associated with disposal facility design, waste form performance, and natural transport processes. The activity includes writing a preliminary performance assessment that is determined to be "technically adequate" by external review committees for transmittal to DOE-HQ to support a decision on the use of the

existing grout vaults and next-generation facilities for ILAW disposal. A final performance assessment will then be prepared that must be determined to provide "reasonable assurance" by outside review committees that the disposal facilities for ILAW will protect the environment and human health. In addition, maintenance and closure performance assessments will be prepared to allow for continued disposal and closure of the facilities.

Facilities. This activity plans and manages the ILAW storage and disposal facilities line-item construction projects (W-465 and W-520). It is responsible for having initial disposal facilities operational by 2002 and follow-on disposal facilities operational by 2005. Its responsibilities also include preparing conceptual and advanced conceptual designs, and Title I and II designs; completing the facilities; and preparing preliminary safety analysis reports (PSAR) and the final safety analysis report (FSAR), permit applications, and supplemental NEPA analyses.

Operations. This activity addresses operations of the ILAW storage and disposal facilities to accept ILAW during both Phase 1 and Phase 2 privatization initiatives. It includes supporting facility definition during engineering and conceptual design, planning and integration of preparation activities; preparing required documents; training and qualifying personnel; and conducting the operational readiness review, and cold and hot testing; preparing for closure; and long-term monitoring.

Closure. This activity will ensure that operations facilities are decontaminated and decommissioned and that disposal systems are closed and monitored. An engineered barrier will be placed over the facility that will use passive systems to minimize risk to human health and the environment by using a capillary break to minimize infiltration and a physical barrier to minimize human intrusion. The activity includes conducting closure engineering studies, prototype design and testing, construction, final design and testing, backfilling and readiness for barrier placement, design and construction of the barrier, decontamination and decommissioning, and long-term monitoring.

Future Projects. This project provides for additional disposal facilities on a time-phased basis to accept the ILAW product generated by Phase 2 privatization activities.

4.6 SCOPE OF ILAW SUBPROJECT PLAN

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 Storage and Disposal Project's portion of the draft TWRS MYWP as of October 1997. 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.

5.0 PROJECT BACKGROUND

5.1 SUMMARY OF LOW-ACTIVITY WASTE TREATMENT AND DISPOSAL OPTIONS

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 HNF-SD-WM-TI-740, Rev. 0, *Standard Inventories of Chemicals and Radionuclides in Hanford Site Waste Tanks* (Kupfer et al. 1997).

In general, the neutralized waste consisted mainly of insoluble solids than 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 137Cs then immobilized in a glass or similar waste form to become the ILAW. These plans are described in more detail in the privatization contract (Wagoner 1996) and the TWRS environmental impact statement (EIS), DOE/EI-0189, *Tank Waste Remediation System, Hanford Site, Final Environmental Impact Statement* (DOE 1996). The following section summarizes the history of the actions and decisions that led to the current strategy for disposal of ILAW.

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 1987a) 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 (Ecology et al. 1994) was renegotiated in September 1993 and was signed by all parties in January 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 a 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.

— 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 [letter report *Classification of Hanford Low-Activity Tank Waste Fraction* (Paperiello 1997)].

As a result of these decisions, 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.

5.2 WASTE STREAM COMPONENTS AND PROJECTIONS

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 1997). 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 inventory 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 [HNF-SD-WM-SP-012, Rev. 0, *Tank Waste Remediation System Operations and Utilization Plan* (Kirkbride 1997)]. 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- and contact-handled 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 Storage and 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 specified three types of waste inventories and 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 supplied to a designated tank in AP tank farm for each 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 [HNF-SD-WM-SP-012, Rev. 0, Volumes I and II, *Tank Waste Remediation System Operation and Utilization Plan* (Kirkbride et al. 1997)]. This information, along with the waste loading specifications in the contract, were used to estimate the total number of ILAW packages to be received by the ILAW Storage and Disposal Project.

An estimate of the expected number of ILAW packages from Phase 1 and Phase 2 privatization production activities is given in Table 2. For a more complete analysis see WHC-SD-W465-AGA-001, Rev. 0, *Alternatives Generation and Analysis Report for Immobilized Low-Level Waste Interim Storage Architecture* (Burbank 1996). The basis for this estimate is the contract specifications for waste loading and durability and the enabling assumptions provided by RL for the Phase 1 AGA study (Burbank 1996) and Orme (1996). For Phase 1, these specifications include 2800 MT of sodium treated in the base contract covering 5 years plus 2300 MT of sodium treated during a 4-year contract extension. The waste form durability specification in the contract is expected to be met with a 20 wt% Na_2O loading. The package fill fraction is expected to be 80 vol% with a nominal average product volume of 73.11 cm^3/mol Na. (The contract specifies up to 100 cm^3/mol of sodium for waste Envelopes A and C, and up to 250 cm^3/mol of sodium for Envelope B, which are used to derive a maximum package count.) Based on contract specifications, individual package size is assumed to be 1.2 m x 1.2 m x 1.8 m. For each vendor, these assumptions yield a total nominal package count of 6,441 packages for Phase 1 privatization or a total production of 12,883 (13,200 in Orme 1996). If maximum product volume values are used, total Phase 1 package count could be 18,139 packages. Maximum peak production to meet Phase 1 contract duration is up to nine packages daily, with nominal production of four packages daily. Similar analyses were completed for Phase 2 production estimates. These yielded a nominal total package count of 82,850 (Burbank 1996) (85,000 in Orme 1996). Thus the total expected package count from both Phase 1 and Phase 2 is 95,733 packages (98,200 in Orme 1996) based on these assumptions and

Table 2. Summary of ILAW Package Production for the ILAW Disposal Subproject.

Planning Design Basis				
Phase 1 Contract Specifications (each vendor)	Envelope A	Envelope B	Envelope C	Total
1. Base contract quantities, MT Na	2600	100	100	2800
2. Extension contract quantity, MT Na	2300	0	0	2300
3. Maximum product volume, cm^3/gmol Na	100	250	100	102.94
Assumptions (DOE direction)				
1. Orme flowsheet total quantity, MT Na				7.8 E+04
2. Nominal average product volume, cm^3/gmol Na	73.11	182.78	73.11	73.11
Derived Design Factors (each vendor)				
1. Base total package count	3190	307	123	3619
2. Extension total package count				2822
3. Phase 1 total package count (each vendor)				6441

Table 2. Summary of ILAW Package Production for the ILAW Disposal Subproject.

Planning Design Basis				
Phase 1 Contract Specifications (each vendor)	Envelope A	Envelope B	Envelope C	Total
Phase 2 nominal package count				85,000
Phase 1 and 2 total package count				98,200

specifications. If the response by the private contractors at the end of Phase 1A is not consistent with these assumptions, the ILAW disposal system design requirements will be adjusted accordingly.

5.3 STORAGE AND DISPOSAL SYSTEM CAPACITY

Current plans are to modify the existing grout vaults for retrievable storage of part of the initial Phase 1 production. Based on a stacking height of 6 packages, required spacing between stacks, and space requirements for handling equipment, about 5,000 packages could be stored in the existing 4 vaults. This should accommodate up to the first 3 years' production. The remaining Phase 1 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. Studies currently are under way to evaluate converting the grout vaults and the additional 200 East facility into permanent disposal facilities.

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). An alternatives analysis, HNF-SD-TWR-AGA-004, Rev. B, *Analysis of Alternatives for Immobilized Low-Activity Waste Disposal* (Burbank and Klem 1997), has been prepared for this area that evaluates 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 30 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 interim storage and disposal of Phase 1 product in excess of the grout vault capacity, as well as for disposal of Phase 2 production. Disposal capacity will be constructed on a phased basis as needed. Figure 1 shows the location of this site.

5.4 REGULATORY REQUIREMENTS AND WASTE CLASSIFICATION

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 (both the storage function and disposal function), and closure of the ILAW disposal facilities.

In compliance with DOE Orders 5400.1, *General Environmental Protection Program* (DOE 1988b), 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 [WHC-SD-WM-PLN-109, Rev. 0, *Characterization Plan for the Proposed TWRS Treatment Complex* (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 an 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.

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 preliminary 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 (Draft), which is being written to replace DOE Order 5820.2A, will still require a performance assessment to get disposal authorization from DOE. Performance assessment requirements and implementation guidance are discussed in Chapter 7.

Other regulatory requirements, such as the durability specification, and waste classifications requirements specified in the RFP (Wagoner 1996), are considered in the waste form performance specifications. Consequently, ILAW waste forms and waste packages that comply with RFP specifications should also comply with the referenced regulatory requirements.

Waste Classification

At the request of the ILAW Storage and 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,"Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste,"are satisfied.

This classification removes the ILAW from the high-level waste disposal licensing authority of the NRC and permits its disposal from both SSTs and DSTs under DOE requirements in shallow land disposal facilities. DOE Order 5820.2A, Chapter 3 (DOE 1988a), 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 in WHC-SD-WM-TI-699, Rev. 2, *Technical Basis for Classification of Low-Activity Waste Fraction from Hanford Site Tanks* (Petersen 1996). Only 9 key radionuclides were considered for removal because they represent 99.9 percent of the waste tank curie inventory. Cesium-137 represents the largest quantity for removal to meet the "technical and economically practical" removal criteria for incidental waste, so the technical basis recommended removing this radionuclide 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.

5.5 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.

5.6 PERFORMANCE ASSESSMENT REQUIREMENTS

The 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 provide "reasonable assurance" that the disposal activity will perform as expected in the design and meet long-term performance objectives. This analysis is based on site-specific hydraulic and geotechnical parameters, disposal system design, inventory of waste disposed of, and waste form durability, as well as radiological dose factors. Based on the PA for LAW from DST inventories immobilized in grout [WHC-SD-WM-EE-004, Rev. 1, *Performance Assessment of Grouted Double-Shell Tank Waste Disposal at Hanford,* (Kincaid et al. 1994), using grout durability properties, and on WHC-EP-0884, *Hanford Low-Level Tank Waste Interim Performance*

Assessment (Mann et al. 1996), an interim PA for an ILAW disposal system containing vitrified LAW, using waste form durability properties specified in the RFP, analysis has determined that ^{99}Tc is the major low-activity radionuclide contributing long-term dose. Uranium isotopes, ^{129}I, and possibly ^{126}Sn contribute significantly less dose. The PA development is integral to disposal system design by providing performance criteria for the system. The interim PA provides information to project management and engineering personnel on the relationship between various disposal system parameters and performance. It is planned to submit a revised PA to DOE-HQ in 1998 to support authorization for construction of Projects W-465 and W-520. The final PA is planned to be issued in 2001. Additional details and programmatic impacts of the PA are discussed in Chapter 7. Appendix C contains a summary of the interim 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.

6.0 LINE-ITEM PROJECT MANAGEMENT APPROACH

The TWRS Storage and Disposal Program includes providing for disposal on the Hanford Site of all ILAW generated as part of the Phase 1 and Phase 2 privatization effort. To meet this program objective, the ILAW Disposal Subproject was created and structured to support the phased approach outlined in the privatization concept. Two design and construction projects (line-item projects) are included as part of the ILAW disposal subproject. The first line-item project is to retrofit the four existing grout vaults to accommodate the initial production of ILAW in Phase 1. This project, approved by DOE (Alm 1996), is designated Project W-465. The second line-item project is to design and construct new facilities to accommodate the remaining Phase 1 production and all Phase 2 ILAW production. This project is designated Project W-520, Low-Activity Waste Disposal Complex. This project plan applies to the overall ILAW Disposal Subproject; more detailed and specific line-item project management plans (PMP) for Line-Item Projects W-465 and W-520 will be prepared at the definitive design stage. The line-item PMPs will be prepared in accordance with approved PHMC procedures and include planning specific to approved, validated DOE modify/construct projects. The PMPs will identify the plans, organizational interfaces, management control systems, and reporting requirements to be used by those responsible for managing the projects. The PMPs will be part of the line-item project baseline and will be controlled documents subject to configuration management. Documents developed after and to support the PMPs also will be controlled documents. The PMPs will be updated annually and supplemented to meet the requirements of the RL Site Management System and the Storage and Disposal Subproject.

PERFORMANCE ASSESSMENT APPROACH

The approach taken for preparing the performance assessments and descriptions of the data requirements, computer simulations, and related elements plus approval requirements is given in HNF-SD-WM-PAP-062, Rev. 2, *Low-Level Tank Waste Performance Assessment Statement of Work* (Mann 1997), which covers fiscal years (FY) 1998 to 2003. The performance assessment activity is based on an analysis of total waste inventory disposed of; design of the disposal system; and site-specific characteristics, such as groundwater recharge rate and site hydraulic properties; plus selected exposure scenarios. The PA data collection and simulation activities have been initiated for a generic disposal based on the grout vault concept and an interim PA was issued (Mann et al. 1997) that emphasizes the impacts of various disposal system parameters on system performance. The executive summary of Mann et al. (1997) is included in this document as Appendix C. Current plans are to submit a PA to DOE-HQ in March 1998 that will include analyses of both the grout vault disposal system and the ILAW disposal complex (Projects W-465 and W-520). This document, based on conceptual designs of the disposal systems, is one of several that require approval for construction authorization. A final PA based on the detailed design will be issued in 2001. In addition to the PA, a site composite analysis to evaluate the impacts of previous and current disposal actions from other sources on the site is required for construction authorization. The site composite analysis will emphasize groundwater contamination. This analysis is currently being done by Pacific Northwest National Laboratory and will be available to support the PA.

7.0 PROJECT CONTROLLING MILESTONES AND CRITICAL ACTIVITIES SCHEDULE

7.1 TRI-PARTY AGREEMENT CONTROLLING MILESTONES

The ILAW Disposal Subproject is structured to meet 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.

Table 3. Tri-Party Agreement Milestones for the ILAW Storage and Disposal Project.

Milestone Number	Milestone Title	Due Date
M-90-01	Submit Project Management Plan to Ecology	12/31/97
M-90-02T	Complete Conceptual Design of ILAW Interim Storage Facility	6/30/98
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	3/30/01
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.	12/31/03
M-20-57	Submit interim ILAW facility Part B Permit application to Ecology	12/2000
M-20-58	Submit ILAW disposal facility Part B Permit application to Ecology	12/2003
M-90-09T	Complete Detailed design - ILAW Additional Storage & Disposal	3/31/03

Table 3. Tri-Party Agreement Milestones for the ILAW Storage and Disposal Project.

Milestone Number	Milestone Title	Due Date
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	3/31/04
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

7.2 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 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), and preliminary AGA for ILAW (Burbank and Klem 1997). Appendix B contains a comprehensive list of these requirements. Activities to ensure compliance with these requirements are included in the MYWP for the ILAW Disposal Subproject (Lenseigne 1997).

7.3 SCHEDULE REQUIREMENTS

The ILAW subproject baseline schedule, provided in Appendix F, also is provided in the TWRS FY 1998 MYWP (Lenseigne 1997). 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.

7.3.1 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	1-98	9-99
W-465 Detailed Design	10-99	3-01
Modify Vaults	7-00	4-02
NEPA/RCRA	10-97	10-01
Safety Authorization Basis	10-97	5-02
Operations	6-02	8-05
Phase 2		
W-520 Conceptual Design	2-98	12-98
W-520 Adv Conceptual Design	1-99	9-00
W-520 Detailed Design	10-00	9-02
W-520 Construction	10-02	10-04
Permits	9-99	3-03
Performance Assessment	10-97	12-01
Safety Authorization Basis	10-97	9-00
Operations	9-05	9-11

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

7.3.2 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. The critical path activities are included in Appendix F.

8.0 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. These costs are based on data from December 3, 1997. A more detailed cost for each discreet project activity is provided in HNF-MD-017, Rev. 0, *Multi-Year Work Plan*, the PHMC MYWP (FDH 1997a).

More definitive total project cost (TPC) estimates for the ILAW Storage and Disposal line-item projects will be 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 will be broken out by the CDR and validation packages, which are being prepared. 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 (FDH 1997a). Project costs will be evaluated during the project life cycle through a value engineering process to identify opportunities for cost reductions.

Table 5. ILAW Disposal Subproject Estimated Life-Cycle Costs.

WBS	FY98 ($)	FY99 ($)	FY00 ($)	FY01 ($)	FY02 ($)	FY03 ($)	FY04 ($)	FY05 ($)	FY06 ($)	FY07 ($)	FY08 ($)	FY09 ($)	FY10 ($)	FY11 ($)	Total FY98-11 ($)	FY12- FY49 ($)
1.1.3.4.1.1 ILAW Project Management/Administration																
Phase 1 and 2 Expense	818,851	794,230	789,069	759,857	768,338	763,649	766,691	763,649	760,606	760,606	766,691	763,649	763,649	763,649	10,803,183	17,479,382
1.1.3.4.1.2 Systems Definition																
Phase 1 Expense	687,970	190,337	31,405	-	107,671	-	-	-	-	-	-	329,520	329,520	-	1,676,423	-
1.1.3.4.1.3 Performance Assessment																
Phase 1 Expense	3,529,945	3,376,990	1,193,691	413,082	5,122	-	-	-	-	-	-	-	-	-	8,518,830	-
Phase 1 Capitol	251,446	149,591	112,640	-	-	-	-	-	-	-	-	-	-	-	513,678	-
1.1.3.4.1.4 ILAW Project W-465 (Phase 1)																
Phase 1 Expense	1,270,375	1,100,582	3,815,864	3,651,907	1,067,017	-	-	-	-	-	-	-	-	-	10,905,745	-
Phase 1 Capital	-	-	3,853,366	14,273,068	14,848,336	-	-	-	-	-	-	-	-	-	32,974,770	-
1.1.3.4.1.4 ILAW Project W-520 (Phase 1)																
Phase 1 Expense	2,203,517	1,423,694	1,656,477	2,080,108	3,079,843	341,357	361,325	654,603	-	-	-	-	-	-	11,800,924	-
Phase 1 Capital	-	-	176,025	4,631,176	8,193,912	61,181,384	82,219,016	76,614	15,258,888	61,527,772	46,514,996	-	-	-	279,779,776	-
1.1.3.4.1.5 ILAW Operations																
Phase 1 Expense	-	1,123,688	2,759,109	4,235,194	4,860,152	5,378,277	6,855,017	7,882,267	5,166,105	5,103,872	4,725,795	5,095,143	5,095,143	3,901,967	62,181,728	-
Phase 2 Expense	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	81,378,616

Table 5. ILAW Disposal Subproject Estimated Life-Cycle Costs.

WBS	FY98 ($)	FY99 ($)	FY00 ($)	FY01 ($)	FY02 ($)	FY03 ($)	FY04 ($)	FY05 ($)	FY06 ($)	FY07 ($)	FY08 ($)	FY09 ($)	FY10 ($)	FY11 ($)	Total FY98-11 ($)	FY12- FY49 ($)
1.1.3.4.1.6 Future Projects (Phase 2)																
Expense	-	-	-	-	-	-	-	-	-	-	-	40,336	-	290,053	330,389	290,053
Capital	-	-	-	-	-	-	-	-	-	-	-	5,095,143	5,095,143	3,901,967	17,993,056	73,098,648
1.1.3.4.1.7 Facility Decontamination and Decommissioning and Closure																
Expense	-	-	-	-	-	-	-	-	-	-	1,141,377	1,005,683	-	-	2,147,060	6,181,242
Capital	-	-	-	-	-	-	-	-	-	-	-	2,287,747	6,835,195	6,320,952	15,443,622	84,857

FY = fiscal year
ILAW = immobilized low-activity waste
WBS = work breakdown structure
Dec. 1997 costs.

9.0 PROGRAMMATIC RISK ASSESSMENT

Risk planning, assessment, analysis, and management (Figure 4) will be used throughout the Subproject to identify significant risk factors and formulate mitigation plans. Risk management will be conducted in accordance with the TWRS programmatic risk management plan [Letter 73300-95-011, *Storage and Disposal Project Risk Management Plan* (Murkowski 1995)] and procedure, *TWRS Administration,* WHC-IP-0842, Volume IV (LMHC 1997). Identified risks will be incorporated into the TWRS 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 (cost and schedule), technical, environmental, safety, and health risks. A risk management plan for the Storage and Disposal Subproject has been prepared (Murkowski 1995). 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.

A major risk is that disposal authorization will not be received from DOE-HQ in time to start disposal operations of the grout vaults. The ILAW subproject is working with DOE-HQ to establish the approval process for disposal. Also, Line-Item Project W-465 currently is scoped as an ILAW storage operation and could be operated as an interim storage facility pending disposal authorization.

APPROVAL REQUIREMENTS

The ILAW Disposal Subproject includes several activities that require review and approval by external authorities. None of these have schedule commitments by the reviewing organizations. Activities that require external approval and the approving organizations are given in Table 6.

Performance Assessment Approval

The approval processes for most of the activities listed in Table 6 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 recent 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 Assistant Secretary for Waste Management. The performance assessment is required as part of the disposal process under DOE Order 5820.2A (and its potential successor, 435.1 Draft) and is part of the ILAW Disposal Subproject. The composite analysis describes the impacts of contaminant contributions from nearby sources on the disposal system performance objectives and is being conducted as a separate project by Pacific Northwest

Figure 4. Programmatic Risk Management Process.

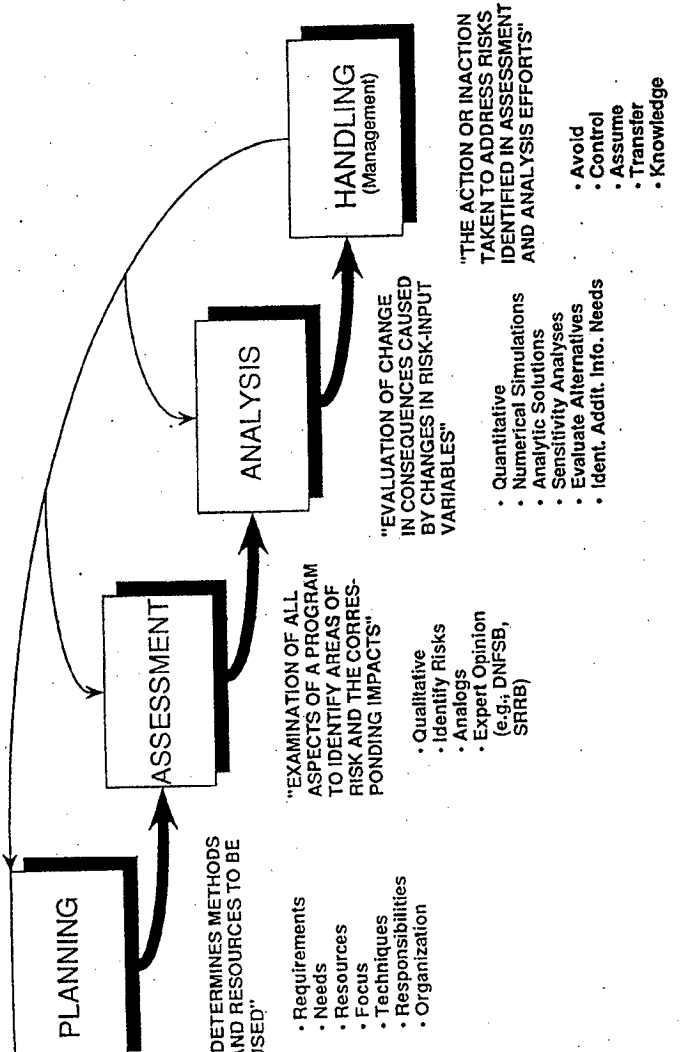


Table 6. ILAW Disposal Subproject Activities that Require External Approval.

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	RL/DOE-HQ
RCRA Part A and Part B permits	Washington State Department of Ecology
Validation and capital funding	DOE-HQ
NRC incidental waste determination	NRC (Approved)
Other permits - Design (Critical Decision 1,2,3) - Construction	 DOE-HQ unless delegated to RL Various organizations
Project management plan	RL
DOE approval to operate	DOE

DNFSB = Defense Nuclear Facilities Safety Board
DOE-HQ = U.S. Department of Energy, Headquarters
NRC = U.S. Nuclear Regulatory Commission
RCRA = *Resource Conservation and Recovery Act of 1976*
RL = U.S. Department of Energy, Richland Operations Office

National Laboratory. It is expected to be completed before the PA is approved. 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. The PA will cover ILAW disposal in both modified grout vaults and the additional ILAW disposal complex facilities. A preliminary PA is expected to be issued to DOE-HQ in March 1998; a final PA is expected to be issued in 2001 and approved in April 2002 so that disposal operations can begin in June 2002. Before disposal operations, ILAW Interim Storage Facilities (grout vaults) will be available to receive ILAW packages by June 2002.

10.0 PROJECT ORGANIZATION, ROLES, AND RESPONSIBILITIES

The ILAW Disposal Subproject organization is based on the PHMC team concept. Active participants include RL, performing TWRS program or project organizations, engineer/ constructor, and, as appropriate, subcontracted architect-engineer and construction contractors. The performing subproject organizations provide program and project management and technical direction for RL during all phases of the project. Appropriate onsite support services, including 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 5. 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 4700.1, *Project Management Systems* (DOE 1992a). A more definitive subset will be developed before definitive design using guidance provided in Hanford Site procedures specific to line-item PMPs [HNF-PRO-563, *Project Management System* (FDH 1997b)].

11.0 PROJECT MANAGEMENT AND CONTROL

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. Sections 11.1 through 11.10 discuss these elements. Section 11.1 includes a discussion of the Subproject work breakdown structure, line-item project management, systems engineering, configuration management and project files management. Section 11.2 discusses technical, schedule, and cost baseline management and control.

11.1 PROJECT PLANNING

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.

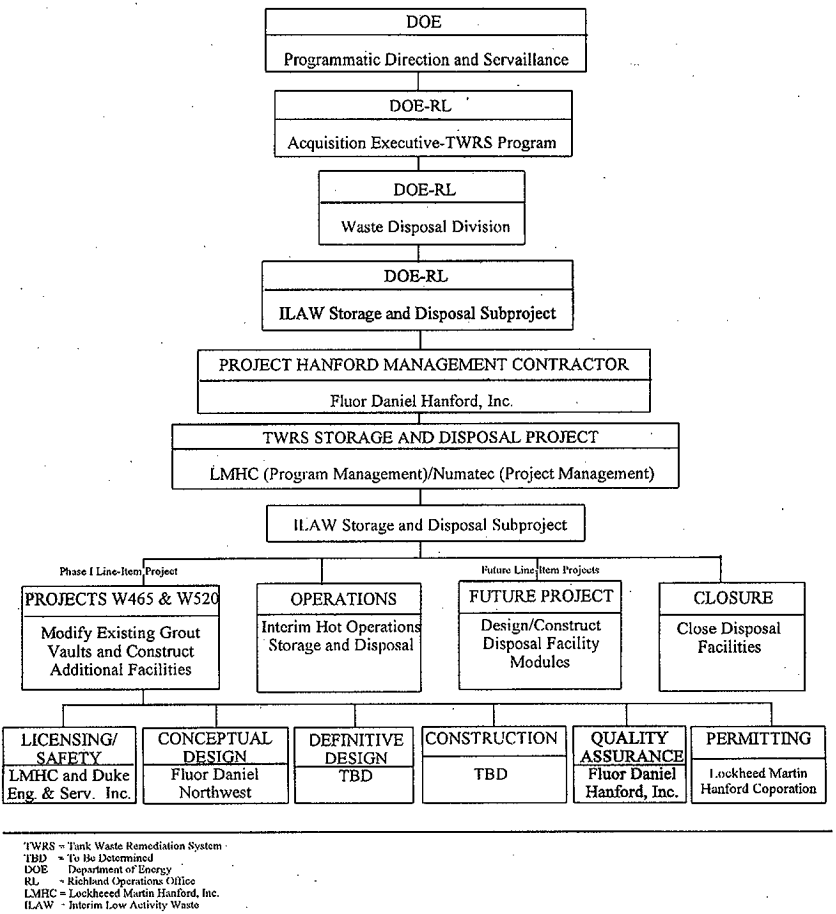
The LAW Storage Subproject Control organization will perform an annual assessment of the participant's management systems. The assessment scope and content will be tailored to an evaluation of implementation or execution and relate to some or all of the management system elements listed in Sections 11.1.1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

11.1.1 Work Breakdown Structure

A WBS was established for planning, execution, and control of the ILAW Storage and 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 Storage and 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 LAW Storage 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 Storage and 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, Figure 6, and are detailed in activity data sheets that are held as backup to the TWRS multi-year program plan. The activity data sheets are available from the TWRS

Figure 5. ILAW Disposal Subproject Organizational Relationships.



TWRS = Tank Waste Remediation System
TBD = To Be Determined
DOE = Department of Energy
RL = Richland Operations Office
LMHC = Lockheed Martin Hanford, Inc.
ILAW = Interim Low Activity Waste

Figure 6. ILAW Storage and Disposal Subproject Work Breakdown Structure.

1.1.3.4.01	**ILAW Storage/Disposal Subproject (Level 5)**
1.1.3.4.01.01	**Project Management/Administration (Level 6)**
1.1.3.4.01.01.01	Fiscal Year Work Plan (FYWP) Maintenance
1.1.3.4.01.01.02	Prepare Project Baseline Summary (PBS)
1.1.3.4.01.01.03	Prepare Multi-Year Program Plan
1.1.3.4.01.01.04	Project Management Support
1.1.3.4.01.02	**System Definition (Level 6)**
1.1.3.4.01.03	**Performance Assessment**
1.1.3.4.01.03.01	Performance Assessment Preparation/Coordination
1.1.3.4.01.03.02	Create Waste Form Data Packages
1.1.3.4.01.03.03	Create Geotechnical Data Packages
1.1.3.4.01.03.04	Obtain Other Data for Performance Assessment
1.1.3.4.01.04	**Immobilized Low-Activity Waste Project W-465/W-520 (Phase 1)**
1.1.3.4.01.04.01	W-465 Project Management
1.1.3.4.01.04.02	W-465 Conceptual Design
1.1.3.4.01.04.03	W-465 Advanced Conceptual Design
1.1.3.4.01.04.04	W-465 Preliminary Detailed Design (Title I)
1.1.3.4.01.04.05	W-465 Detailed Design (Title II)
1.1.3.4.01.04.06	W-465 Building Modifications/ Transport Systems
1.1.3.4.01.04.07	W-465 Startup
1.1.3.4.01.04.08	W-465 Permitting
1.1.3.4.01.04.09	W-465 Safety
1.1.3.4.01.04.10	W-520 Project Management
1.1.3.4.01.04.11	W-520 Conceptual Design
1.1.3.4.01.04.12	W-520 Advanced Conceptual Design
1.1.3.4.01.04.13	W-520 Preliminary Detailed Design (Title I)
1.1.3.4.01.04.14	W-520 Detailed Design (Title II)
1.1.3.4.01.04.15	W-520 Construction
1.1.3.4.01.04.16	W-520 Startup
1.1.3.4.01.04.17	W-520 Permitting
1.1.3.4.01.04.18	W-520 Safety
1.1.3.4.01.05	**Operations (Level 6)**
1.1.3.4.01.06	**Future Projects (Phase 2) (Level 6)**
1.1.3.4.01.06.01	Project Management
1.1.3.4.01.06.02	Conceptual Design
1.1.3.4.01.06.03	Advanced Conceptual Design
1.1.3.4.01.06.04	Preliminary Detailed Design (Title I)
1.1.3.4.01.06.05	Detailed Design (Title II)
1.1.3.4.01.06.06	Construction
1.1.3.4.01.06.07	Startup
1.1.3.4.01.06.08	Permitting
1.1.3.4.01.06.09	Safety
1.1.3.4.01.07	**Facility Decontamination and Decommissioning/Closure (Level 6)**
1.1.3.4.01.07.01	Dispose ILAW Operations
1.1.3.4.01.07.02	Close ILAW Disposal Facilities
1.1.3.4.01.07.03	Dispose ILAW (Phase 2)
1.1.3.4.01.07.04	Close ILAW Disposal Facilities (Phase 2)

Storage and Disposal Project files. The LAW Storage Subproject level (Level 5) and major Subproject activities (Level 6) dictionary sheets are summarized in Section 4.5.

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.

11.1.2 Project Management Plans (Phase 1 and 2 ILAW Storage and Disposal Line-Item Projects)

A PMP 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 (1992a) and are expected to include 430.1 (DOE 1995). Each line-item project PMP 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 PMPs 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 PMP also are considered controlled documents and must be subject to disciplined configuration management procedures. The line-item PMP will be updated annually and will be supplemented to meet the requirements of the RL Site Management System and MYWP (FDH 1997a). Each line-item PMP will be developed after the line-item project's conceptual design activity is complete.

11.1.3 System Engineering Management

The ILAW Disposal subproject will use WHC-SD-WM-SEMP-002, TWRS *System Engineering and Management Plan* (SEMP) (Peck 1996) as the basis for applying the systems engineering concept to the program. A Subproject SEMP will be 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. It includes a mission analysis to define objectives, an evaluation and optimization subprocess using functions and requirements analysis along with alternative generation and architecture selection plus trade studies as needed and a test and evaluation subprocess.

This systems engineering process was used to guide the MYWP planning and will allow for modification of the MYWP as better information becomes available from engineering trade studies. Baseline MYWP planning included using specifications for ILAW waste loading and durability as stated in the contract using worst case assumptions where ranges of properties were specified to ensure conservative planning. These include assumptions that all packages will have a specification maximum contact dose of 1 rem/hr, which requires shielding for transportation and

remote handling. The total LAW waste inventory in Hanford Site tanks, based on sodium inventories to be processed during both Phase 1 and Phase 2, as stated in the contract, were used, along with the waste loading specifications, to estimate the total ILAW inventory of glass expected (about 200,000 m^3).

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.

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.

A line-item project-specific SEMP will be prepared for each line-item project, as necessary, 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. See Figure 7 for a typical line-item project life cycle and associated systems engineering documents.

The line-item project SEMPs will conform to the DOE requirements (DOE Order 4700.1 or equivalent) as well as to the TWRS SEMP. The TWRS Systems engineering process, presented in Figure 8, will be used to develop an optimal cost-effective option to meet the identified system need. The end product of the process is documentation describing the preferred system and required performance. The process is a systematic approach that integrates the

Figure 7. A Typical Project Life Cycle with Associated Systems Engineering Documents.

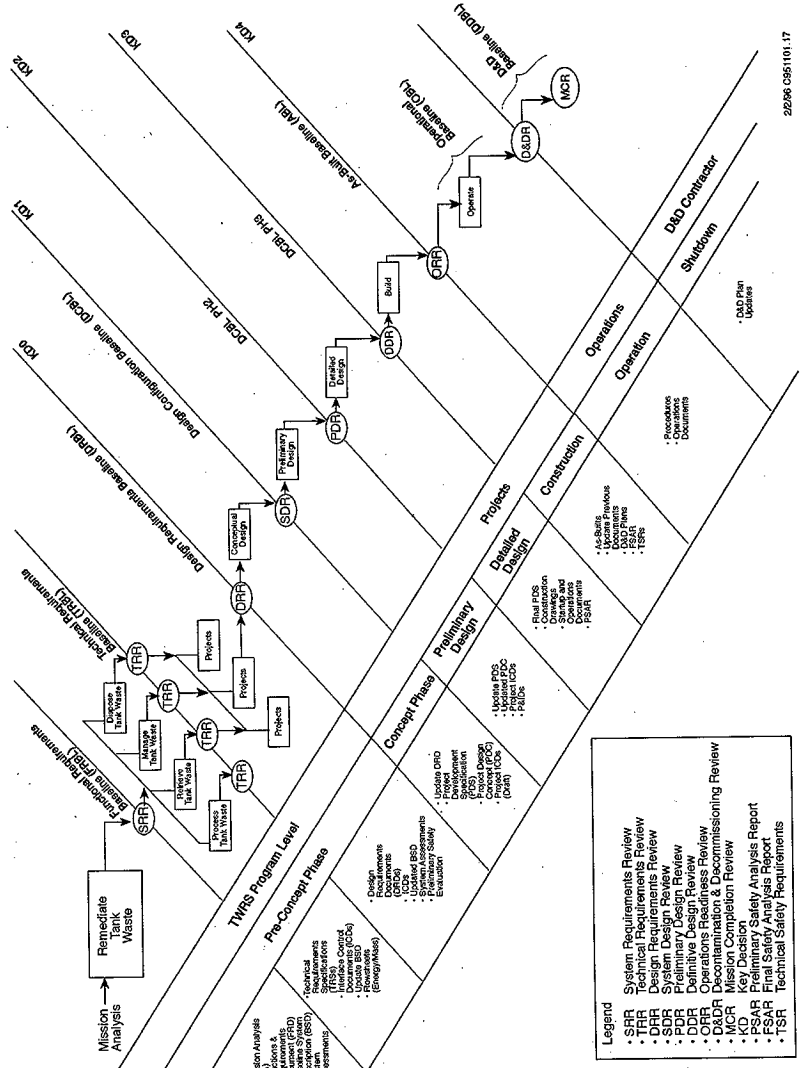
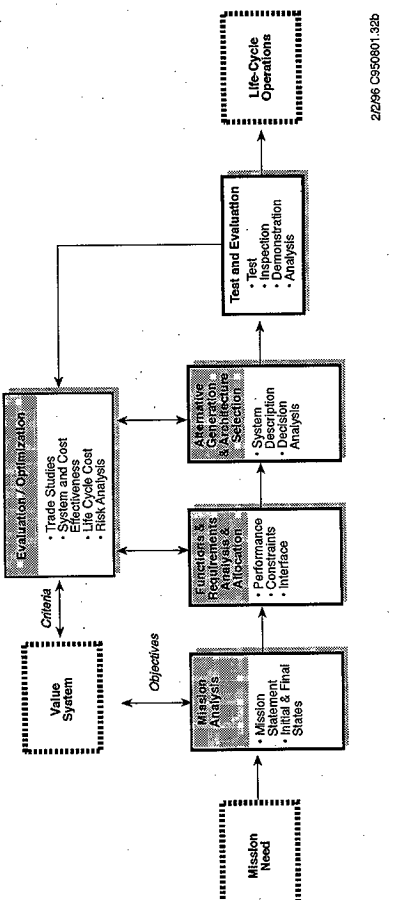


Figure 8. TWRS Systems Engineering Process.



development, construction, test, operations, support, and decommissioning of the system. It will be used throughout the system's life cycle.

ILAW Disposal line-item projects have been assigned a project risk/complexity factor of "moderate" and an associated Systems engineering level of 2. This designation will be formally documented in the line-item project SEMP. A Systems engineering Level-2 project is defined in the TWRS SEMP as a project requiring a full set of systems engineering activities and documentation that, because of its moderate degree of risk or complexity, can be tailored to the project's specific needs. The Systems engineering activities and resulting documentation determined necessary for the Projects W-465 ILAW Storage and Disposal line-item projects are presented in Figure 9. These figures show the status of the Systems engineering process as of the end of FY 1997.

The TWRS SEMP provides guidance to adopt the approved Systems engineering process for Hanford Site projects that were established before the approved TWRS SEMP was issued. Project W-465 was defined and is proceeding in parallel with development of the TWRS SEMP. The Systems engineering approach adopted by Project W-465 is essentially the same as that presented in the TWRS SEMP except that the Project W-465 DRD was developed and approved in lieu of preparing both a technical requirements specification and a DRD. Both documents have the same format and contain essentially the same information; however, the DRD includes more detail. Therefore, a technical requirements specification will not be prepared for Project W-465.

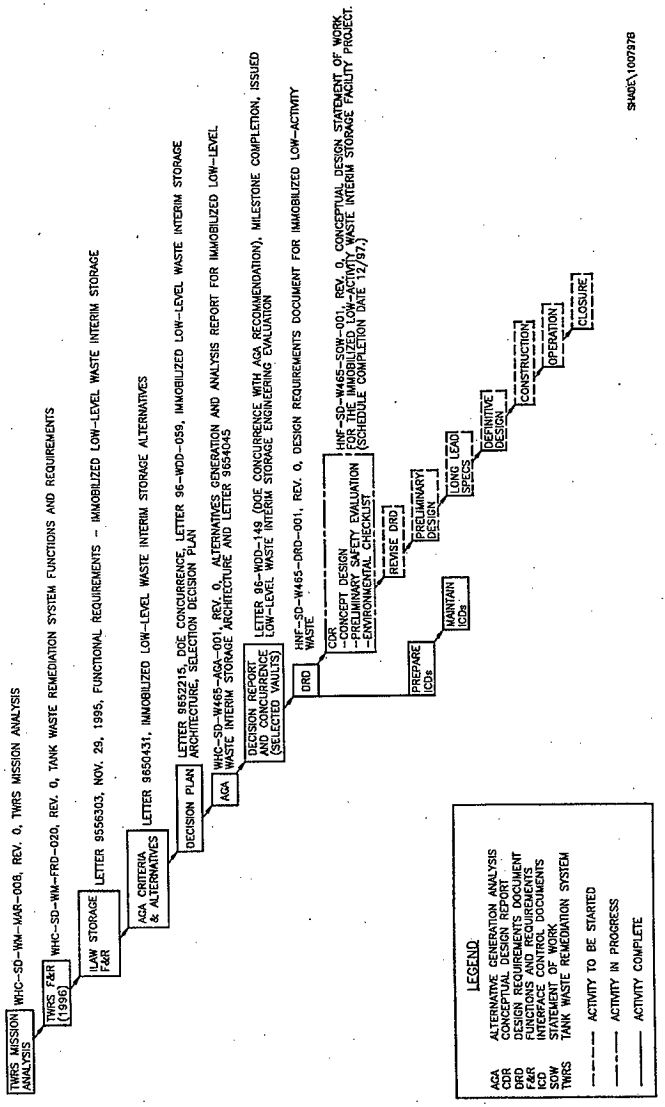
An AGA (Burbank 1996) was developed for ILAW Phase 1 interim storage. It identified the four existing grout vaults as the best alternative for interim storage for the initial production in Phase 1 privatization. A DRD has been prepared for grout vault modification (Burbank 1997) and conceptual design of vault modification alternatives has begun. Because Phase 1 is expected to produce up to about 14,000 packages, and the grout vaults have only about a 5,000-package capacity, additional storage will be required. A second alternatives analysis for ILAW disposal has been completed (Burbank and Klem 1997) that concurs with the 36.5 ha (90-acre) disposal site recommended in the TWRS complex site evaluation (Shord 1995) as the additional disposal site for the remaining Phase 1 production and all Phase 2 production. A separate DRD will be prepared for this disposal site.

Changes to the Hanford Site and TWRS technical baselines in the Hanford Site Technical Database will be incorporated as updates to the Project W-465 DRD.

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.

Figure 9. Systems Engineering Activities and Documentation—Project W-465.



11.1.4 Configuration Management

Configuration management is an integrated approach to controlling the technical cost, schedule, and administrative tasks necessary to manage the project. The Hanford Site configuration management requirements are prescribed in the PHMC Configuration Management Plan, HNF-MP-013, *Configuration Management* (FDH 1997c). The TWRS SEMP (Peck 1996) provides the requirements for a program documenting a product's functional and physical characteristics to be controlled during its life cycle, control changes to those characteristics, and provide information on the status of the product. These relationships are active throughout the product's life cycle, and when a change occurs to any one of these relationships, the others are evaluated to determine the impacts of the change.

A change control process provides an avenue to revise a product and determine the effects of the revision on other attributes of the product or on other products. Selected products will be identified and placed under Configuration Management control; the rigor of that control will be differentiated, and procedures will be established to define the rigor of control. The TWRS *Baseline Change Control*, HNF-IP-0842, Volume III, Section 1.1 procedure (LMHC 1997) will be the vehicle for making changes to the integrated baseline.

11.1.5 Project Files

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.

11.2 BASELINE MANAGEMENT

A total ILAW Storage and Disposal Subproject baseline are established for all activities to the completion of the subproject. All of these activities are reflected in the ILAW Storage and Disposal Subproject WBS (Figure 7). The technical baseline is the basis for the schedule and cost baselines that are reflected in the ILAW Storage and Disposal Subproject MYWP. 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 is done by establishing change class levels (level of approval authority) and a project change control board as specified in HNF-MD-008, *Baseline Change Control* (FDH 1997d). This management directive 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 (LMHC 1997).

11.2.1 Technical Baseline Control

A technical baseline will be established for the ILAW Storage and Disposal Subproject as depicted by the Subproject WBS and Subproject activities. A more detailed technical baseline will be developed for each ILAW Storage and 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.

11.2.2 Schedule Baseline Control

The LAW Storage Subproject baseline schedule is reflected in the MYWP.

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 and will contain sufficient detail to allow integration of all detail schedules into the Subproject summary schedule.

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-MD-008 (FDH 1997d) and implemented in accordance with the appropriate procedures in HNF-IP-0842 (LMHC 1997).

11.2.3 Cost Baseline Control

The Subproject cost baseline is the Subproject cost estimate and is established and controlled in the MYWP. Cost estimates need to be 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 RL 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, 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 DOE Waste Disposal Division (WDD) 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 will be processed through Change Control in accordance with the procedures found in HNF-MD-008. 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.

11.3 WORK AUTHORIZATION

Overall work authorization occurs by contractual arrangements between the RL 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 RL. Appropriate work performed by the PHMC A/E will be authorized by a letter of instruction.

11.4 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.

11.5 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 12.2.3, "Cost Baseline Control."

11.6 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.

11.7 MEETINGS AND REVIEWS

The Subproject will conduct monthly management review meetings with DOE WDD. 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, 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.

11.8 PROJECT VALIDATIONS

The line-item projects will be validated in accordance with DOE Order 4700.1 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 will be held late in FY 1998 for FYs 2000 through 2002 authorizations. A complete validation review will be conducted during FY 1998 for Project W-465. Validation for Project W-520 is scheduled for 1999.

11.9 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 (Alm 1996). Future CDs also are delegated to the RL manager. CD-2, authorization to begin definitive design, will be granted by the RL manager. CD-3 is authorization to begin construction activities and CD-4 is authorization to begin operation.

11.10 EXTERNAL INTERFACE CONTROL

Interface activities between the privatization contractor and ILAW Storage and Disposal will be conducted in accordance with the procedures in an ICD for the transfer of ILAW Phase 1 product from the privatization contractor to the ILAW Storage and Disposal Subproject. The ICD currently is being written. Its final version, which DOE, the PHMC, and the privatization contractor must agree with, will describe procedures and include resolution of issues for transferring ILAW packages from the privatization contractor to the ILAW Storage and Disposal Project.

12.0 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 project management plan. 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 project management plan. The project management plan is described in Section 11.1.2. The primary purpose of the project management plan acquisition strategy is to describe line-item project acquisition objectives and contracting processes and provide them to line-item project participants for implementation. The project management plan 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.

13.0 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, and waste form qualification.

13.1 QUALITY ASSURANCE

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 1997e), which is based on 10 CFR 830.120 and DOE Order 5700.6C, *Quality Assurance* (DOE 1991a). 10 CFR 830.120 applies to all TWRS activities involving a nuclear facility and DOE Order 5700.6C applies to the other activities.

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.

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.

13.2 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 1997f) and HNF-PRO-705, Rev.0, *Safety Basis Planning, Documentation, Review, and Approval* (FDH 1997g), in accordance with applicable DOE orders, standards, and policies, as well as Hanford Site-specific guidelines and work procedures.

13.2.1 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, *Nuclear Safety Analysis Reports* (DOE 1992b) and 5481.1B, *Safety Analysis and Review System* (DOE 1987b).

- 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.

Engineering task plans will be prepared to identify specific activities before work begins. The PSE and PSAR will undergo a Tier 1 PHMC functional review and an accelerated DOE review for approval (one tier instead of two). The three-tier review process will be reserved for the final authorization basis package to be approved for operation (see Section 13.2.2).

13.2.2 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 (LMHC 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 (FDH 1997g).

13.2.2.1 Program Level. The current TWRS authorization basis for the Hanford Site [HNF-SD-WM-BIO-001, Rev. 0, *Tank Waste Remediation System Basis for Interim Operations* (Noorani 1997) and the future TWRS FSAR] 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 (assuming that the TWRS FSAR will be approved at this time, otherwise it would become an addendum to the TWRS basis for interim operations) that addresses the following issues for both IHLW (Subproject W-464) and 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)
- IHLW and 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 and Spent Nuclear Fuel health and safety plan)

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

13.2.2.2 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 [HD-SD-W465-PSE-001, Rev. 0, *Preliminary Safety Evaluation for Project W-465, Immobilized Low-Activity Waste Interim Storage*(Mouette 1997)]. The FSAR will be completed before start up. However, the current plan, outlined in Table 7, 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 et al. 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*.

13.2.3 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 7. 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 1.1.3.4.01.04.09, Project W-465, and WBS 1.1.3.4.01.04.18, Project W-520 Safety (see Figure 6).

13.2.4 Safety References

- HNF-PRO-430, Rev. 0, *Safety Analysis Program* (FDH 1997f), based on the following orders, standards, and policies:
  - DOE 5480.21, *Unreviewed Safety Questions* (DOE 1992c)
  - DOE 5480.22, *Technical Safety Requirements* (DOE 1992d)

Table 7. Safety-Related Activities.

Tasks	Responsible and performing organizations	Observations/ project stages	DOE approval required	Tier review		
				1	2	3
Overall schedule						
Preliminary Safety Evaluation	TWRS 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	TWRS NS&L, OPSS	Advance conceptual design and congress budget cycle	Approval per HNF-PRO-705	x	x	(x)
Preliminary TWRS FSAR addendum development	TWRS NS&L, and SA group	Basis for both low- and high-activity PSAR/FSAR development - detailed design	No			
Update and final TWRS FSAR addendum	TWRS NS&L, Safety Analysis group (SA)	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)
Engineering task plan for development of PSAR	TWRS NS&L, OPSS	Mobilization for detailed design	No	x		
Development and DOE approval of a PSAR	TWRS NS&L, SA and OPSS groups	Detailed design and prior to start of procurement	Authorization to start procurement	x	x	(x)
Development of transportation criteria related to safety	TWRS NS&L, OPSS and WMH	Procurement specifications for trucks and casks	No			
SARP	TWRS NS&L, OPSS and Waste Management Federal Services Hanford	detailed design, construction and cold testing	Yes	x	x	x
USQ screening	TWRS NS&L, OPSS	Check that construction activities are covered by current AB	No			

Table 7. Safety-Related Activities.

Tasks	Responsible and performing organizations	Observations/ project stages	DOE approval required	Tier review		
				1	2	3
Overall schedule						
Development and approval of a FSAR	TWRS NS&L, SA and OPSS 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.

AB =
DOE = U.S. Department of Energy
FSAR = final safety analysis report
NS&L = Nuclear Safety and Licensing
OPSS = Operation and Project Safety Support
PSAR = preliminary safety analysis report
SA = Safety Analysis
SARP = Safety Analysis Report for Packaging
TBD = to be determined
TWRS = Tank Waste Remediation System
USQ = unreviewed safety question
WMH = Waste Management Federal Services Hanford

- DOE 5480.23, *Nuclear Safety Analysis Reports* (DOE 1992b), and DOE-STD-3009-94, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23* (DOE 1994a)
- DOE-STD-3009-94 and DOE-STD-3011-94, *Guidance for Preparation of Nuclear Facility Safety Analysis Reports, Technical Safety Requirements and SAR Implementation Plans* (DOE 1994b)
- DOE 5481.1B, *Safety Analysis and Review Systems* (DOE 1987b)
- DOE 6430.1A, *General Design Criteria* (DOE 1989)
- SEN-35-91, *DOE Nuclear Safety Policy* (DOE 1991b)
- DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE 5480.23* (DOE 1992e)
- DOE-EM-STD-5502-94, *Hazard Baseline Documentation* (DOE 1994c)

- HNF-IP-0842, Volume IV, *Authorization Basis Amendment Process* (LMHC 1997)

- HNF-SD-W465-PSE-001, Rev. 0, *Preliminary Safety Evaluation for Project W-465 Immobilized Low-Activity Waste Interim Storage Facility* (Mouette 1997)
- HNF-SD-ENV-EE-003, Rev. 0, *Permitting Plan for the Immobilized Low-Activity Waste Project* (Borneman 1997)
- WHC-CM-2-14, *Hazardous Material Packaging and Shipping.*
- HNF-PRO-705, Rev. 0, *Safety Planning, Documentation, Review and Approval* (FDH 1997g)
- HNF-SD-BIO-001, Rev. 0, *Tank Waste Remediation System Basis for Interim Operation* (Noorani 1997)
- 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* (Gilbert 1993)
- WHC-SD-WM-SSP-005, Rev.0, *Grout Facilities Standby Plan* (Claghorn 1994).

13.2.5 Permitting Process

In addition to the NEPA, RCRA, and safety documentation, permits will be required for anticipated air emissions and liquid effluents. In general, under the clean air regulations, these permits constrain the start of construction or operation. Specifically, notices of construction must be submitted to the Washington State Department of Health and the EPA before construction or modification of facilities such as the canister storage building (CSB) to address air emissions. Permit applications must be prepared and submitted to Ecology so that they can issue discharge permits or permit modifications for liquid waste disposal. A permitting plan that describes activities and milestones for obtaining permits has been prepared (Deffenbaugh 1997).

13.3 ENVIRONMENTAL MANAGEMENT

The environmental protection program for the Subproject, HNF-1773, Rev. 0, *TWRS Environmental Program Plan for M&I Contractor Work Scope in Support of TWRS Phase 1B Privatization,* (Borneman 1998) is established to ensure that 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 will be 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 will address environmental permitting requirements for the transportation and interim storage 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 Storage and Disposal Subproject portion of the TWRS MYWP (Lenseigne 1997). Important permitting activities are summarized in the LAW Storage and Disposal Subproject 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. This act is to protect public health and welfare through operations management, emissions control, and monitoring.
- *Hazardous Material Packaging and Shipping*, WHC-CM-2-14, which is the PHMC onsite transportation safety program.

- DOE Order 5400.1, *General Environmental Protection Program* (DOE 1988b), and DOE Order 5400.5, *Radiation Protection of the Public and the Environment* (DOE 1993), which require that monitoring be performed to determine any impact on the environment from activities that involve potential emission of radionuclides.

13.4 REGULATORY COMPLIANCE WITH DISPOSAL FACILITY REQUIREMENTS

13.4.1 Compliance Responsibilities

Compliance with ILAW product specification as stated on 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 accepting the ILAW product.

13.4.2 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.

14.0 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 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 PMPs. These test plans or specifications and procedures will address testing requirements for 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 Storage and 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 including: 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 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, 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 preoperational testing to demonstrate that operators, procedures, and 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.

15.0 REFERENCES

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APPENDIX A

CROSS-CHECK MATRIX OF PLAN ELEMENTS

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APPENDIX A

CROSS-CHECK MATRIX OF PLAN ELEMENTS

In Section 11.5 of the *Hanford Federal Facility Agreement and Consent Order*[1] (Tri-Party Agreement) as modified on December 31, 1996, the Washington State Department of Ecology requested that certain elements be included in project management plans. Table A-1 is the road map showing where these elements are located in this document.

Table A-1. Cross-Check Road Map between the Tri-Party Agreement and the Project Plan for the Immobilized Low-Activity Waste Subproject.

Required Elements	Location in Document
1. Project goals and objectives	Sec. 2.0 Hanford Mission/Objectives Sec. 3.0 ILAW Project Mission/Objectives
2. Project background 2.1 Waste stream physical information (inventories etc.) 2.2 Discussion of current commercial activities 2.3 Discussion of component and stream stability 2.4 Summary of earlier evaluation/ disposition options for each waste stream 2.5 Applicable regulatory requirements and impacts to project	Sec. 5.0 Project Background Sec. 5.2 Waste Stream Projections Sec. 5.3 S&D System Capacity Sec. 5.5 Current Disposal Activities Sec. 5.2 Waste Stream Components/ Projections Sec. 5.1 Summary of Treatment/Disposal Options. Sec. 5.4 Regulatory Requirements Sec. 5.6 Performance Assessment Appendix B, Applicable Documents
3. Project scope 3.1 Description of facilities 3.2 Description of planned approach 3.3 Top-level WBS with WBS dictionary 3.4 Projected TSD capability with performance requirements and projected capacity needs.	Sec. 4.0 Scope of ILAW Subproject Sec. 4.1 Facility Description Sec. 4.2, 4.3, 4.4, and 4.6 Sec. 4.5 Sec. 4.1 Facility Description Sec. 5.2, 5.3 Waste Projections and Disposal Capacity Needs

[1]Ecology, EPA, and DOE, 1996, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, U.S. Department of Energy, Olympia, Washington

Table A-1. Cross-Check Road Map between the Tri-Party Agreement and the Project Plan for the Immobilized Low-Activity Waste Subproject.

Required Elements	Location in Document
4. Project constraints with Tri-Party Agreement milestones and externally established schedule requirements.	Sec. 7.0 Project Controlling Milestones and Requirements. Sec. 7.1, 7.2, and 9.0
5. Schedule and critical path analysis	Sec. 7.3 and 7.3.2
6. Key deliverables and products plus performance parameters.	Sec. 7.0 Sec. 11.1 Project Planning Sec. 11.6 Performance Measurement/ Reporting App. D Key Deliverables/Measurements
7. Performance measurement: specific performance measures	Sec. 7.0 App. D Key Deliverables and Performance Measures
8 Project control 8.1 Project interface control 8.2 Reporting and notification requirements	Sec. 11.0 Project Management and Control Sec. 10.0 Project Roles App. E Responsibility Matrix. Sec. 11.6, 11.1
9. Change management: change control requirements	Section 11.2 Baseline Management
10. Summary of results of interim ILAW disposal facility performance assessment.	Appendix C, Performance Assessment Executive Summary.

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

APPENDIX B

APPLICABLE DOCUMENTS

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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.

B.1 GOVERNMENT DOCUMENTS

Federal government and Washington State regulations along with DOE orders have been reviewed to determine constraints applicable to the design, construction, and operation of the 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 TWRS program.

Table B-1. Applicable Constraint Documents.

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

Table B-1. Applicable Constraint Documents.

Document Identifier	Title
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
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 173-400	General Air Regulations

Table B-1. Applicable Constraint Documents.

Document Identifier	Title
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 173-303	Dangerous Waste Regulations
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
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.

B.2 NON-GOVERNMENT DOCUMENTS

Table B-2 provides a list of non-government documents that contain requirements applicable to the ILAW Storage.

Table B-2. *Company-Wide Controlled Manuals and Other Applicable Codes.*

Document identifier	Title
ASME	Boiler and Pressure Vessel Code, Section VIII, American Society of Mechanical Engineers
ANSI/ISA (1985)	Graphic Symbols for Process Displays
ANSI/ISA (1991)	Instrument Loop Diagrams
ANSI/ISA (1992) (R)	Binary Logic Diagrams for Process Operations
ANSI/ISA (1994)	Instrumentation Symbols and Identification
ANSI/ASME B30.2	Overhead and Gantry Cranes
ANSI B30.17	Overhead and Gantry Cranes
ASME (1989)	Quality Assurance Program Requirements for Nuclear Facilities
HSRCM-1	Hanford Site Radiological Control Manual
WHC-CM-1-3	Management Requirements and Procedures
WHC-CM-1-10	Safety Manual

Table B-2. Company-Wide Controlled Manuals and Other Applicable Codes.

Document identifier	Title
WHC-CM-1-11	Industrial Hygiene
WHC-CM-2-14	Hazardous Material Packaging and Shipping
WHC-CM-4-2	Quality Assurance Manual
WHC-CM-4-27	Radiological Control Practices and Procedures
WHC-CM-4-40	Industrial Hygiene Manual
WHC-CM-4-41 (1995)	Fire Protection Program Manual
WHC-CM-4-46	Safety Analysis Manual
WHC-CM-6-1	Standard Engineering Practices
WHC-CM-6-2	Project Management
WHC-CM-7-5	Environmental Compliance
WHC-EP-0063-4 (1993)	Hanford Site Solid Waste Acceptance Criteria
WHC-SD-ETF-WAC-001 (1994)	Acceptance of Feed Streams for Storage and Treatment at the LERF/ETF Complex

ANSI = American National Standards Institute
ASHRAE = American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME = American Society of Mechanical Engineers
ETF = Effluent Treatment Facility
HSRCM = Hanford Site Radiological Control Manual
ISA = Instrument Society of America
LERF = Liquid Effluent Retention Facility.

B.2.1 Hanford Site Documents/Other

Selected DOE orders and federal government and Washington State regulations have been reviewed by the Project Hanford Management Contractor (PHMC) to provide a consistent interpretation of the constraints for application at the Hanford Site. These constraints are represented in company-wide Controlled Manuals (CM).

B.2.2 Information Documents

Table B-3 lists other information documents.

Table B-3. Information Documents.

Document identifier	Title
WHC-SD-GN-DGS-3011	Radiological Design Guide
KH-SD-GN-DGS-30012	HPS, Architectural/Civil Manual
KH-SD-GN-DGS-30013	HPS, Electrical Manual
KH-SD-GN-DGS-30014	HPS, Instrumentation Manual
KH-SD-GN-DGS-30015	HPS, Mechanical Manual
WHC-IP-1043	Westinghouse Hanford Company Occupational ALARA Program
DOE/RL-92-36	Hanford Site Hoisting and Rigging Manual
CMAA-70	Electric Overhead Traveling Cranes

CMAA = Crane Manufacturer's Association of America
HPS = Hanford Plant Standards.

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APPENDIX C

SUMMARY OF *HANFORD LOW-LEVEL TANK WASTE INTERIM PERFORMANCE ASSESSMENT*, HNF-EP-0884, Rev. 1

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APPENDIX C

SUMMARY OF *HANFORD LOW-LEVEL TANK WASTE INTERIM PERFORMANCE ASSESSMENT* HNF-EP-0884, Rev. 1

The *Hanford Low-Level Tank Waste Interim Performance Assessment*, HNF-EP-0884, Rev. 1, examines the long-term environmental and human health effects associated with the disposal of the low-level fraction of the Hanford single- and double-shell tank waste in the Hanford Site 200 East Area. This report was prepared as a good management practice to provide needed information about the relationship between the disposal system design and performance early in the disposal system project cycle. The calculations in this performance assessment show that the disposal of the low-level fraction can meet environmental and health performance objectives.

C.1 BACKGROUND

The Hanford Site in south-central Washington State has been used extensively as a location for defense materials production by the U.S. Department of Energy (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 the 200 Areas.

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, to separate the waste into a small quantity of high-level waste and a much larger quantity of low-level waste on site in near-surface low-level tank 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 Remediation Systems, Hanford Site, Richland, Washington"[3]. Over 200,000 m^3 (6,000,000 ft^3) of low-level waste will be disposed of under this plan. This quantity is among the largest amounts in the DOE Complex and contains one of the largest inventories of long-lived radionuclides at a low-level waste facility.

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

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

DOE Order 5820.2A, *Radioactive Waste Management*,[4] is the primary regulation currently governing management and disposal of radioactive waste at DOE facilities. The interim performance assessment uses the techniques, methods, and rigor of the final performance assessment described in DOE Order 5820.2A where possible. Much of the data for this interim performance assessment is based on information from other projects or programs. As more of the design effort is completed and more data are collected, the preliminary and final performance assessments, which are required by DOE Order 5820.2A, will be prepared.

DOE Order 5820.2A is being revised. The existing drafts require similar information and effort as was required by DOE Order 5820.2A. The preliminary and final performance assessments will follow the DOE regulations then in effect.

C.2 DATA SOURCES

The data used in the interim performance assessment are documented in *Data Packages for the Hanford Low-Level Tank Waste Interim Performance Assessment*[5]. The base analysis and sensitivity cases are provided in *Definition of the Base Analysis Case of the Interim Performance Assessment*.[6]

Many of the decisions concerning the disposal of the low-level fraction of the Hanford tank waste have not yet been made. These include the choice of waste form, the selection of the disposal site, and the design of the disposal facility. Therefore, enabling assumptions were made.

The release rate of contaminants from the waste form (4.4 parts per million per year) used in the base analysis case is based on the Request for Proposal[7] issued by the Richland Operations

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

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

[6]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*, HANF-SD-WM-RPT-200, Revision 0, Westinghouse Hanford Company, Richland, Washington, December 1995.

[7]*Request for Proposals (RFP) No. DE-RP06-96RL13308*, letter from J. D. Wagoner to Prospective Offerors, U.S. Department of Energy, 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.

Office for the separation and immobilization of tank waste. Sensitivity cases were also performed for a typical low-level waste glass using computer simulation to estimate the rate at which the glass would release the contaminants.

The location of the disposal facility is assumed to be in the Hanford Site 200 East Area, just southwest of the Plutonium-Uranium Extraction (PUREX) facility. The disposal facility is assumed to consist of the following:

- A surface cover (to minimize the amount of water or other intrusion entering the facility)
- A sand-gravel capillary barrier to divert water around the waste form
- A concrete vault that is assumed to degrade in 500 years.

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 area.

The inventory of contaminants in the waste form is based on estimates for the tank waste inventory and using a conservative estimate to project the low-level 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 estimate for the most important radionuclide in this analysis (^{99}Tc) is in agreement with actual tank sampling data.

C.3 RESULTS

C.3.1 Introduction

Performance objectives were established[8] to protect the following:

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

The three-dimensional PORFLOW computer code was used to simulate the flow and transport of contaminants from the waste form through the vadose zone to the groundwater. The three-dimensional VAM3D-CG computer code simulated the flow and transport in the

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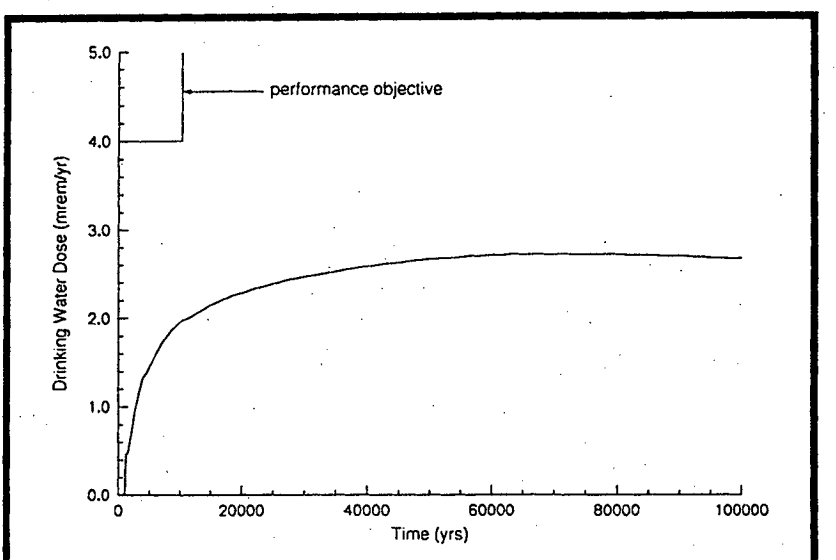
[8] *Performance Objectives of the Tank Waste Remediation Systems Low-Level Waste Disposal Program*, WHC-EP-0826, Revision 0, Westinghouse Hanford Company, Richland, Washington, December 1994.

groundwater. The results from PORFLOW and VAM3D-CG were combined with inventory and dosimetry data using the INTEG code to provide concentrations in groundwater and dose rates. Explicit calculations were conducted to 100,000 years after disposal with extrapolations used to extend the result to 65 million years. 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, in which the contaminant release time is short compared to the contaminant travel time, resulting in a peaked response.

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 4.0 mrem in a year for the first 10,000 years.



C.3.2 Protection of the General Public

Table C-1 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 for the all-pathways performance objective to be exceeded would require one or more of the following:

- A waste form not having a long-term release rate whose value is as small as for the short-term release rate specified in the Request for Proposal
- A high infiltration rate and a disposal facility design without a sand-gravel diverter
- A significantly larger inventory of selenium, technetium, or uranium.

During the first 10,000 years (the time 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). ^{99}Tc 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 Hanford actions 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-1. Comparison of Estimated Impacts with Performance Objectives for Protecting the Public. Time of Compliance is 10,000 Years. Place of Compliance is 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
ALARA (all-pathways) [persons-rem/y]	500.0	5.0

C.3.3 Protection of Inadvertent Intruders

Table C-2 compares the estimated impacts to the performance objectives for protecting the inadvertent intruder (the values for which are given in the DOE order). A one-time dose (an acute exposure) scenario as well as a continuous exposure scenario (a homesteader) are defined. Both performance objectives are met.

Table C-2. Comparison of Estimated Impacts with Performance Objectives for Protecting the Inadvertent Intruder. 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

The acute dose (estimated by assuming 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 three lower than the performance objective. At the time of compliance (500 years) ^{126}Sn contributes over 95 percent of the dose.

C.3.4 Protection of Groundwater Resources

Table C-3 compares the estimated impacts to the performance objectives for protecting the groundwater resources. The 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 downgradient of the disposal facility. The estimated impact from beta emitters is a factor of 2 less than the performance objectives and a factor of 5 less than the performance objective for the alpha emitters. The concentration of radium is insignificant.

The most important drivers are the inventory of technetium and uranium, the release rate from the waste form, the amount of mixing in the aquifer, and the area of the disposal facility. For the impact of alpha emitters, the amount of retardation experienced by the uranium isotopes in the vadose zone is also important.

Table C-3. Comparison of Estimated Impacts with Performance Objectives for Protecting Groundwater Resources. Time of Compliance is 10,000 Years. Place of Compliance is a Well 100 Meters Downgradient of 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
Radium [pCi/L]	3.0	<0.001

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. However, there are two exceptions. If the water infiltration rate is a factor of 5 lower than assumed (which is 0.5 mm/y for the first 1,000 years [the period during which the surface barrier is assumed to function] and 3.0 mm/y thereafter), then the most mobile radionuclides do not reach the groundwater in significant quantities during the compliance period. Alternatively, if the infiltration rate is a factor of 30 higher than assumed and if no capillary barrier is in place to divert the infiltration, then the uranium group arrives in significant amounts at the water table during the compliance period.

The beta/gamma drinking water dose rate is not estimated to exceed 4 mrem in a year for 75,000 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.

C.3.5 Protection of Surface Water Resources

Table C-4 displays a comparison of 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. Because of the large flow of the Columbia River, tremendous mixing occurs in the river and the predicted impacts would be far lower. 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.

Table C-4. Comparison of Estimated Impacts with Performance Objectives for Protecting Surface Water Resources. Time of Compliance is 10,000 Years. Point of Compliance is a Well 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
Radium [pCi/L]	3.0	<0.001

C.3.6 Protection of Air Resources

Table C-5 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-5. Comparison of Estimated Impacts with Performance Objectives for Protecting Air Resources. Time of Compliance is 10,000 Years. Point 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	$<10^{-8}$

C.4 DISCUSSION

Because of the early stage of this project, conservative assumptions have been used. Given such assumptions, it is gratifying that all the estimated impacts meet the performance objectives.

The numerous sensitivity cases that were run show that the results presented in this assessment are quite robust. The computer simulations of dissolution rates for low-level glass (LD6-5412) show that the 4.4 parts per million per year rate can be met. Concerning radionuclide inventory, the calculations are most sensitive to the amount of technetium. For the base analysis case no credit is taken for enhanced chemical separation or separation occurring during immobilization. Possible increased in the amounts of ^{90}Sr and ^{137}Cs over the amounts assumed in the base analysis case have no significant impacts at the intruder time of compliance of 500 years. Computer simulations of flow and transport under a wide variety of conditions show that slightly increased impacts may occur, but that most changes would result in larger decreases. Finally, calculations show that disposing of some of the tank waste in the existing Tank Waste Remediation System grout vaults, which are east of the PUREX facility, would not significantly affect the results.

The preliminary and final performance assessments (required by DOE Order 5820.2A) will benefit from knowledge of the waste form, the disposal facility location, 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 rates and waste form release rates. The performance assessments are expected to show that the onsite disposal of the low-level Hanford tank waste can meet the performance objectives with a high degree of assurance.

APPENDIX D

KEY DELIVERABLES AND PERFORMANCE MEASUREMENTS

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APPENDIX D

KEY DELIVERABLES AND PERFORMANCE MEASUREMENTS

Table D.1 summarizes the key milestones (Level 5 or above) for the ILAW Disposal Project and indicates due dates and 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.

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 Statement of Work-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	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.

Table D-1. ILAW Disposal Project Deliverables and Performance Measures.

Milestone Title	Due Date	Activity Description
Issue 1998 Performance Assessment	31Mar98	Issue PA for both grout vaults (W-465) and ILAW disposal complex (W-520) disposal systems for review.
Submit final PBS to RL	31Aug98	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 Statement of Work- FY 1999 to FY 2004	15Jun98	Revise the "Statement of Work for FY 1999 to 2004 for the Hanford LLW Performance Assessment 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	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	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 Statement of Work - FY 2000 to FY 2005	15Jun99	Revise "Statement of Work for FY 2000 - 2005" for the Hanford Low-Level Tank Waste Performance Assessment 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).

Table D-1. ILAW Disposal Project Deliverables and Performance Measures.

Milestone Title	Due Date	Activity Description
(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.
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.

Table D-1. ILAW Disposal Project Deliverables and Performance Measures.

Milestone Title	Due Date	Activity Description
Complete hot ops - ILAW S&D Phase 1 Facilities	30Dec11	Perform activities to operate ILAW ISF systems during ILAW production; system operations, maintenance, production & 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.
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 = activitiy data sheet
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
ILAW = immobilized low-activity waste
ISF = intermediate-scale facility
ISS = interim-status standards
KD = key decision
LAW = low-activity waste
MDS = material data sheet
MYPP = multi-year program 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
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

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APPENDIX E

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

Table E-1. Division of Responsibility Matrix - ILAW Storage/Disposal Subproject.

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

Table E-1. Division of Responsibility Matrix - ILAW Storage/Disposal Subproject.

Organization Activity	ILAW Storage/ Disposal Project Office (DOE WDD)	PHMC ILAW Storage/ Disposal Project	Phase I ILAW Storage/ Disposal Subproject (PHMC/ subcontractors)	Design Agent
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
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

Table E-1. Division of Responsibility Matrix - ILAW Storage/Disposal Subproject.

Organization Activity	ILAW Storage/ Disposal Project Office (DOE WDD)	PHMC ILAW Storage/ Disposal Project	Phase I ILAW Storage/ Disposal Subproject (PHMC/ subcontractors)	Design Agent
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

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APPENDIX F

IMMOBILIZED LOW-ACTIVITY WASTE SUBPROJECT SCHEDULE

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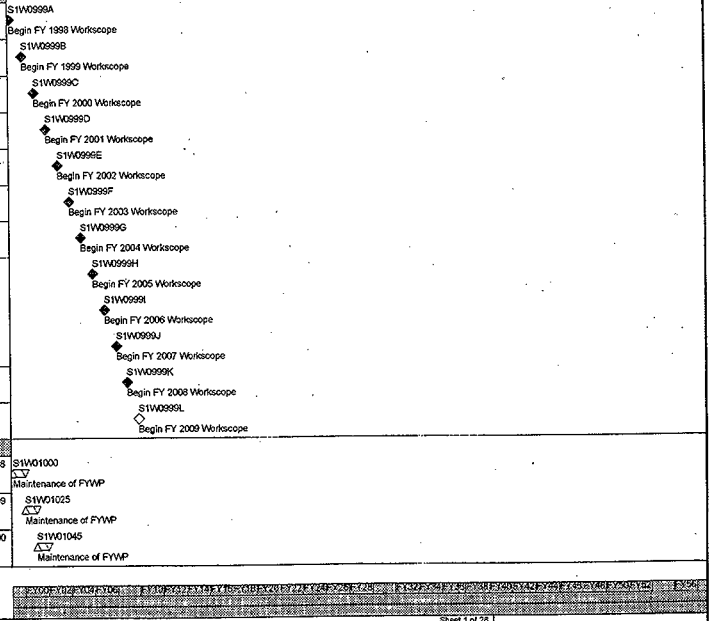
Activity ID	Activity Description	Early Start	Early Finish
1 Hanford			
1.1 Tank Waste Remediation System			
1.1.3 Waste Disposal			
1.1.3.4 ImBiz/Tank Waste Storage and Disposal (RL-TW09)			
1.1.3.4.01 LAW Storage/Disposal			
1.1.3.4.01.01 Project Administration			
S1W0999A	Begin FY 1998 Workscope	01OCT97*	
S1W0999B	Begin FY 1999 Workscope	01OCT98	
S1W0999C	Begin FY 2000 Workscope	01OCT99	
S1W0999D	Begin FY 2001 Workscope	02OCT00	
S1W0999E	Begin FY 2002 Workscope	01OCT01	
S1W0999F	Begin FY 2003 Workscope	01OCT02	
S1W0999G	Begin FY 2004 Workscope	01OCT03	
S1W0999H	Begin FY 2005 Workscope	01OCT04	
S1W0999I	Begin FY 2006 Workscope	03OCT05	
S1W0999J	Begin FY 2007 Workscope	02OCT06	
S1W0999K	Begin FY 2008 Workscope	01OCT07	
S1W0999L	Begin FY 2009 Workscope	01OCT08	
1.1.3.4.01.01.01 FYWP Maintenance			
S1W01000	Maintenance of FYWP	01OCT97	30SEP98
S1W01025	Maintenance of FYWP	01OCT98	30SEP99
S1W01045	Maintenance of FYWP	01OCT99	29SEP00



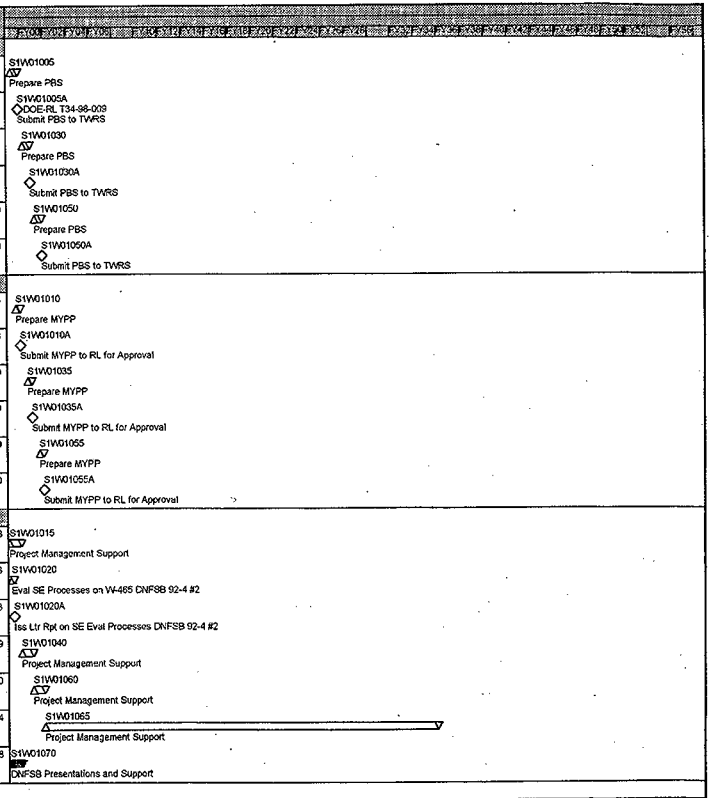
Project Start	01OCT97	Early Bar	
Project Finish	30SEP48	Progress Bar	
Data Date	01OCT97	Critical Activity	
Run Date	08DEC97		

TW91

Sheet 1 of 28

Lockheed Martin Hanford Corporation
Immobilized Waste
TW91 (10/97)

Activity ID	Activity Description	Early Start	Early Finish
1.1.3.4.01.01.02 Prepare PBS			
S1W01005	Prepare PBS	02JAN98	31AUG98
S1W01005A	Submit PBS to TWRS		31AUG98
S1W01030	Prepare PBS	04JAN99	31AUG99
S1W01030A	Submit PBS to TWRS		31AUG99
S1W01050	Prepare PBS	04JAN00	31AUG00
S1W01050A	Submit PBS to TWRS		31AUG00
1.1.3.4.01.01.03 Prepare MYPP			
S1W01010	Prepare MYPP	01JUN98	24SEP98
S1W01010A	Submit MYPP to RL for Approval		24SEP98
S1W01035	Prepare MYPP	01JUN99	24SEP99
S1W01035A	Submit MYPP to RL for Approval		24SEP99
S1W01055	Prepare MYPP	01JUN00	26SEP00
S1W01055A	Submit MYPP to RL for Approval		26SEP00
1.1.3.4.01.01.04 Project Management Support			
S1W01015	Project Management Support	01OCT97	30SEP98
S1W01020	Eval SE Processes on W-465 DNFSB 92-4 #2	01DEC97	27FEB98
S1W01020A	Iss Ltr Rpt on SE Eval Processes DNFSB 92-4 #2		27FEB98
S1W01040	Project Management Support	01OCT98	30SEP99
S1W01060	Project Management Support	01OCT99	29SEP00
S1W01065	Project Management Support	02OCT00	29SEP34
S1W01070	DNFSB Presentations and Support	01OCT97	30SEP98



Activity ID	Activity Description	Early Start	Early Finish
S1W01075	DNFSB Presentations and Support	01OCT98	30SEP99
S1W01100	Independent Cost Estimate Review	01OCT97	30SEP98
S1W01105	Independant Cost Estimate Review	01OCT98	30SEP99
S1W01110	Independant Cost Estimate Review	01OCT99	29SEP00
S1W01115	Independant Cost Estimate Review	02OCT00	28SEP01
S1W01120	Independant Cost Estimate Review	01OCT01	30SEP02
S1W01125	Independant Cost Estimate Review	01OCT02	29SEP34
S1W01130	Privatization/EIS Independent Review Support	01OCT97	30SEP98
S1W01175	Vadose Zone Program Integration	01OCT97	30SEP98
S1W01180	Vadose Zone Program Integration	01OCT98	30SEP99
S1W01205	Risk Management List Preparation and Maintenance	01OCT97	09OCT98
S1W01210	Risk Management List Preparation and Maintenance	12OCT98	11OCT99
S1W01215	Risk Management List Preparation and Maintenance	12OCT99	10OCT00
S1W01220	Risk Management List Preparation and Maintenance	11OCT00	09OCT01
S1W01225	Risk Management List Preparation and Maintenance	10OCT01	09OCT02
S1W01230	Risk Management List Preparation and Maintenance	10OCT02	10OCT34
S1W01235	Grout Vault Safety Checks	01OCT97	30SEP98
S1W01240	Grout Vault Safety Checks	01OCT98	30SEP99
S1W01245	Grout Vault Safety Checks	01OCT99	29SEP00
S1W01250	Grout Vault Safety Checks	02OCT00	28SEP01

Activity ID	Activity Description	Early Start	Early Finish
S1W01255	Grout Vault Safety Checks	01OCT01	30SEP02
S1W01260	Buyer Support	01OCT97	30SEP98
S1W01265	Buyer Support	01OCT98	30SEP99
S1W01270	Buyer Support	01OCT99	29SEP00
S1W01275	Buyer Support	02OCT00	28SEP01
S1W01280	Buyer Support	01OCT01	30SEP02
S1W01285	Buyer Support	01OCT02	29SEP34
S1W01290	PMBS/SMBS Updates	01OCT97	30SEP98
S1W01295	PMBS/SMBS Updates	01OCT98	30SEP99
S1W01300	PMBS/SMBS Updates	01OCT99	29SEP00
S1W01305	PMBS/SMBS Updates	02OCT00	28SEP01
S1W01310	PMBS/SMBS Updates	01OCT01	30SEP02
S1W01315	PMBS/SMBS Updates	01OCT02	29SEP34
S1W01320	Directors Office	01OCT97	30SEP98
S1W01325	Directors Office	01OCT98	30SEP99
S1W01330	Directors Office	01OCT99	29SEP00
S1W01335	Directors Office	02OCT00	28SEP01
S1W01340	Directors Office	01OCT01	30SEP02
S1W01345	Directors Office	01OCT02	28APR34

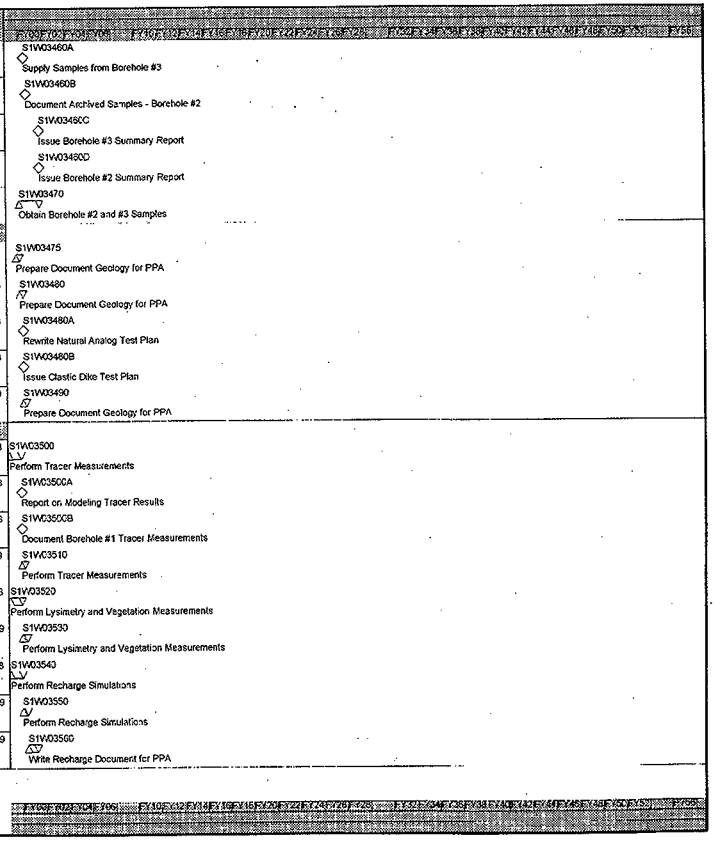
Activity ID
Activity Description
Early Start
Early Finish
1.13.4.01.02.01 LAW Systems Definition
S1WO2000 Program Logic Development 01OCT97 29MAY98
S1WO2010 Prepare Life Cycle Waste Mgmt Plan Per 435.1 01APR99 30SEP99
S1WO2020 Project Management Plan to Ecology 01OCT97 31DEC97
S1WO2020A M-90-01 Sub Project Management Plan to Ecology 31DEC97
S1WO2030 Prepare Systems Engineering Mgmt Plan for W-465 01APR98 30SEP98
S1WO2040 Support DNFSB Investigation of W-465 01OCT97 30SEP98
S1WO2050 Update DRD Proj Tech Basis Based on CD for W-465 05JAN98 31MAR98
S1WO2060 Prep DRD for the Disp System Include Closure Cap 01OCT97 30SEP98
S1WO2070 Prepare DRD for the Disposal System 01OCT96 31JAN00
S1WO2080 Prepare Waste Acceptance Criteria Per 435.1 01APR99 30SEP99
S1WO2090 Maint Interface w/Private Vendors/Update ICD 15 01OCT97 30SEP98
S1WO2100 Eng Study-RH Vs CH LAW Prod/Derived ST (ICD 15) 01OCT97 27FEB98
S1WO2110 Eng Study Reducing Overall Waste Volume (ICD 15) 01OCT97 31MAR98
S1WO2120 Maint Interface w/PA Team/Closure Plan Per 435.1 02FEB98 31JUL98
S1WO2130 PA Team Interface/Site Char Prov Inventory Basis 05JAN98 30JUN98
S1WO2140 Update Environmental/Permitting Strategies 01OCT97 27FEB98
S1WO2150 Support Closeout of SRR Action Items 01OCT97 30SEP98
S1WO2160 To-69 Product Storage Location 01OCT01 30SEP02
S1WO2170 To-69 Product Safety Basis Implications Review 01OCT08 30SEP10
S1WO2000 Program Logic Development
S1WO2010 Prepare Life Cycle Waste Mgmt Plan Per 435.1
S1WO2020 Project Management Plan to Ecology
S1WO2020A M-90-01: Sub Project Management Plan to Ecology
S1WO2030 Prepare Systems Engineering Mgmt Plan for W-465
S1WO2040 Support DNFSB Investigation of W-465
S1WO2050 Update DRD Proj Tech Basis Based on CD for W-465
S1WO2060 Prep DRD for the Disp System Include Closure Cap
S1WO2070 Prepare DRD for the Disposal System
S1WO2080 Prepare Waste Acceptance Criteria Per 435.1
S1WO2090 Maint Interface w/Private Vendors/Update ICD 15
S1WO2100 Eng Study-RH Vs CH LAW Prod/Derived ST (ICD 15)
S1WO2110 Eng Study Reducing Overall Waste Volume (ICD 15)
S1WO2120 Maint Interface w/PA Team/Closure Plan Per 435.1
S1WO2130 PA Team Interface/Site Char Prov Inventory Basis
S1WO2140 Update Environmental/Permitting Strategies
S1WO2150 Support Closeout of SRR Action Items
S1WO2160 To-69 Product Storage Location
S1WO2170 To-69 Product Safety Basis Implications Review

Activity ID
Activity Description
Early Start
Early Finish
1.3.4.01.05.01 Performance Assessment Preparation/Coordination
1.3.4.01.05.01.01 1998 Performance Assessment
S1WD3000 1998 Performance Assessment 01OCT97 30SEP98
S1WD3000 1998 Performance Assessment
S1WD3000A Issue 1998 Performance Assessment 31MAR98
S1WD3000A Issue 1998 Performance Assessment
S1WD3010 1998 Performance Assessment 01OCT98 15JAN99
S1WD3010 1998 Performance Assessment
S1WD3010A Receive DOE-HQ Approval of 1998 Perf Assessment 15JAN99
S1WD3010A Receive DOE-HQ Approval of 1998 Perf Assessment
1.3.4.01.05.01.02 2001 Performance Assessment
S1WD3050 Create Data Packages for 2001 PA 04JAN00 31JAN00
S1WD3050 Create Data Packages for 2001 PA
S1WD3050A Issue Data Packages for 2001 PA 31JAN00
S1WD3050A Issue Data Packages for 2001 PA
S1WD3060 Estab 2001 PA Base Analy Case/Sensitivity Cases 01FEB00 28APR00
S1WD3060 Estab 2001 PA Base Analy Case/Sensitivity Cases
S1WD3070 Perform Calculations for PPA 01MAY00 31OCT00
S1WD3070 Perform Calculations for PPA
S1WD3080 Write 2001 Performance Assessment 01MAY00 30MAR01
S1WD3080 Write 2001 Performance Assessment
S1WD3080A Reissue 2001 PA for HQ Review 30MAR01
S1WD3080A Reissue 2001 PA for HQ Review
S1WD3090 Interface to H101020 (PHMS 400.020) 30MAR01
S1WD3090 Interface to H101020 (PHMS 400.020)
S1WD3090 Interact with HQ on 2001 Performance Assessment 02APR01 31DEC01
S1WD3090 Interact with HQ on 2001 Performance Assessment
1.3.4.01.05.01.03 Coordination and Support
S1WD3100 Provide Administrative Support 01OCT97 30SEP98
S1WD3100 Provide Administrative Support
S1WD3110 Provide Administrative Support 01OCT98 29SEP01
S1WD3110 Provide Administrative Support
S1WD3120 Prepare SOWs 01APR98 15JUN98
S1WD3120 Prepare SOWs
S1WD3120A Issue SOW for FY 1999-FY 2004 15JUN98
S1WD3120A Issue SOW for FY 1999-FY 2004
S1WD3130 Prepare SOWs 01APR99 15JUN00
S1WD3130 Prepare SOWs
S1WD3130A Issue SOW for FY 2000-FY 2005 15JUN99
S1WD3130A Issue SOW for FY 2000-FY 2005

Activity ID	Activity Description	Early Start	Early Finish
S1W03130B	Issue SOW for FY 2001-FY 2006		15JUN00
S1W03140	PRP Interaction	01OCT97	30SEP98
S1W03150	PRP Interaction	01OCT98	28SEP01
S1W03160	Advisory Board	01OCT97	30SEP98
S1W03170	Advisory Board	01OCT98	31DEC99
S1W03180	Provide Support to WIT	01OCT97	30SEP98
S1W03190	Provide Support to WIT	01OCT98	28SEP01
1.1.3.4.0.1.0.5.0.1.2	Obtain Waste Form Data Packages		
1.1.3.4.0.1.0.3.0.2.0.1	Obtain Waste Form Simulation Code		
S1W03200	Obtain Waste Form Simulation Code for PPA-PNNL	01OCT97	30SEP98
S1W03210	Obtain Waste Form Simulation Code for PPA - LLNL	01OCT97	30SEP98
S1W03210A	Document Selection of Waste Form Simulation Code	30JAN99	
S1W03220	Obtain Waste Form Simulation Code for PPA	01OCT98	30APR99
1.1.3.4.0.1.0.3.0.2.0.2	Perform Waste Form Simulations	01OCT97	30SEP98
S1W03250	Waste Form Simulations - PNNL	01OCT97	30SEP98
S1W03255	Waste Form Simulations	01OCT98	30APR99
S1W03255A	Document Chemical Range (pH, Redox) - FY 1998		30SEP98
1.1.3.4.0.1.0.3.0.2.0.3	Perform Natural Analogue Testing	01OCT97	30SEP98
S1W03275	Natural Analogue Testing	01OCT98	30APR99
S1W03280	Natural Analogue Testing		
1.1.3.4.0.1.0.3.0.2.0.4	Waste Form Screening	01OCT97	30JAN98
S1W03300	Waste Form Screening - PNNL	01OCT97	30JAN98
S1W03310	Waste Form Screening - ANL	01OCT97	30JAN98

Activity ID	Activity Description	Early Start	Early Finish	FY00 FY01 FY02 FY03 FY04 FY05 FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15 FY16 FY17 FY18 FY19 FY20 FY21 FY22 FY23 FY24 FY25 FY26
S1WO3310A	Document Screening Testing		30JAN98	S1WO3310A Document Screening Testing
1.1.3.4.01.03.02.05 Waste Form Testing		30APR98		
S1WO3000C	Doc Characterization of Fully Radioactive Glass	30APR98		S1WO3060C Doc Characterization of Fully Radioactive Glass
S1WO3350	Waste Form Testing - PNNL	01OCT98	30APR99	S1WO3350 Waste Form Testing - PNNL
S1WO3350A	Doc Test Plan for PUF Tests with Vendor Glasses	31MAR98		S1WO3350A Doc Test Plan for PUF Tests with Vendor Glasses
S1WO3360	Waste Form Testing - PNNL	02FEB98	30SEP98	S1WO3360 Waste Form Testing - PNNL
S1WO3360A	Document PCT Test Plan for Vendor Glasses	30APR98		S1WO3360A Document PCT Test Plan for Vendor Glasses
S1WO3360B	Document PCT Testing on Vendor Glass - FY 1998		30SEP98	S1WO3360B Document PCT Testing on Vendor Glass - FY 1998
S1WO3360D	Doc Unsaturated Measurements on Vendor Glass		30SEP98	S1WO3360D Doc Unsaturated Measurements on Vendor Glass
S1WO3360E	Document To-Doped Glass Testing		30SEP98	S1WO3360E Document To-Doped Glass Testing
S1WO3370	Waste Form Testing - ANL	02FEB98	30SEP98	S1WO3370 Waste Form Testing - ANL
S1WO3375	Waste Form Testing - ANL	01OCT98	30APR99	S1WO3375 Waste Form Testing - ANL
1.1.3.4.01.03.02.06 Document Preparation		01OCT97	31DEC97	
S1WO3400	Docmnt Proced for Determining Long-Term Rel-ANL	01OCT97	31DEC97	S1WO3400 Docmnt Proced for Determining Long-Term Rel-ANL
S1WO3410	Docmnt Proced for Determining Long-Term Rel-PNNL	01OCT97	31DEC97	S1WO3410 Docmnt Proced for Determining Long-Term Rel-PNNL
S1WO3410A	Iss Procedure for Determining Long-Term Release		31DEC97	S1WO3410A Iss Procedure for Determining Long-Term Release
S1WO3420	Prep Waste Form Data Package for 2001 PA	03MAY99	31DEC99	S1WO3420 Prep Waste Form Data Package for 2001 PA
S1WO3420A	Issue Waste Form Data Package for 2001 PA		31DEC99	S1WO3420A Issue Waste Form Data Package for 2001 PA
1.1.3.4.01.03.03 Grab/Archived Data Packages				
1.1.3.4.01.03.03.01 Obtain Borehole Samples		01OCT97	31JUL99	
S1WO3450	Obtain Borehole #1 Samples	01OCT97	31JUL99	S1WO3450 Obtain Borehole #1 Samples
S1WO3450A	Document Archived Samples - Borehole #1	31MAR98		S1WO3450A Document Archived Samples - Borehole #1
S1WO3460	Obtain Borehole #2 and #3 Samples CBNRTC	01OCT98	30JUN00	S1WO3460 Obtain Borehole #2 and #3 Samples - CBNRTC

Activity ID	Activity Description	Early Start	Early Finish
S1W03460A	Supply Samples from Borehole #3	31MAR99	
S1W03460B	Document Archived Samples - Borehole #2	28MAY99	
S1W03460C	Issue Borehole #3 Summary Report		30JUN00
S1W03460D	Issue Borehole #2 Summary Report		30JUN00
S1W03470	Obtain Borehole #2 and #3 Samples	01OCT98	30JUN00
1.1.3.4.01.03.03.02 Provide Geology Information			
S1W03475	Prepare Document Geology for PPA	01JUL98	30SEP98
S1W03480	Prepare Document Geology for PPA	01OCT98	31DEC98
S1W03480A	Rewrite Natural Analog Test Plan		31DEC98
S1W03480B	Issue Clastic Dike Test Plan		31DEC98
S1W03490	Prepare Document Geology for PPA	04JAN99	28APR99
1.1.3.4.01.03.03.03 Provide Recharge Rate Information			
S1W03500	Perform Tracer Measurements	01OCT97	30SEP98
S1W03500A	Report on Modeling Tracer Results		30SEP98
S1W03500B	Document Borehole #1 Tracer Measurements		30SEP98
S1W03510	Perform Tracer Measurements	01OCT98	28JAN99
S1W03520	Perform Lysimetry and Vegetation Measurements	01OCT97	30SEP98
S1W03530	Perform Lysimetry and Vegetation Measurements	01OCT98	31MAR99
S1W03540	Perform Recharge Simulations	01OCT97	30SEP98
S1W03550	Perform Recharge Simulations	01OCT98	31MAR99
S1W03560	Write Recharge Document for PPA	01APR99	31DEC99



Activity ID	Activity Description	Early Start	Early Finish
S1W03560A	Reissue Recharge Document for PPA		31DEC99
1.1.3.4.01.03.03.04 Provide Far-Field Hydraulic Information			
S1W03570	Gather Other Far-Field Hydraulic Data	01OCT97	30SEP98
S1W03580	Gather Other Far-Field Hydraulic Data	01OCT98	28MAY99
S1W03590	Measure FY 1998 Borehole Hydraulic Data	01OCT98	31MAR99
S1W03600	Measure FY 1998 Borehole Hydraulic Data	01APR98	30SEP98
S1W03610	Prepare Far-Field Hydraulic Properties for PPA	01JUN99	31DEC99
1.1.3.4.01.03.03.05 Provide Near-Field Hydraulic Information			
S1W03620	Obtain Near-Field Hydraulic Data	01OCT97	30SEP98
S1W03630	Obtain Near-Field Hydraulic Data	01OCT98	30JUN99
S1W03640	Document Near-Field Hydraulic Properties for PPA	01JUL99	31DEC99
S1W03640A	Reissue Near-Field Hydraulic Data Docmnt for PPA		31DEC99
1.1.3.4.01.03.03.06 Provide Far-Field Geochemical Information			
S1W03650	Gather Other Far-Field Chemical Data	01OCT97	30SEP98
S1W03660	Gather Other Far-Field Chemical Data	01OCT98	31MAR99
S1W03670	Measure FY 1998 Borehole Chemical Data	01APR98	30SEP98
S1W03680	Measure FY 1998 Borehole Chemical Data	01OCT98	29JAN99
S1W03690	Document Far-Field Chemical Parameters for PPA	01APR99	31DEC99
S1W03690A	Reissue Far-Field Chemical Data Document for PPA		31DEC99
1.1.3.4.01.03.03.07 Provide Near-Field Geochemical Information			
S1W03700	Measure Near-Field Chemical Data	01OCT97	30SEP98
S1W03710	Measure Near-Field Chemical Data	01OCT98	28MAY99
S1W03720	Gather Getter Chemical Data - PNNL	01OCT98	30SEP99

Activity ID	Activity Description	Early Start	Early Finish
S1WD3730	Gather Getter Chemical Data - PNNL	01OCT99	31MAY00
S1WD3740	Gather Getter Chemical Data - SANDIA	01OCT98	30SEP99
S1WD3750	Gather Getter Chemical Data - SANDIA	01OCT99	31MAY00
S1WD3760	Document Near-Field Chemical Parameters for PPA	01JUN99	28DEC99
1.1.3.4.01.03.03.08	Obtain Contaminant Transport Codes		
S1WD3780	Select Code to be Used for Vadose Zone Transport	01OCT97	30SEP98
S1WD3780A	Select Code to be used for Vadose Zone Transport		30SEP98
S1WD3790	Upgrade Selected Vadose Zone Code	01OCT98	31DEC99
S1WD3790A	Issue V&V Report for Vadose Zone Simulation Code		31DEC99
S1WD3800	Groundwater Model (Assume from ER)	01OCT97	30SEP98
S1WD3810	Groundwater Model (Assume from ER)	01OCT98	31DEC99
1.1.3.4.01.03.04	Obtain Other Data for Performance Assessment		
1.1.3.4.01.03.04.01	Obtain Inventory Information		
S1WD3820	Create PPA Inventory Document	01OCT97	30SEP98
S1WD3830	Create PPA Inventory Document	01OCT98	31DEC99
S1WD3830A	Reissue PPA Inventory Document		31DEC99
1.1.3.4.01.03.04.02	Obtain Conceptual Model		
S1WD3840	Create PPA Conceptual Model for Disposal Fac	01OCT97	30SEP98
S1WD3850	Create PPA Conceptual Model for Disposal Fac	01OCT98	31DEC99
1.1.3.4.01.03.04.03	Obtain Dosimetry Information		30SEP98
S1WD3860	Document Dosimetry Data for PPA	01OCT97	
S1WD3870	Document Dosimetry Data for PPA	01OCT98	31DEC99
1.1.3.4.01.03.04.04	Determine Performance Objectives		
S1WD3880	Document Performance Objectives for PPA	01OCT98	31DEC99

Activity ID	Activity Description	Early Start	Early Finish
1.1.3.4.01.03.04.05 Determine Scenarios			
S1W03890	Document Scenarios for PPA	01OCT98	31DEC99
1.1.3.4.01.04 ILAW Project W-465/W-520 (Phase I)			
1.1.3.4.01.04.01 W-465 Project Management			
S1W04000	Project Validation (W-465)	01OCT97	30APR98
S1W04005	Life Cycle Cost Estimate	01OCT97	29APR98
S1W04010	Safeguards and Security Plan	01OCT97	29APR98
S1W04015	QAPP Graded Approach	02JAN98	27FEB98
S1W04020	Congressional Budget Cycle	01MAY98	30SEP99
S1W04025	Project Integration - Expense	02JAN01	28SEP01
S1W04030	Privatization Interface	03APR00	29SEP00
S1W04035	Project Management Construction - Expense	02JAN01	29AUG01
S1W04040	Privatization Interface	04JAN99	30SEP99
S1W04045	Privatization Interface	02OCT00	28SEP01
S1W04050	Privatization Interface	01OCT01	27SEP02
1.1.3.4.01.04.02 W-465 Conceptual Design			
S1W04055	Prep 100% Conceptual Design Rev/A/E Incorp/Issue	01OCT97	15DEC97
S1W04055A	M-90-02T: Comp Conceptual Design-ILAW ISF		15DEC97
1.1.3.4.01.04.04 W-465 Preliminary Detailed Design (Title I)			
S1W04060	Mobilize Design Team - Expense	01OCT99	31DEC99
S1W04065	Mobilize Design Team - Capital	01OCT99	31DEC99
S1W04069A	Critical Decision 1-Initiate Design - ILAW ISF	04JAN00	
S1W04070	Prepare Preliminary Design (Title I) - Expense	04JAN00	30JUN00

Chart annotations:

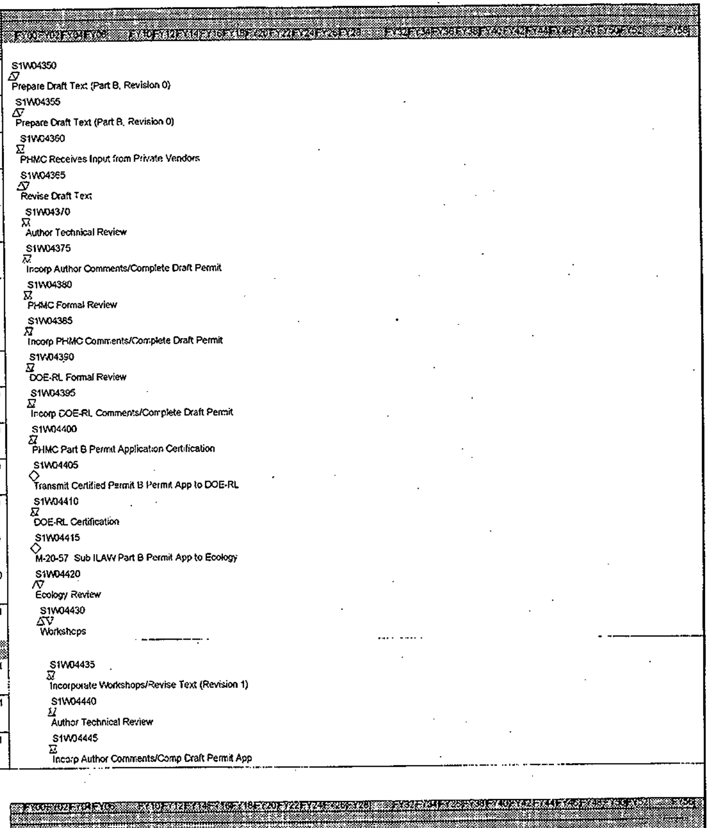
- S1W03890 Document Scenarios for PPA
- S1W04000 Project Validation (W-465)
- S1W04005 Life Cycle Cost Estimate
- S1W04010 Safeguards and Security Plan
- S1W04015 QAPP Graded Approach
- S1W04020 Congressional Budget Cycle
- S1W04025 Project Integration - Expense
- S1W04030 Privatization Interface
- S1W04035 Project Management Construction - Expense
- S1W04040 Privatization Interface
- S1W04045 Privatization Interface
- S1W04050 Privatization Interface
- S1W04055 Prep 100% Conceptual Design Rev/A/E Incorp/Issue
- S1W04055A TPA-TARGET T09-98-022 M-90 02T: Comp Conceptual Design-ILAW ISF
- S1W04060 Mobilize Design Team - Expense
- S1W04065 Mobilize Design Team - Capital
- S1W04069A Critical Decision 1-Initiate Design - ILAW ISF
- S1W04070 Prepare Preliminary Design (Title I) - Expense

Activity ID	Activity Description	Early Start	Early Finish
S1WO4075	Prepare Preliminary Design (Title I) - Capital	04JAN00	30JUN00
S1WO4075A	Issue Preliminary Design (Title I) - ILAW1SF		30JUN00
1.1.3.4.1.01.04.06.W 465 Detailed Design (Title II)			
S1WO4080	Prepare Detailed Design (Title II) - Expense	05JUL00	29SEP00
S1WO4085	Prep 90% Detailed Design (Title II) - Expense	02OCT00	29DEC00
S1WO4090	Prep 100% Detailed Design (Title II) - Expense	02JAN01	30MAR01
S1WO4095	Prepare Detailed Design (Title II) - Capital	05JUL00	30MAR01
S1WO4095A	M-90-04T: Complete Detailed Design - ILAW1SF		30MAR01
S1WO4100	Prepare Long Lead Equipment Specifications	05JUL00	29SEP00
1.1.3.4.1.01.04.06.W 465 Conversion			
S1WO4110	Eng Studies-Resolve CDR Uncertainties (W-465)	02JAN98	30SEP98
S1WO4114A	Initiate Site Preparation	05JUL00	
S1WO4115	Site Preparation for Grout Vaults - Exp	05JUL00	28JUN01
S1WO4120	Bid Prep for Construction of Vaults - Capital	05JUL00	30MAR01
S1WO4125	Award Bid Package - Capital	02APR01	28JUN01
S1WO4130	Critical Decision 3-Start of Construction - Exp	02APR01	28JUN01
S1WO4134A	M-90-05: CD-3-Initiate Construction - ILAW1SF	29JUN01	
S1WO4135	Modify Grout Vaults - Expense	28JUN01	31MAY02
S1WO4140	Modify Grout Vaults - Capital	28JUN01	31MAY02
S1WO4140A	Complete Modifications of Grout Vaults		31MAY02
S1WO4145	Product Receipt - Development and Testing	01MAR99	30SEP99

Activity ID	Activity Description	Early Start	Early Finish
S1W04150	Procurement of MII Handling Equipment - Expense	03APR00	26SEP00
S1W04155	Procure/Test Material Handling Equipment-CE/RTC	02OCT00	03APR01
S1W04160	Material Handling Equipment Testing - Expense	04APR01	02JAN02
S1W04165	Prepare Construction Permits - Capital	29JUN01	31MAY02
S1W04170	Construction Support	29JUN01	31MAY02
1.1.3.4.01.04.07	W-465 Start Up		
S1W04175	Critical Decision 4-Start of Operations - Exp	03JAN02*	03JAN02
S1W04180	Support Startup - Capital	02JAN02	31MAY02
1.1.3.4.01.04.08	W-465 Permitting		
1.1.3.4.01.04.08.01	ILAW Air Permit		
S1W04190	Obtain MOD/EMOH Approval	01OCT97	31DEC97
1.1.3.4.01.04.08.02	ILAW SEPA/NEPA		
S1W04200	Prepare Briefing (SEPA)	17MAR98	30MAR98
S1W04205	Request Meeting with Ecology (SEPA)	17MAR98	30MAR98
S1W04210	Dry Run with DOE-RL (SEPA)	31MAR98	31MAR98
S1W04215	Revise Briefing (SEPA)	01APR98	06APR98
S1W04220	LMHC Prepare Letter (NEPA)	14APR98	16APR98
S1W04225	Brief Ecology (SEPA)	07APR98	08APR98
S1W04230	LMHC Sign Letter (NEPA)	17APR98	17APR98
S1W04235	LMHC Transmit Letter to FDH (NEPA)	20APR98	20APR98
S1W04240	Preparation of C-2 Analysis	18JAN03	13OCT00
1.1.3.4.01.04.08.03	ILAW Notice of Intent (NOI)		
S1W04245	Prepare NOI for Review	01OCT97	14NOV97

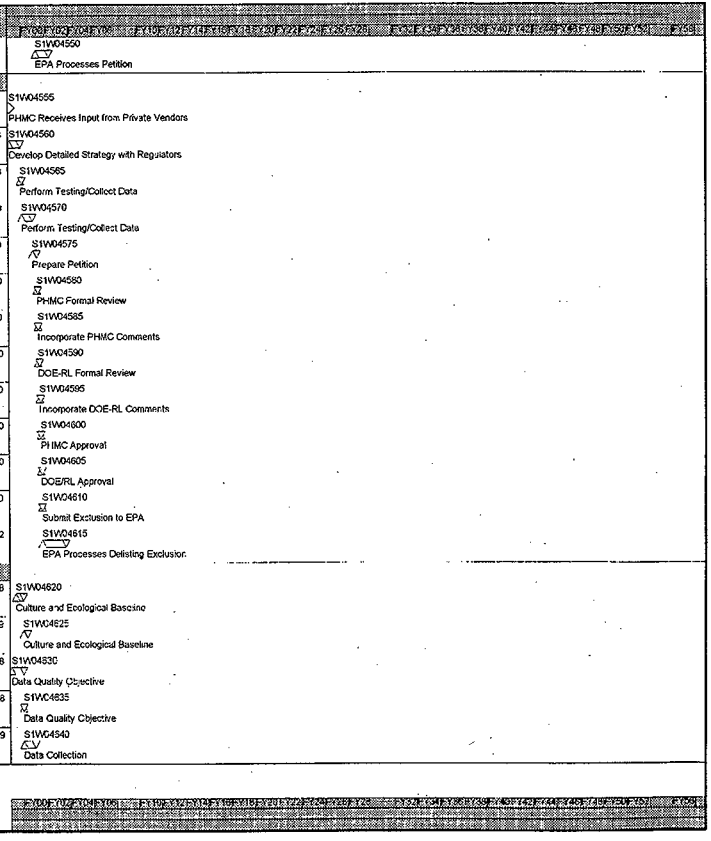
Activity ID	Activity Description	Early Start	Early Finish	1997 NOVEMBER
S1W04250	DOE-RL/Contractor Review	17NOV97	05DEC97	S1W04250 DOE-RL/Contractor Review
S1W04255	Incorporate Comments	08DEC97	26DEC97	S1W04255 Incorporate Comments
S1W04260	PHMC Approval	29DEC97	09JAN98	S1W04260 PHMC Approval
S1W04265	Transmit to DOE-RL		09JAN98	S1W04265 Transmit to DOE-RL
S1W04270	DOE-RL Approval	12JAN98	02FEB98	S1W04270 DOE-RL Approval
S1W04275	Submit NOI to Ecology	03FEB98	03FEB98	S1W04275 Submit NOI to Ecology
S1W04280	Review Period	04FEB98	02JUL98	S1W04280 Review Period
S1W04285	Request for Legal Notice Announcement	04FEB98	04FEB98	S1W04285 Request for Legal Notice Announcement
S1W04290	Legal Notice Publication Period	09FEB98	20FEB98	S1W04290 Legal Notice Publication Period
S1W04300	Prepare Part A Form 3	11MAR98	03APR98	S1W04300 Prepare Part A Form 3
S1W04305	PHMC Formal Review	06APR98	16APR98	S1W04305 PHMC Formal Review
S1W04310	Incorporate PHMC Comments	17APR98	24APR98	S1W04310 Incorporate PHMC Comments
S1W04315	DOE-RL Formal Review	27APR98	08MAY98	S1W04315 DOE-RL Formal Review
S1W04320	Incorporate DOE-RL Comments	11MAY98	20MAY98	S1W04320 Incorporate DOE-RL Comments
S1W04325	PHMC Part A Certification	21MAY98	17JUN98	S1W04325 PHMC Part A Certification
S1W04330	Transmit Certified Part A to DOE-RL		17JUN98	S1W04330 Transmit Certified Part A to DOE-RL
S1W04335	DOE-RL Certification	18JUN98	02JUL98	S1W04335 DOE-RL Certification
S1W04340	Submit Part A Permit Application		02JUL98	S1W04340 Submit Part A Permit Application
S1W04345	Ecology Review and Approval	07JUL98	30SEP98	S1W04345 Ecology Review and Approval

Activity ID	Activity Description	Early Start	Early Finish
1.1.3.4.01.04.08.05 Part B Permit Application, Rev. 0			
S1W04350	Prepare Draft Text (Part B, Revision 0)	01JUL98	30SEP98
S1W04355	Prepare Draft Text (Part B, Revision 0)	01OCT98	17FEB99
S1W04360	PHMC Receives Input from Private Vendors	18FEB99	18FEB99
S1W04365	Revise Draft Text	19FEB99	16JUN99
S1W04370	Author Technical Review	17JUN99	30JUN99
S1W04375	Incorp Author Comments/Complete Draft Permit	01JUL99	19JUL99
S1W04380	PHMC Formal Review	20JUL99	16AUG99
S1W04385	Incorp PHMC Comments/Complete Draft Permit	17AUG99	15SEP99
S1W04390	DOE-RL Formal Review	16SEP99	13OCT99
S1W04395	Incorp DOE-RL Comments/Complete Draft Permit	14OCT99	12NOV99
S1W04400	PHMC Part B Permit Application Certification	15NOV99	16DEC99
S1W04405	Transmit Certified Permit B Permit App to DOE-RL		16DEC99
S1W04410	DOE-RL Certification	17DEC99	17JAN00
S1W04415	M-20-57: Sub ILAW Part B Permit App to Ecology		17JAN00
S1W04420	Ecology Review	18JAN00	12MAY00
S1W04430	Workshops	15MAY00	14MAR01
1.1.3.4.01.04.08.06 Part B Permit Application, Rev. 1			
S1W04435	Incorporate Workshops/Revise Text (Revision 1)	15MAR01	10MAY01
S1W04440	Author Technical Review	11MAY01	24MAY01
S1W04445	Incorp Author Comments/Comp Draft Permit App	25MAY01	06JUN01



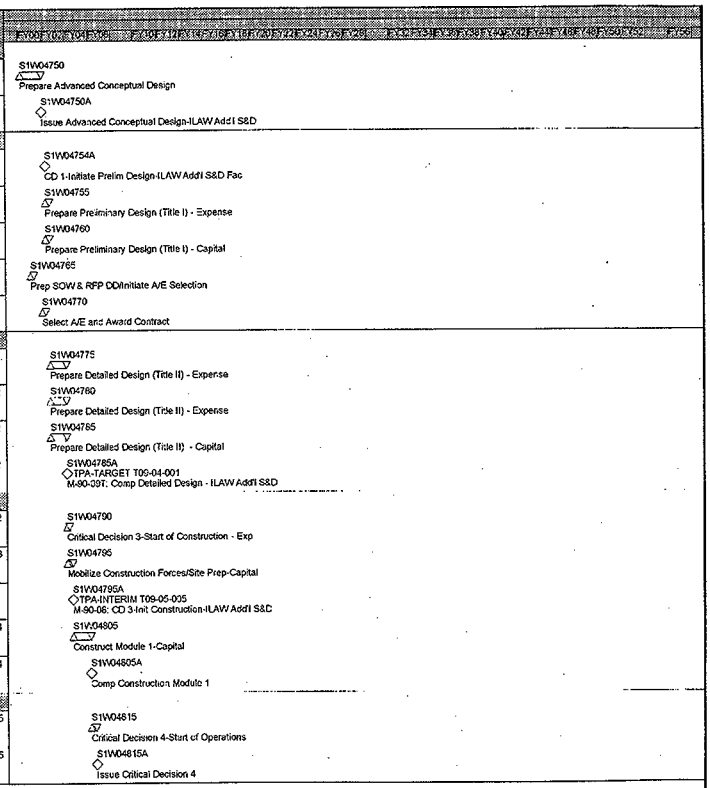
Activity ID	Activity Description	Early Start	Early Finish	FY96 FY97 FY98 FY99 FY00 FY01 FY02 FY03 FY04 FY05 FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15 FY16 FY17 FY18 FY19 FY20 FY21 FY22 FY23 FY24 FY25 FY26 FY27 FY28 FY29 FY30 FY31 FY32 FY33 FY34 FY35 FY36 FY37 FY38 FY39 FY40 FY41 FY42 FY43 FY44 FY45 FY46 FY47 FY48 FY49 FY50 FY51 FY52 FY53 FY54 FY55 FY56
S1W04450	PHMC Formal Review	07JUN01	03JUL01	S1W04450 PHMC Formal Review
S1W04455	Incorp PHMC Comments/Complete Draft Permit App	06JUL01	26JUL01	S1W04455 Incorp PHMC Comments/Complete Draft Permit App
S1W04460	DOE-RL Formal Review	27JUL01	23AUG01	S1W04460 DOE-RL Formal Review
S1W04465	Incorporate DOE-RL Comments/Comp Draft Permit	24AUG01	14SEP01	S1W04465 Incorporate DOE-RL Comments/Comp Draft Permit
S1W04470	PHMC Part B Permit Application Certification	17SEP01	26SEP01	S1W04470 PHMC Part B Permit Application Certification
S1W04475	Transmit Certified Part B Permit App to DOE-RL		28SEP01	S1W04475 Transmit Certified Part B Permit App to DOE-RL
S1W04480	DOE-RL Certification	01OCT01	30OCT01	S1W04480 DOE-RL Certification
1.1.3.4.01.04.03.07 ILAW Delisting Petition				
S1W04485	Prelim Strat/Cost Ben Analy for Delisting ILAW	01OCT97	12DEC97	S1W04485 Prelim Strat/Cost Ben Analy for Delisting ILAW
S1W04490	Scoping with EPA/Ecology - Delisting Content	15DEC97	13JUL98	S1W04490 Scoping with EPA/Ecology - Delisting Content
S1W04495	PHMC Req Data from PCPC Generates Data	14JUL98	11SEP98	S1W04495 PHMC Req Data from PCPC Generates Data
S1W04500	PHMC Receives Input from Private Contractors	14SEP98	14SEP98	S1W04500 PHMC Receives Input from Private Contractors
S1W04505	Prepare Delisting Petition	15SEP98	30SEP98	S1W04505 Prepare Delisting Petition
S1W04510	Prepare Delisting Petition	01OCT98	24MAY99	S1W04510 Prepare Delisting Petition
S1W04515	PHMC Formal Review	25MAY99	28JUL99	S1W04515 PHMC Formal Review
S1W04520	Incorporate PHVC Comments	27JUL99	24AUG99	S1W04520 Incorporate PHMC Comments
S1W04525	DOE-RL Formal Review	25AUG99	05OCT99	S1W04525 DOE-RL Formal Review
S1W04530	Incorporate DOE-RL Comments	06OCT99	03NOV99	S1W04530 Incorporate DOE-RL Comments
S1W04535	PHMC Approval	04NOV99	23NOV99	S1W04535 PHMC Approval
S1W04540	DOE-RL Approval	24NOV99	04JAN00	S1W04540 DOE-RL Approval
S1W04545	Submit Exclusion to EPA	05JAN00	05JAN00	S1W04545 Submit Exclusion to EPA

Activity ID	Activity Description	Early Start	Early Finish
S1W04550	EPA Processes Petition	06JAN00	23FEB01
1.1.3.4.01.04.08.08	LAW Rulemaking Petition		
S1W04555	PHMC Receives Input from Private Vendors	01OCT97	
S1W04560	Develop Detailed Strategy with Regulators	01OCT97	09SEP98
S1W04565	Perform Testing/Collect Data	10SEP98	30SEP98
S1W04570	Perform Testing/Collect Data	01OCT98	08SEP99
S1W04575	Prepare Petition	09SEP99	06JAN00
S1W04580	PHMC Formal Review	07JAN00	04FEB00
S1W04585	Incorporate PHMC Comments	07FEB00	25FEB00
S1W04590	DOE-RL Formal Review	28FEB00	27MAR00
S1W04595	Incorporate DOE-RL Comments	28MAR00	17APR00
S1W04600	PHMC Approval	18APR00	01MAY00
S1W04605	DOE/RL Approval	02MAY00	31MAY00
S1W04610	Submit Exclusion to EPA	01JUN00	01JUN00
S1W04615	EPA Processes Delisting Exclusion	02JUN00	31MAY02
1.1.3.4.01.04.08.09	Environmental Monitoring		
S1W04620	Culture and Ecological Baseline	02FEB98	30SEP98
S1W04625	Culture and Ecological Baseline	01OCT98	26FEB99
S1W04630	Data Quality Objective	01OCT97	30SEP98
S1W04635	Data Quality Objective	01OCT98	09OCT98
S1W04640	Data Collection	12OCT98	20OCT99

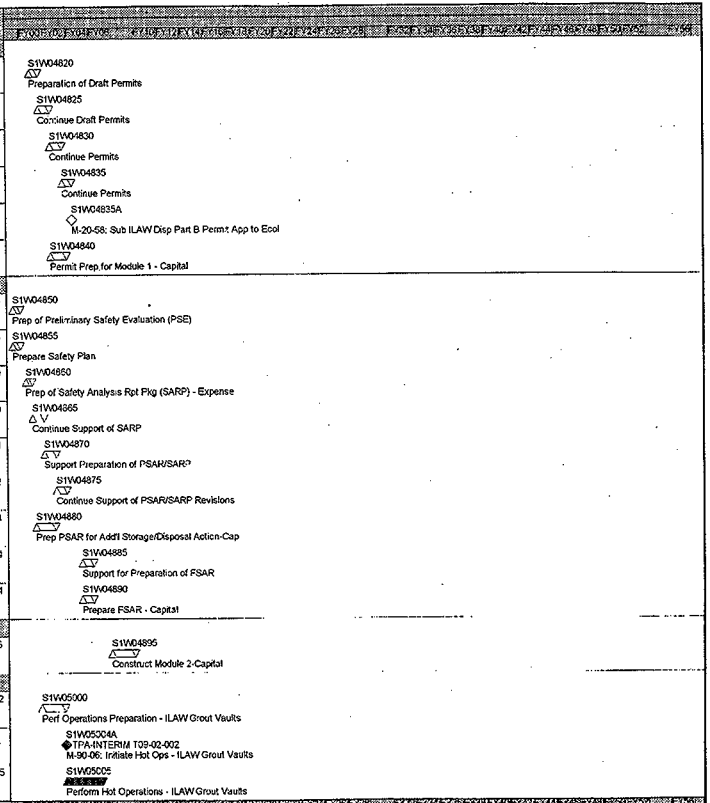


Activity ID	Activity Description	Early Start	Early Finish
113.4.01.04.09 W465 Safety			
S1W04645	Preparation PSAR/SARP - Expense	01JUL98	30SEP98
S1W04650	Continue Support of PSAR/SARP	01OCT98	30SEP99
S1W04655	Continue Support of PSAR/SARP	01OCT99	29SEP00
S1W04660	Prep PSAR/SARP for Mtl Transport System-Capital	01OCT99	29SEP00
S1W04660A	Issue PSAR/SARP		29SEP00
S1W04665	Preparation of FSAR - Expense	02OCT00	30MAR01
S1W04670	Prepare FSAR - Capital	02OCT00	30MAR01
S1W04675	SAR for Packaging-Trans Cask (FY 2000)	01OCT99	31MAR00
113.4.01.04.10 W520 Project Management			
S1W04700	Project Validation for Module 1	01OCT98	30APR99
S1W04705	Congressional Budget Cycle	03MAY99	29SEP00
S1W04710	Justification of Mission Need	01OCT97	30APR98
S1W04715	Program/Project Support	01OCT01	30SEP02
113.4.01.04.11 W520 Conceptual Design			
S1W04720	Prepare SOW for Addl Storage/Disposal Facility	01OCT97	30JAN98
S1W04725	Facilitated/Partnering Alignment Meeting	28JAN98	30JAN98
S1W04725A	Init Conceptual Design-ILAW Addl S&D Facility	02FEB98	
S1W04730	Prepare 30% CDR Review/Submit Comments to A/E	02FEB98	30APR98
S1W04735	Prepare 90% CDR Review/Submit Comments to A/E	01MAY98	30SEP98
S1W04740	Prep 100% CDR Review/Submit Comments to A/E	01OCT98	15DEC98
S1W04740A	M-90-07T Comp Conceptual Design-ILAW Addl S&D		15DEC98

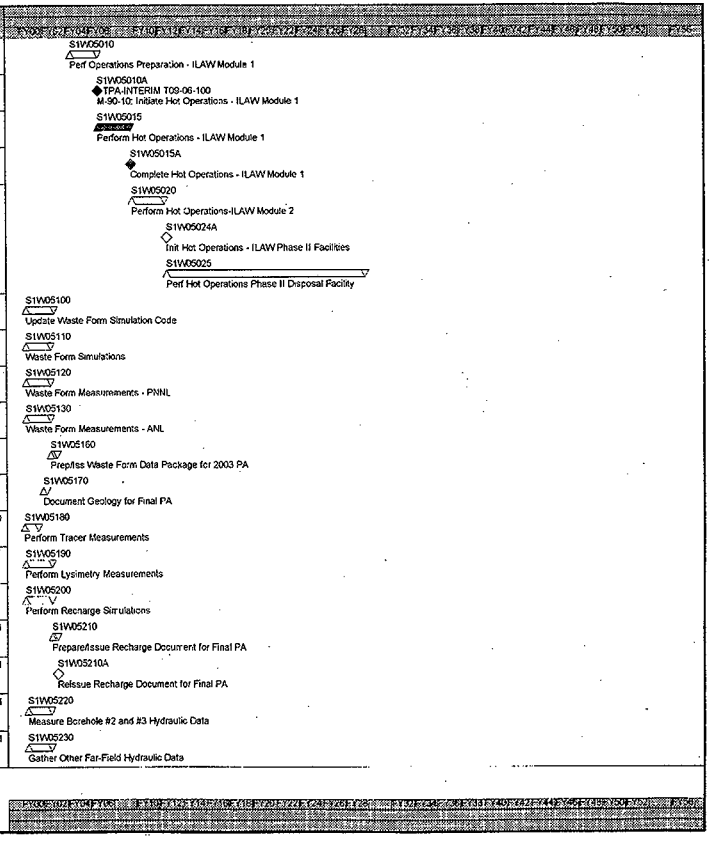
Activity ID	Activity Description	Early Start	Early Finish
1.1.3.4.01.04.12 W-529 Advanced Conceptual Design			
S1W04750	Prepare Advanced Conceptual Design	16DEC98	29SEP00
S1W04750A	Issue Advanced Conceptual Design-ILAW Addl S&D		29SEP00
1.1.3.4.01.04.13 W-529 Prelim Detailed Design (Title I)			
S1W04754A	CD 1-Initiate Prelim Design-ILAW Addl S&D Fac	01FEB01	
S1W04755	Prepare Preliminary Design (Title I) - Expense	01FEB01	31MAY01
S1W04760	Prepare Preliminary Design (Title I) - Capital	01FEB01	31MAY01
S1W04765	Prep SOW & RFP DD/Initiate A/E Selection	01OCT99	31DEC99
S1W04770	Select A/E and Award Contract	02OCT00	31JAN01
1.1.3.4.01.04.14 W-520 Detailed Design (Title II)			
S1W04775	Prepare Detailed Design (Title II) - Expense	01JUN01	30SEP02
S1W04780	Prepare Detailed Design (Title II) - Expense	01JUN01	30SEP02
S1W04785	Prepare Detailed Design (Title II) - Capital	01JUN01	30SEP02
S1W04785A	M-90-09T: Comp Detailed Design - ILAW Addl S&D		30SEP02
1.1.3.4.01.04.15 W-520 Construction			
S1W04790	Critical Decision 3-Start of Construction - Exp	01OCT02	31DEC02
S1W04795	Mobilize Construction Forces/Site Prep-Capital	01OCT02	31MAR03
S1W04795A	M-90-08: CD 3-Init Construction-ILAW Addl S&D	01APR03	
S1W04805	Construct Module 1-Capital	01APR03	30SEP04
S1W04805A	Comp Construction Module 1		30SEP04
1.1.3.4.01.04.16 W-520 Startup			
S1W04815	Critical Decision 4-Start of Operations	01OCT04	31MAR05
S1W04815A	Issue Critical Decision 4		31MAR05



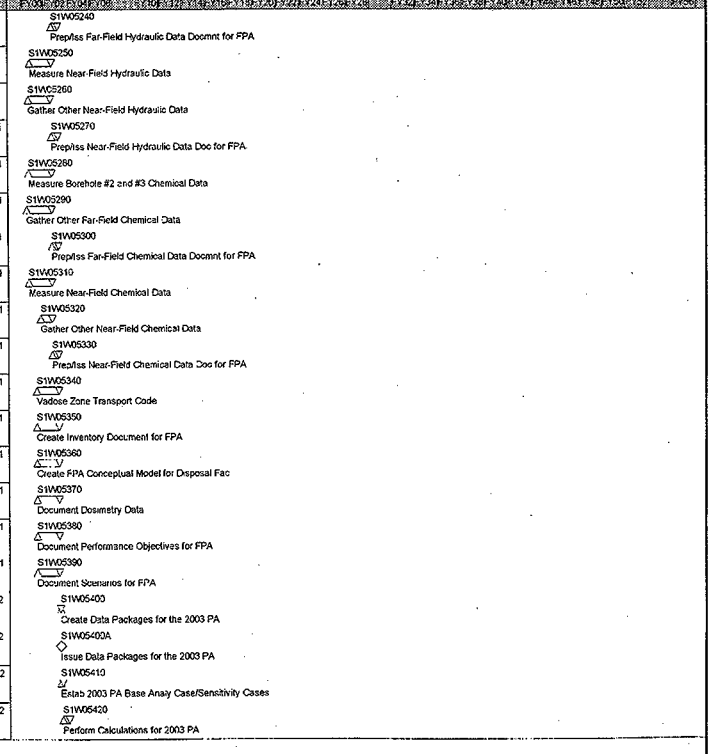
Activity ID	Activity Description	Early Start	Early Finish
1.1.3.4.01.04.17 W-520 Permitting			
S1W04820	Preparation of Draft Permits	01SEP99	31MAY00
S1W04825	Continue Draft Permits	01JUN00	31MAY01
S1W04830	Continue Permits	01JUN01	31MAY02
S1W04835	Continue Permits	03JUN02	31MAR03
S1W04835A	M-20-58: Sub ILAW Disp Part B Permit App to Ecol		31MAR03
S1W04840	Permit Prep for Module 1 - Capital	01JUN01	30SEP02
1.1.3.4.01.04.18 W-520 Safety			
S1W04850	Prep of Preliminary Safety Evaluation (PSE)	02FEB98	30SEP98
S1W04855	Prepare Safety Plan	02FEB98	30SEP98
S1W04860	Prep of Safety Analysis Rpt Pkg (SARP) - Expense	01APR99	30SEP99
S1W04865	Continue Support of SARP	01OCT99	29SEP00
S1W04870	Support Preparation of PSAR/SARP	02OCT00	01OCT01
S1W04875	Continue Support of PSAR/SARP Revisions	02OCT01	03SEP02
S1W04880	Prep PSAR for Addl Storage/Disposal Action-Cap	04JAN00	31AUG01
S1W04885	Support for Preparation of FSAR	02JAN04	31DEC04
S1W04890	Prepare FSAR - Capital	02JAN04	31DEC04
1.1.3.4.01.04.19 Module 2 Construction			
S1W04895	Construct Module 2-Capital	05JUL05	30JUN06
1.1.3.4.01.05 Operations			
S1W05000	Perf Operations Preparation - ILAW Grout Vaults	01JUN00	31MAY02
S1W05004A	M-90-06: Initiate Hot Ops - ILAW Grout Vaults	04JUN02	
S1W05005	Perform Hot Operations - ILAW Grout Vaults	04JUN02	01AUG05



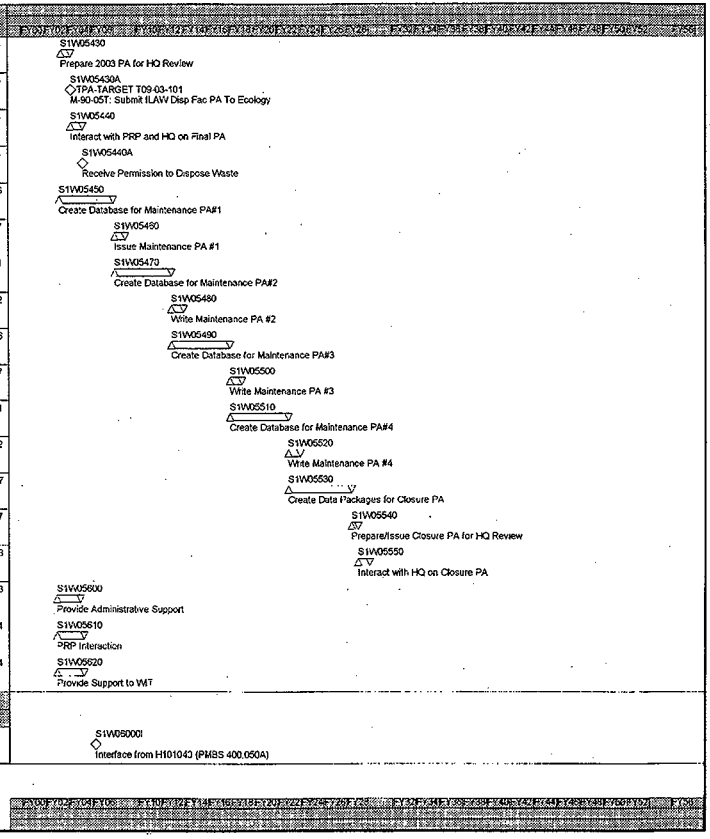
Activity ID	Activity Description	Early Start	Early Finish
S1W05010	Perf Operations Preparation - ILAW Module 1	01APR03	29JUL05
S1W05010A	M-90-10: Initiate Hot Operations - ILAW Module 1	02AUG05	
S1W05015	Perform Hot Operations - ILAW Module 1	02AUG05	02JUN08
S1W05015A	Complete Hot Operations - ILAW Module 1		02JUN08
S1W05020	Perform Hot Operations-ILAW Module 2	01JUL08	29APR11
S1W05024A	Init Hot Operations - ILAW Phase II Facilities	01AUG11	
S1W05025	Perf Hot Operations Phase II Disposal Facility	01AUG11	28JUL26
S1W05100	Update Waste Form Simulation Code	03MAY99	30AUG01
S1W05110	Waste Form Simulations	03MAY99	31MAY01
S1W05120	Waste Form Measurements - PNNL	03MAY99	31MAY01
S1W05130	Waste Form Measurements - ANL	03MAY99	31MAY01
S1W05160	Prep/Iss Waste Form Data Package for 2003 PA	01JUN01	31DEC01
S1W05170	Document Geology for Final PA	03OCT00	30JAN01
S1W05180	Perform Tracer Measurements	01FEB99	28APR00
S1W05190	Perform Lysimetry Measurements	01APR99	29JUN01
S1W05200	Perform Recharge Simulations	01APR99	29JUN01
S1W05210	Prepare/Issue Recharge Document for Final PA	02JUL01	31DEC01
S1W05210A	Reissue Recharge Document for Final PA		31DEC01
S1W05220	Measure Borehole #2 and #3 Hydraulic Data	01JUN99	31MAY01
S1W05230	Gather Other Far-Field Hydraulic Data	01JUN99	31MAY01



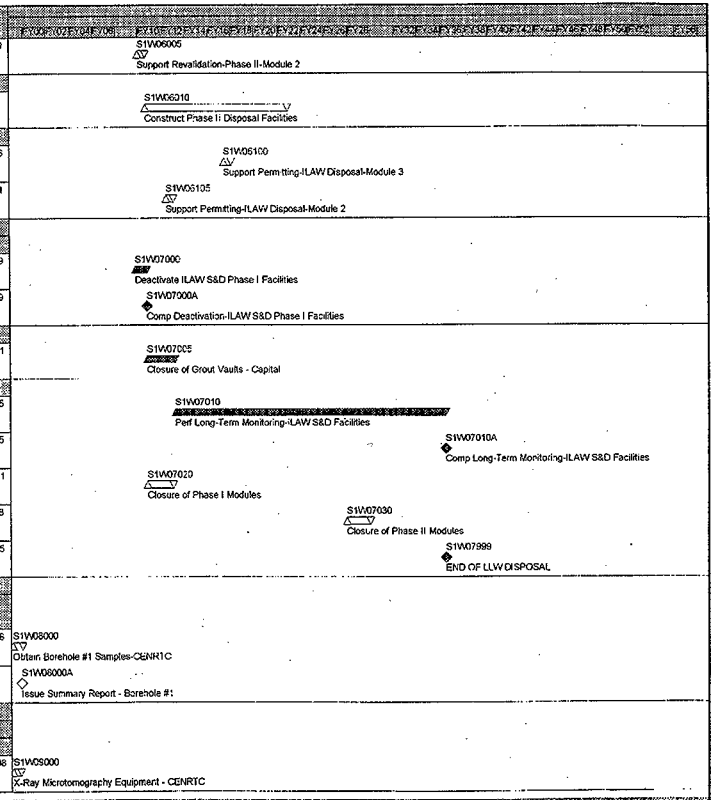
Activity ID	Activity Description	Early Start	Early Finish
S1W05240	Prep/Iss Far-Field Hydraulic Data Docmnt for FPA	01JUN01	31DEC01
S1W05250	Measure Near-Field Hydraulic Data	01JUL99	31MAY01
S1W05260	Gather Other Near-Field Hydraulic Data	01JUN99	30APR01
S1W05270	Prep/Iss Near-Field Hydraulic Data Doc for FPA	01JUN01	31DEC01
S1W05280	Measure Borehole #2 and #3 Chemical Data	01JUN99	31MAY01
S1W05290	Gather Other Far-Field Chemical Data	01APR99	31MAY01
S1W05300	Prep/Iss Far-Field Chemical Data Docmnt for FPA	01JUN01	31DEC01
S1W05310	Measure Near-Field Chemical Data	01JUN99	31MAY01
S1W05320	Gather Other Near-Field Chemical Data	01JUN00	31MAY01
S1W05330	Prep/Iss Near-Field Chemical Data Doc for FPA	01JUN01	31DEC01
S1W05340	Vadose Zone Transport Code	04JAN00	31DEC01
S1W05350	Create Inventory Document for FPA	04JAN00	31DEC01
S1W05360	Create FPA Conceptual Model for Disposal Fac	04JAN00	31DEC01
S1W05370	Document Dosimetry Data	04JAN00	31DEC01
S1W05380	Document Performance Objectives for FPA	04JAN00	31DEC01
S1W05390	Document Scenarios for FPA	04JAN00	31DEC01
S1W05400	Create Data Packages for the 2003 PA	02JAN02	31JAN02
S1W05400A	Issue Data Packages for the 2003 PA		31JAN02
S1W05410	Estab 2003 PA Base Analy Case/Sensitivity Cases	01FEB02	29MAR02
S1W05420	Perform Calculations for 2003 PA	01APR02	30SEP02



Activity ID	Activity Description	Early Start	Early Finish
S1W05430	Prepare 2003 PA for HQ Review	01APR02	31JAN03
S1W05430A	M-90-05T: Submit ILAW Disp Fac PA To Ecology		31JAN03
S1W05440	Interact with PRP and HQ on Final PA	03FEB03	30JAN04
S1W05440A	Receive Permission to Dispose Waste		30JAN04
S1W05450	Create Database for Maintenance PA#1	02JAN02	29SEP06
S1W05460	Issue Maintenance PA #1	02OCT06	28SEP07
S1W05470	Create Database for Maintenance PA#2	02OCT06	30SEP11
S1W05480	Write Maintenance PA #2	03OCT11	28SEP12
S1W05490	Create Database for Maintenance PA#3	03OCT11	30SEP16
S1W05500	Write Maintenance PA #3	03OCT16	29SEP17
S1W05510	Create Database for Maintenance PA#4	03OCT16	30SEP21
S1W05520	Write Maintenance PA #4	01OCT21	29SEP22
S1W05530	Create Data Packages for Closure PA	01OCT21	31MAR27
S1W05540	Prepare/Issue Closure PA for HQ Review	01APR27	30SEP27
S1W05550	Interact with HQ on Closure PA	01OCT27	29SEP28
S1W05600	Provide Administrative Support	01OCT01	30SEP03
S1W05610	PRP Interaction	01OCT01	30JAN04
S1W05620	Provide Support to WIT	01OCT01	30JAN04
1.1.3.4.01.06 Future Projects (Phase II)			
1.1.3.4.01.06.01 Future Projects Project Management			
S1W06000I	Interface from H101040 (PMBS 400.050A)	31JAN05*	



Activity ID	Activity Description	Early Start	Early Finish
S1W06005	Support Revalidation-Phase II-Module 2	01OCT08	30APR09
1.1.3.4.01.06.05 Future Projects-Construction			
S1W06010	Construct Phase II Disposal Facilities	01MAY09	30JUL21
1.1.3.4.01.06.06 Future Projects-Permitting			
S1W06100	Support Permitting-ILAW Disposal-Module 3	01FEB16	30SEP16
S1W06105	Support Permitting-ILAW Disposal-Module 2	01FEB11*	30SEP11
1.1.3.4.01.07 Facility D&D/Closure			
1.1.3.4.01.07.01 Disposal LAW Operations			
S1W07000	Deactivate ILAW S&D Phase I Facilities	03JUN08	01JUN09
S1W07000A	Comp Deactivation-ILAW S&D Phase I Facilities		01JUN09
1.1.3.4.01.07.02 Close ILAW Disposal Facilities			
S1W07005	Closure of Grout Vaults - Capital	02JUN09	01NOV11
1.1.3.4.01.07.04 Close ILAW Disposal Facilities (Phase II)			
S1W07010	Perf Long-Term Monitoring-ILAW S&D Facilities	02NOV11	01FEB35
S1W07010A	Comp Long-Term Monitoring-ILAW S&D Facilities		01FEB35
S1W07020	Closure of Phase I Modules	02JUN09	30AUG11
S1W07030	Closure of Phase II Modules	03AUG26	28JUL28
S1W07999	END OF LLW DISPOSAL		01FEB35
1.1.3.4.01.8C Borehole #1 - CENRTC			
1.1.3.4.01.8C.03 Borehole #1 - CENRTC			
1.1.3.4.01.8C.03.M8 Obtain Borehole #1 Samples - CENRTC			
S1W08000	Obtain Borehole #1 Samples-CENRTC	01OCT97	31JUL98
S1W08000A	Issue Summary Report - Borehole #1	30JUN98	
1.1.3.4.01.9C X-Ray Microtomography Equipment - CENRTC			
1.1.3.4.01.9C.03 X-Ray Microtomography Equipment - CENRTC			
1.1.3.4.01.9C.03.M7 X-Ray Microtomography Equipment - CENRTC			
S1W09000	X-Ray Microtomography Equipment - CENRTC	01OCT97	29MAY98



Activity ID
Activity Description
Early Start
Early Finish
S1VM0000A Install X-Ray Microtomography Equipment 29MAY98
S1VM0000B Place Contract-X-Ray Microtomography Equipment 31DEC97
S1VM0000A
Install X-Ray Microtomography Equipment
S1VM0000B
Place Contract-X-Ray Microtomography Equipment

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