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SYSTEMS ENGINEERING MANAGEMENT AND IMPLEMENTATION PLAN FOR PROJECT W-464, IMMOBILIZED HIGH-LEVEL WASTE STORAGE

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Abstract: The Systems Engineering Management and Implementation Plan (SEMIP) for TWRS Project W-46 describes the project implementation of the Tank Waste Remediation System Systems Engineering Management Plan (TWRS SEMP), Rev. 1. The SEMIP outlines systems engineering (SE) products and processes to be used by the project for technical baseline development. A formal graded approach is used to determine the products necessary for requirements, design, and operational baseline completion. SE management processes are defined, and roles and responsibilities for management processes and major technical baseline elements are documented.

Release Approval Date

Release Stamp

Approved for Public Release

Prepared for
Lockheed Martin Hanford Corporation
Richland, Washington

Systems Engineering Management and Implementation Plan for Project W-464, Immobilized High Level Waste Storage HNF-2579, Rev. 0

Prepared by
Parsons Infrastructure and Technology Group, Inc.
Richland, Washington

TABLE OF CONTENTS

LIST OF ACRONYMS

AGA	Alternatives Generation and Analysis
CDR	Conceptual Design Report
CSB	Canister Storage Building
DRD	Design Requirements Document
EQS	Environmental, Quality, Safety
F&Rs	Functions and Requirements
FSAR	Final Safety Analysis Report
HLW	High Level Waste
HSTD	Hanford Site Technical Database
ICD	Interface Control Document
IHLW	Immobilized High-Level Waste
LMHC	Lockheed Martin Hanford Company
LMSI	Lockheed Martin Services Inc.
MAR	Mission Analysis Report
MEL	Master Equipment List
MOA	Memorandum of Agreement
MYWP	Multi-Year Work Plan
NRC	Nuclear Regulatory Commission
O&M	Operations and Maintenance
OUP	Operations and Utilization Plan
P&IDs	Piping and instrumentation diagrams
PC	Private Contractor
PHMC	Project Hanford Management Contractor
QARD	Quality Assurance Requirements and Description
PSE	Preliminary Safety Evaluation
QA	Quality Assurance
QAPP	Quality Assurance Program Plan
QC	Quality Control
RAM	Reliability, Availability, and Maintainability
RCR	Review Comment Record
RCRA	Resource Conservation and Recovery Act of 1976
RML	Risk Management List
SARP	Safety Analysis Report for Packaging
SE	Systems Engineering
SEL	Safety Equipment List
SEMP	Systems Engineering Management Plan
SEMIP	Systems Engineering Management and Implementation Plan
SNF	Spent Nuclear Fuels
SOW	Statement of Work
SSC	Systems, structures, and components
T&E	Test and Evaluation
TWRS	Tank Waste Remediation Plan

1.0 INTRODUCTION

1.1 DOCUMENT SUMMARY

This Systems Engineering Management and Implementation Plan (SEMIP) describes the Project W-464 (herein after called the Project) implementation of the *Tank Waste Remediation System Systems Engineering Management Plan* (TWRS SEMP) (LMHC 1998b). The Project SEMIP defines the systems engineering (SE) products and processes used by the Project to comply with the TWRS SEMP (LMHC 1998b). It provides the basis for tailoring the SE processes by applying a graded approach to identify the minimum (necessary and sufficient) SE requirements for successful project execution without incurring unacceptable risks. The SEMIP is a living document that will be revised as necessary to reflect changes in systems engineering guidance as the Project evolves.

1.2 SCOPE AND APPLICABILITY

This project is a sub-project of the Storage and Disposal Program performed by the Tank Waste Retrieval (TWR) Division of Lockheed Martin Hanford Company's (LMHC) Tank Waste Remediation System (TWRS). The primary objective of the project, in concert with site and TWRS Missions, is to provide interim storage capabilities for the Immobilized High Level Waste (IHLW) product to be produced by one of the two privatization vendors during the demonstration phase production operations. In addition to the IHLW product, the Project will also provide interim storage for Cesium-137 product, and non-routine HLW. For brevity, these three separate waste streams, when addressed as a whole, will be referred to as the IHLW product. The storage alternative selected for Project W-464 is to outfit the Canister Storage Building (CSB) vaults two and three for interim storage of the IHLW product.

1.2.1 Present Stage of the Project

Project W-464 is currently in the final stages of conceptual design development with performance requirements identified and estimates prepared for completing the design and construction phases. The Project Justification of Mission Need has been completed, the Project "birthright" has been established in the Design Requirements Document (WHC 1996c), and Critical Decision 1 (Authorization to initiate conceptual design) has been granted (DOE-RL 1996c). Major technical baseline products which have been completed include the *Functions and Requirements Document for Interim Store Solidified High-Level and Transuranic Waste* (WHC 1996d), the *Solidified High Level Waste Interim Storage Alternatives Analysis and Recommendation* (Calmus 1996a), the *Design Requirements Document for Phase I Solidified High Level Waste, Function 4.2.4.1.2* (WHC 1996c), and the *Conceptual Design Report Immobilized High-Level Waste Interim Storage Facility (Phase 1)* (FDNW 1998). Thus the requirements baseline, as described in the TWRS SEMP, is nearly complete for the Project.

A general assessment of systems engineering process implementation as well as existing baseline products was completed in preparation of this SEMIP. The assessment evaluated the adequacy

of systems engineering application to the Project up through and including the Conceptual Design Report (CDR) (FDNW 1998). This assessment concluded that the existing baseline was consistent with requirements of the TWRS SEMP (LMHC 1998b), and that it provides an adequate foundation for continuing baseline development. In addition to this general assessment, a detailed evaluation of the existing technical baseline should be performed to verify that the proper F&Rs have been selected, and that the proposed architecture is consistent with these F&Rs. The System Functional Review process, required before Critical Decision 2 (see Sec. 2.5) would provide the proper forum for this detailed evaluation. Any forthcoming recommendations from this detailed review should then be considered in the DRD Rev. 1 and throughout design baseline development.

1.2.2 SEMIP Application

This SEMIP describes the entire technical baseline, concluding with Critical Decision 4 (Authorization to Begin Operations), at the end of the operational baseline (See TWRS SEMP Fig. 4). Existing baseline products which support the Project Validation planned for FY 1998 are summarized. However, the focus of the SEMIP is on the near-term products and processes necessary for completion of the design baseline and facility construction. The SEMIP provides a "road map" for systems engineering application for the duration of the project life-cycle.

1.2.3 Project Risks

W-464 Project risks have been well defined and documented at both the project and program levels, and are managed according to the process described in Sec. 2.3.2 (Risk Management). The general assessment of SE process implementation done in preparation of this SEMIP concluded that there are no major risks to the successful completion of the Project's mission at the time of writing (April, 1998).

1.2.4 SE Graded Approach

The application of systems engineering to Project W-464 employs a graded approach as outlined in HNF-IP-0842 Vol. IV, Sec. 1.2 (TWRS Systems Engineering Grading Guidelines, draft). Rather than grading the Project as a whole, the grading process has been applied to the major project systems, in accordance with the guidance of the revised TWRS SEMP (LMHC 1998b). The two major systems for the project are (1) The CSB interim storage facility and equipment, and (2) the IHLW transportation system. A formal grading process was applied for both of the above systems using a table of risk and complexity factors taken from HNF-IP-0842 Vol. IV, Sec 1.2 (LMHC 1997c), and is presented in Appendix A (Tables A.1 and A.2). The results of the grading process are used to determine the SE products and processes necessary to the subject systems, as outlined in the Grading Guidelines. The TWRS SEMP was also referenced to determine necessary baseline products. Table 3.1 further describes the resultant necessary baseline products.

The Canister Storage Building (CSB) Interim Storage Facility and Equipment: The formal grading process presented in Table A.1 results in a Category SE-1 application for this major system. As described in the *TWRS Systems Engineering Grading Guidelines*, SE-1 systems require the full suite of systems engineering activities and products. However these products can be tailored to be commensurate with the SSC risk/complexity. The risk and level of complexity for the CSB Interim Storage Facility is moderate within the context of the overall TWRS program. The CSB and associated equipment are moderate in technical complexity but subject to a complex set of environmental requirements. There is some risk in the Resource Conservation and Recovery Act of 1976 (RCRA) permitting process, and Project interfaces with private contractors are complex. The greatest risk for the W-464 Project may be the time constraints which could worsen with future delays in the time needed for completion of Project W-379 (the CSB Spent Nuclear Fuel interim storage project). The SE processes required for the storage systems will include a disciplined design process with the associated design reviews; test and evaluation planning and documentation; operations infrastructure development (procedures, training, emergency preparedness); and a formal readiness review process. Management Systems for configuration control, formal interface control, and risk and decision management will also be required.

IHLW Transportation System: The formal grading process presented in Table A.2 results in a Category SE-2 application, as described in the *TWRS Systems Engineering Grading Guidelines*. SE-2 systems require a selective application of systems engineering, with some SE activities performed informally. The basic architecture for the transportation system (truck with shielded cab, trailer, shipping cask, and access roadways) is simple, and similar to other transportation systems used at the Hanford Site. The risk involved in designing and procuring or constructing a system that will meet the transportation safety program requirements is minimal. The SE processes and products required for the transportation system focus on development of a Packaging Design Criteria document; the Safety Analysis Report for Packaging (SARP); procurement and/or construction specifications; and fabrication, construction, and acceptance under a Quality Assurance program. Development testing, preliminary design deliverables, extensive design reviews, and post-delivery testing and evaluation may not be necessary.

1.2.5 Interface With Other Planning Documents

TWRS top-level document relationships are shown in Figures 1 and 2 of the TWRS SEMP (LMHC 1998b). This SEMIP implements the TWRS Plans and Procedures (DOE Good Practice Guides, TWRS Risk Management Plan, TWRS Configuration Management Plan, etc.) referenced in Sec. 2 of the TWRS SEMP. This SEMIP also interfaces with the TWRS Program Baseline, which includes the TWRS Program Multi-Year Work Plan (MYWP) (project technical scope and schedule), the TWRS Program Plan (FDH 1998d) and the TWRS Level 1 Logic. This Level 1 Logic provides an operational event sequence for the storage and disposal projects, and details interfaces with the private contractor operations and other TWRS projects. At the Project level, the SEMIP interfaces with the upper-tier project plan are addressed in the *TWRS Retrieval and Disposal Mission Immobilized High-Level Waste Storage Plan* (FDH 1997e). A W-464 Project Management Plan will be developed following conceptual design, which will identify

plans, organizational interfaces, management control systems, and reporting requirements for project managers.

2.0 SYSTEMS ENGINEERING MANAGEMENT PROCESSES

This section describes the processes that are used to control the elements of the Integrated Baseline. Emphasis is placed primarily on control processes for the Technical Baseline.

2.1 RISK MANAGEMENT

The primary tool for communicating risk information is the *TWRS Retrieval and Disposal Project Risk Management List* (RML) (LMHC 1998g). The RML identifies Project risks; describes their likelihood and consequences; and identifies any residual risks, handling actions, and handling action status for Projects W-464, W-465, and W-520. The Storage and Disposal RML is currently being reviewed and updated on a monthly basis. The *Tank Waste Remediation System Risk Management Plan* (FDH 1998a), requires that Risk Management Implementation Plans be developed for each TWRS Project. The Risk Management Implementation Plan for Projects W-464 and W-465 is documented in the *Storage and Disposal Project Risk Management Plan* (WHC 1995a), which will be updated as necessary during Project evolution. Detailed guidance for performing risk management activities is provided in HNF-IP-0842, Volume IV, Sec. 2.6, "Risk Management" (LMHC 1997c), and further information is in the *Tank Waste Remediation System Program Plan*, Rev. 1, Sec. 9.5 (FDH 1998d).

2.2 DECISION MANAGEMENT

The Project will develop a Decision Document following conceptual design, which will be cross-referenced to the TWRS Level 1 logic and will outline decisions throughout the baseline development. The Decision Document will incorporate CDR uncertainties, DRD hold points, and define design agent risk management responsibilities. A formal decision process will be employed by the Project for decisions of major importance. A simplified process will be employed for decisions of lesser magnitude. The decision maker or responsible manager will determine to what extent the full decision process is required for each particular decision. Decision management for the project will be accomplished according to HNF-IP-0842, Volume IV, Sec. 2.7, "Decision Management" (LMHC 1997c). The Project emphasis will be on early identification of decision points and issues; effective communication to involved parties; elevation, if required, to the appropriate decision maker with any requested information and recommendations; timely decision making; and prompt communication of results.

2.3 INTERFACE MANAGEMENT

Interface management will be essential for interfaces with DOE, permitting authorities (e.g., Ecology, EPA), and privatization contractors. Interface Control Documents (ICDs) and contract modifications are in development at the time of this writing. Interface management will be conducted in accordance with *Identification and Control of TWRS Interfaces* (LMHC 1998e); the TWRS SEMP, Sec. 2.3.2; and HNF-IP-0842 Vol. IV, Sec. 2.8 (Interface Control). Further information on interface management is given in the *Tank Waste Remediation System Program*

Plan, Rev. 1, Sec. 9.7. The *TWRS Retrieval and Disposal Mission IHLW Storage Plan* (FDH 1997e), Sec. 4.3, provides information on interfacing organizations and approval authorities. Interface Analysis and ICDs are addressed in Sec. 3 of this document.

2.4 CONFIGURATION MANAGEMENT

The configuration management requirements for TWRS are provided in the *Tank Waste Remediation System Configuration Management Plan* (FDH 1997d). The *Tank Waste Remediation System Configuration Management Implementation Plan* (CMIP)(LMHC 1997f) will by revised to implement the requirements of this plan. Configuration Management provides a structure for identifying and controlling critical physical systems and configuration information (documents, drawings, data, logic diagrams, etc.). The products of the W-464 Project will be evaluated based on configuration management scope criteria to identify those products that will be controlled as configuration items. The minimum requirements for the configuration management scope criteria are defined in *Configuration Management Plan* (FDH 1998e). Hanford Site Technical Database (HSTD) configuration management will be maintained according to the *TWRS Technical Baseline Database Manager Definition Doc* (LMHC 1997g).

Document control for the Project is accomplished in accordance with HNF-PRO-232, "Project and Task Document Management." The Lockheed Martin Services, Inc. (LMSI) implementation of these requirements is found in the *Documentation and Records Management Manual* (LMSI 1995). Documents for W-464 are maintained by a dedicated document control representative in the Document Service Center, Room 1310 of the 2440 Stevens Building, Richland, Washington.

2.5 TECHNICAL REVIEWS

Reviews are conducted to assess the development of the Project Baseline and to verify conformance to the TWRS baseline, the project mission, and requirements sources [e.g., Final Safety Analysis Report (FSAR), Testing and Evaluation (T&E) Plan, Fire Hazards Analysis, etc.). Project reviews will be conducted according to the TWRS SEMP, Sec. 2.3.6, and will be completed prior to project Critical Decisions (See Figs. 3.1 - 3.4). The three remaining reviews include the (1) System Functional Review, (2) Detailed Design Review, and (3) Operational Startup Review. Other reviews may be added at the discretion of TWRS or the Project Manager. Management responsibilities for the reviews are presented in Table 2.1. The following is an outline of the planned baseline products associated with the three remaining Critical Decision Reviews:

System Functional Review (CD-2): The review product consists of a Review Comment Record (RCR) and a Project Validation Package submitted to DOE with a request for validation. This review is in progress for Project W-464 as of April, 1998.

Detailed Design Review (CD-3): The review product consists of an approved design released for construction.

Operational Startup Review (CD-4): The review product consists of a summary letter from the Project to DOE, declaring readiness for operations.

2.6 SE MANAGEMENT PROCESS ROLES AND RESPONSIBILITIES

Table 2.1 provides a matrix to crosswalk between organizations/positions defined in the Project Management Plan (listed down the left side) and the management processes identified in sections 2.1 through 2.5 above (listed across the top). The chart is intended to depict "level of responsibility" rather than actual descriptions of management processes.

Table 2.1. Management Processes Responsibilities Matrix

	Management Process				Technical Reviews		
Organization/ Position	Risk Mngmt.	Decision Mngmt.	Config. Mngmt.	Interface Mngmt.	System Functional Review (CD-2)	Detailed Design Review (CD-3)	Operational Startup Review (CD-4)
Prog. Manager	A/L	A/L	A	A	A	A	A
Proj. Manager	A	A	A/S	A	A	A/L	A
EQS	S	S	A/S	S	A/S	S	A/S
SE	S	S	A/L	L	S	S	S
Operations Rep.	S/R/C	A	A	A/S	A/S	A/S	A/L
TE&NS and Project Engr.	S/R/C	S	A/S	A/S	A/S	A/S	A/S
Design Agent	S	S	C/S	S	S	A/S	S
Bus. Manager	S/R	S/C		S	S	S	S
HNF-IP-0842 Vol. IV Sec. #	2.6	2.7	HNF-1900	2.8	GPG-FM-015	GPG-FM-015	3.12

Legend:

A: Approve - Responsibility for process management and authority to issue documents.
C: Concurrence - Approval is requested but not mandatory.
L: Lead - Responsible for process performance or product preparation.
R: Review - Comments requested within position's or organization's area of expertise.
S: Support - Provide support for process performance or product preparation.

3.0 SYSTEMS ENGINEERING PROCESS

This section provides details of how systems engineering will be applied to the TWRS Project W-464 Technical Baseline development. A description of existing baseline products is given, as well as an outline of the SE processes and products to be used to further define the baseline during the design and construction phases of the project. Roles and responsibilities for major baseline product development are outlined in Sec. 3.4.

3.1 SYSTEMS ENGINEERING APPLICATION TO PROJECT W-464

This subsection provides a narrative of SE products and processes applied to the Project. The text explains the products, processes, and decision points which are shown graphically in Fig. 3.1 through 3.4 (W-464 Project Baseline Development Flow Diagrams). Reference to the TWRS SEMP (LMHC 1998b) is made where applicable to avoid redundancy.

3.1.1 Requirements Traceability

The upper level functions that the TWRS Storage and Disposal program is required to provide are currently dictated by the TWRS Mission Analysis Report (MAR) (LMHC 1998c) and the HSTD. A planned revision to the TWRS Operations and Utilization Plan (OUP) (LMHC 1997d) will incorporate private contractor data when it is released. Lower level functions and performance requirements for the project are defined in a DRD, Rev. 0 (WHC 1996c), and will be updated as necessary throughout design baseline development. Requirements traceability will be maintained by documenting requirements in the HSTD through periodic change requests. Design criteria for the IHLW transportation system will be similarly input to the HSTD. This process is described in the TWRS SEMP (LMHC 1998b), Sec. 2.3.5.

3.1.2 Mission Analysis

The TWRS SEMP (LMHC 1998b) does not require a MAR for projects which are defined by a "top-down" process, utilizing the missions defined in the TWRS MAR (LMHC 1998c). The mission and upper level functions for the Storage and Disposal program are well defined in the TWRS MAR, Rev. 3.

3.1.3 Functions and Requirements/Specification Development

The major functions that the TWRS program must perform to accomplish the Storage and Disposal missions are identified in the HSTD. Upper level performance requirements for throughput, storage capacity, storage durations, etc. for IHLW interim storage are described in the TWRS MAR (LMHC 1998c) and the TWRS OUP (LMHC 1997d). The IHLW interim storage functions and requirements decomposition is provided in the Project DRD (WHC 1996c).

The DRD will provide the basis for Level 1 specifications, which will be generated from the HSTD following conceptual design. Functions and requirements for the IHLW transportation system will be captured in a design criteria document (or equivalent thereof), and input to the HSTD.

3.1.4 Alternative Analysis and Selection

The formal interim storage facility architecture evaluation is documented in the *Solidified High-Level Waste Interim Storage Alternative Analysis and Path Forward Recommendation* (Calmus, 1996a). This Alternatives Analysis also concludes that the option of using the excess vaults in the existing CSB is preferred. Although the AGA (Calmus, 1996a) did not do a comparison of solidified HLW transportation system options, the Phase 1 privatization vendor contracts limit the options to over-the-road transport by truck, thereby eliminating the need for a formal transportation system alternative evaluation. The DOE-documented concurrence with the Decision Board's recommendations is in the letter from W.J. Taylor (RL) to H.J. Hatch (FDH) "Contract Number DE-AC-06-96-RL-13200, High-Level Waste (HLW) Interim Storage Architecture Selection Decision Report." (DOE/RL 1996d).

The W-464 Advanced Conceptual Design process will analyze alternatives for high-risk elements identified in the CDR (FDNW 1998) and the TWRS Storage and Disposal RML. Alternative analysis will continue throughout design development until all lower-level architecture is defined.

3.1.5 Interface Analysis

An initial project interface analysis is provided in the memorandum *Identification and Control of TWRS Interfaces* (LMHC 1998e). Section 3.1.6 of this SEMIP augments that analysis. Guidance on interface analysis is provided in the TWRS SEMP (LMHC 1998b) and WHC-IP-0842 Vol. IV, Sec. 2.8 "Interface Control" (LMHC 1997c). Further interface analysis will be provided in Level 1 Logic and supporting documentation.

3.1.6 Interface Control Documentation

Project W-464 has a number of interfaces with outside organizations including: the Privatization Contractors, other LMHC organizations, other PHMC contractors, DOE, and other regulatory agencies. Management of interfaces is described in Sec. 2.3 "Interface Management". A description of the documentation associated with each of the currently identified interfaces is provided in sections 3.1.6.1 through 3.1.6.5.

3.1.6.1 Privatization Contractor Interface Documentation. Three unique interface documents describe the interfaces between Project W-464 and DOE concerning the private contractor interfaces: The first, concerns the interface with the LAW/HLW Plant for the receipt

of the IHLW by the Project and will be documented in ICD 14, the *Interface Control Document Between DOE and the PHMC-Phase 1 Privatization Immobilized High-Level Waste Product* (FDH 1997d). The second, also concerning the interface between the Project and the LAW/HLW Plant, is for the receipt of the non-routine HLW by the Project and will be documented in ICD 13, the *Interface Control Document Between DOE and the PHMC-Phase 1 Privatization - Non-Routine High-Level Solid Wastes* (FDH 1997b). Lastly, there is an interface between the Project and DOE concerning both the LAW Plant and the LAW/HLW Plant for the receipt of the Cesium-137 product by the Project. This last interface is documented in ICD-17, the *Interface Control Document Between DOE and the PHMC-Phase 1 Privatization Cesium-137 Intermediate Product* (FDH 1997c).

3.1.6.2 Infrastructure Interface Documentation. A summary of Hanford contractor infrastructure services is given in the *Tank Waste Remediation System Retrieval and Disposal Mission Technical Baseline Summary Description* (FDH 1998b).

In support of the privatization efforts, the contracts between Flour Daniel Hanford, Inc. (FDH) and supporting contractors [DE&S Hanford, Inc.(DESH, DynCorp (DYN), and Waste Management Federal Services Hanford, Inc. (WMFSH)] will be modified as required, based on specific sets of requirements provided by the TWRS Project and documented in the HSTD. Interface documentation will also be developed for infrastructure elements internal to TWRS including telecommunications and remote monitoring systems (as required). Staffing for facility operations and management responsibilities for project turnover, readiness preparations, and post-operational monitoring/closure will be negotiated by the Operations Manager and documented in separate Memorandum of Understanding documents as appropriate.

3.1.6.3 Environmental Interface Documentation. The *Permitting Plan for the High-Level Waste Interim Storage Project* (LMHC 1997a) provides guidance for compliance with all environmental regulation. Environmental interface documentation essentially consists of the documents necessary for this compliance.

3.1.6.4 Interface with Duke - SNF Documentation. Use of the CSB depends on the eventual use of the SNF Project W-379-provided CSB facility. A Memorandum of Agreement (MOA) (Hansen 1996) between the SNF Project and IHLW interim storage project has been established to formally document this interface. Project W-464 will need to continuously interact with the SNF Project to assess potential impacts to the Project scheduling and the Project baseline MYWP in particular.

3.1.6.5 Interface with DOE (RW) Documentation. Background information on this interface is provided in the *TWRS Retrieval and Disposal Mission, IHLW Storage Plan*, Sec. 13.3 (FDH 1997e). In general terms, DOE/RL and the DOE Office of Environmental Management (EM) intend to comply with the DOE Office of Civilian Radioactive Waste Management's (RW) acceptance requirements. Project 464 will provide technical support and supplemental compliance basis information for this interface between DOE/RL, EM and RW.

3.1.7 System Assessments and Evaluations

There is a requirement to determine the extent to which the existing system/facility is able to perform the Project's Mission. The Project has met this requirement through analytical assessments of the existing facility documented in the *Solidified High Level Waste Interim Storage Alternative Analysis and Recommendation* (Calmus 1996a) and the *Conceptual Design Report for Immobilized High-Level Waste Interim Storage Facility (Phase 1)* HNF-2298, Rev. 0 (FDNW 1998). This process is described in the TWRS SEMP Sec. 3.2.5 (LMHC 1998b).

3.1.8 Specialty Engineering Analysis and Integration

In addition to project engineering, specialty engineering disciplines as listed in the TWRS SEMP (LMHC 1998b) will be used in the Project's baseline development. Specialty engineering analyses will be documented and traceable. Results will be used during functional and performance analyses and/or input into the appropriate SSC specifications. The following are specialty engineering applications which have been or will be required for Project W-464:

3.1.8.1 Human Systems Integration: Human systems integration is used to reduce the potential for human error in system operation and ensure system safety, operational efficiency, ease of maintainability, and reliability. Human engineering is described in the Project DRD, Sec. 3.3.7 (WHC 1996c). The *Conceptual Design Report for Immobilized High-Level Waste Interim Storage Facility (Phase 1)* HNF-2298, Rev. 0 (FDNW 1998) outlines some requirements for the work environment at the CSB, however further input to the baseline will be required, and may be derived form the Project O& M Concept, RAM analysis, and other sources.

3.1.8.2 Reliability, Availability, and Maintainability (RAM): A RAM analysis will be completed for the SSCs required for the CSB retrofit. RAM analysis will be evaluated against the design requirements when design detail is sufficiently well developed (typically during the definitive design phase). The Project DRD (WHC 1996c) Sec 3.2.5 provides guidance for the incorporation of RAM concepts into system design.

3.1.8.3 Safety: A Preliminary Safety Evaluation (PSE) will be performed during the conceptual design stage. At the time of this writing (April, 1998), the first draft of the Preliminary Safety Evaluation (HNF-SD-W464-PSE-001, Rev. 0, "Preliminary Safety Evaluation for Project W-464, Immobilized High-Level Waste Interim Storage", Mouette, 1998) was nearing completion. Other safety analyses are planned, including a SARP for the IHLW transportation system. These documents are used as source documents for the requirements baseline. Further safety analysis will be done in accordance with the Master Safety Plan (Mouette 1998).

A detailed description of Project Safety Activities as well as Authorization Basis documentation and approval activities (both at the TWRS and Project level) is provided in the *TWRS Retrieval and Disposal Mission, IHLW Storage Plan* (FDH 1997e) Sec. 13.2. This plan also provides

details on how W-379 Safety and Authorization Basis activities may be utilized when redundant with the Project.

3.1.8.4 Quality: A Quality Assurance Program Plan (QAPP) is required for Project W-464 in accordance with PHMC requirements appearing in the *Quality Assurance Program Description*, HNF-MP-599 (FDH 1997g). The QAPP will be written for the Project during the conceptual design phase, and will provide guidance for project activities throughout the construction phase. The QAPP utilized for the SNF CSB Project W-379 (CSB-QAPP# WHC-SD-W-379-QAPP-001, Rev. 1, 06/04/97) will be evaluated to determine what areas have potential applicability to the W-464 Project. Areas unique to W-464 will then be modified or updated as appropriate. Project quality procedures will be developed and implemented to comply with the Office of Civilian Radioactive Waste Management's *Quality Assurance Requirements and Description* (QARD) (DOE/RW 1995). The *TWRS Retrieval and Disposal Mission, IHLW Storage Plan* (FDH 1997e) Sec. 13.1 provides further details on how quality assurance is to be applied to Project W-464.

3.1.8.5 Regulatory Compliance: The *Permitting Plan for the High-Level Waste Interim Storage Project* (LMHC 1997a) provides the current project strategy and identifies analyses and document submittals required by regulation. Revisions of the Permitting Plan will be written as required. Approved permits and other regulatory decisions become project constraints and will be used as requirement source documents during design baseline development. Further details concerning project environmental compliance are provided in the *TWRS Retrieval and Disposal Mission, IHLW Storage Plan* (FDH 1997e), Sec. 13.3.

3.1.8.6 Facility Startup: Following completion of W-464 facility construction and testing, and prior to IHLW interim storage operations, the project will complete operations readiness preparations to include operation and maintenance procedure validation and training, emergency preparedness, issuing as-built P&IDs and essential drawings, spare parts procurement for initial operations, and operational staffing plans.

3.1.9 Operations and Maintenance Concept Development

An Operations and Maintenance Concept will be developed for the project to summarize how the entire system is to be operated and maintained. Operations and Maintenance (O&M) concepts for the W-464 project will be developed from existing applicable procedures for project W-379 and by the SSC architecture and design concepts that address the various subfunctions of the project. Throughput and other processing requirements affecting operational capabilities and operating constraints are also part of the O&M Concept. The O&M Concept will be written to the level of information available at the time, and will be updated as the project design matures. The existing flowsheet in the Project CDR will be used as a basis for further O&M concept development.

3.1.10 Design Optimization

Design optimization studies will performed to resolve conceptual design uncertainties or other design issues where necessary. These studies will be identified in the MYWP and included as references to support Definitive Design, Level 1 Specifications, Statements of Work (SOWs), etc. Design optimization guidance is given in the TWRS SEMP (LMHC 1998b).

3.1.11 Test and Evaluation

The project will develop a T&E Plan to verify that end products perform their design functions and meet all established requirements prior to project turnover. A graded approach will be used to determine the degree to which elements of T&E are applied to W-464 systems. Required test procedures will be developed in the design baseline, and subsequent test reports will be documented in the operational baseline. The IHLW transportation system will be verified in accordance with the vendor testing and QA/QC requirements identified in the fabrication/procurement specifications. Additional post-receipt inspections and testing, if any, will be identified in the procurement specifications.

The T&E Plan and procurement specifications for the IHLW interim storage and transportation systems, as well as all test and QA/QC procedures used by the project, will be maintained current and revised as necessary by a formal process should performance requirements, associated test methods or acceptance criteria be modified. The complete set of T&E results will be reviewed as part of the turnover process, and identified issues will be formally resolved prior to the declaration of operational readiness. Development and execution of T&E will be in accordance with HNF-2029, *Tank Waste Remediation System Test and Evaluation Plan* (LMHC 1998i) and the appropriate sections of the *TWRS Administrative Manual*, HNF-IP-0842 (LMHC 1997c). Additional details on the Project's T&E Plan including construction testing, construction acceptance testing, preoperational testing, operational testing and dry-run demonstrations are provided in *the TWRS Retrieval and disposal Mission, IHLW Storage Plan* (FDH 1997e), Sec. 14.

3.1.12 Integrated Logistics Support

The TWRS SEMP requirements for integrated logistics support planning will be met by baseline documents including the O&M Concept, O&M Procedures, Packaging and Transport Design Criteria, Design Reports, RAM Analysis, and Training Needs Analysis. The Project architecture is relatively simple and does not warrant development of stand-alone logistics support plans.

3.1.13 Project Validation

The basis for project validation is the technical information, schedule, and cost estimates developed during conceptual design. Project W-464 validation is described in the *TWRS*

Retrieval and Disposal Mission, IHLW Storage Plan (FDH 1997e). An initial Project W-464 validation package review is scheduled for FY 1998 with planned yearly updates.

3.1.14 Decision Points

Critical Decision 1, authorization to initiate conceptual design, has been completed for the project. Remaining critical decisions are shown in Figs. 3.1 through 3.4, and are described in the *TWRS Retrieval and Disposal Mission, IHLW Storage Plan* (FDH 1997e).

3.2 TECHNICAL BASELINE DEVELOPMENT

Technical baseline development is described in detail in GPG-FM-10 (Project Execution and Engineering Management Planning). Baseline development is an iterative process in which several cycles of functions and requirements definition, alternatives analysis and system design are necessary. This iterative process ensures that the project end products satisfy the mission needs. This iterative process is reflected in the W-464 baseline by the planned revision to the Project DRD (WHC 1996c) and plans for advanced conceptual design, which will build on the existing CDR (FDNW 1998).

Figures 3.1 through 3.4 illustrate the chronological development of the Project baseline. Supporting processes and documents including safety analysis, project reviews and T&E functions are also shown as they relate to baseline development.

Fig. 3.1: Project W-464 Technical Baseline Development
Requirements Baseline (Part I)

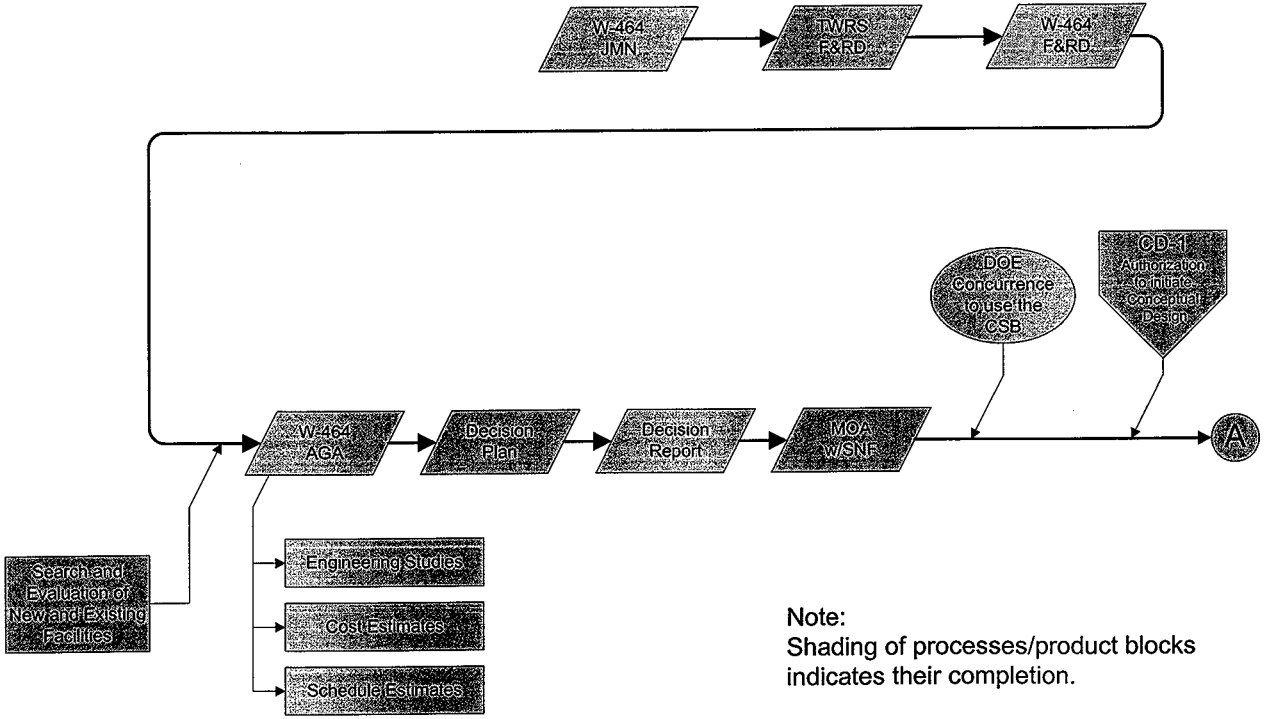


Fig. 3.2: Project W-464 Technical Baseline Development Requirements Baseline (Part II)

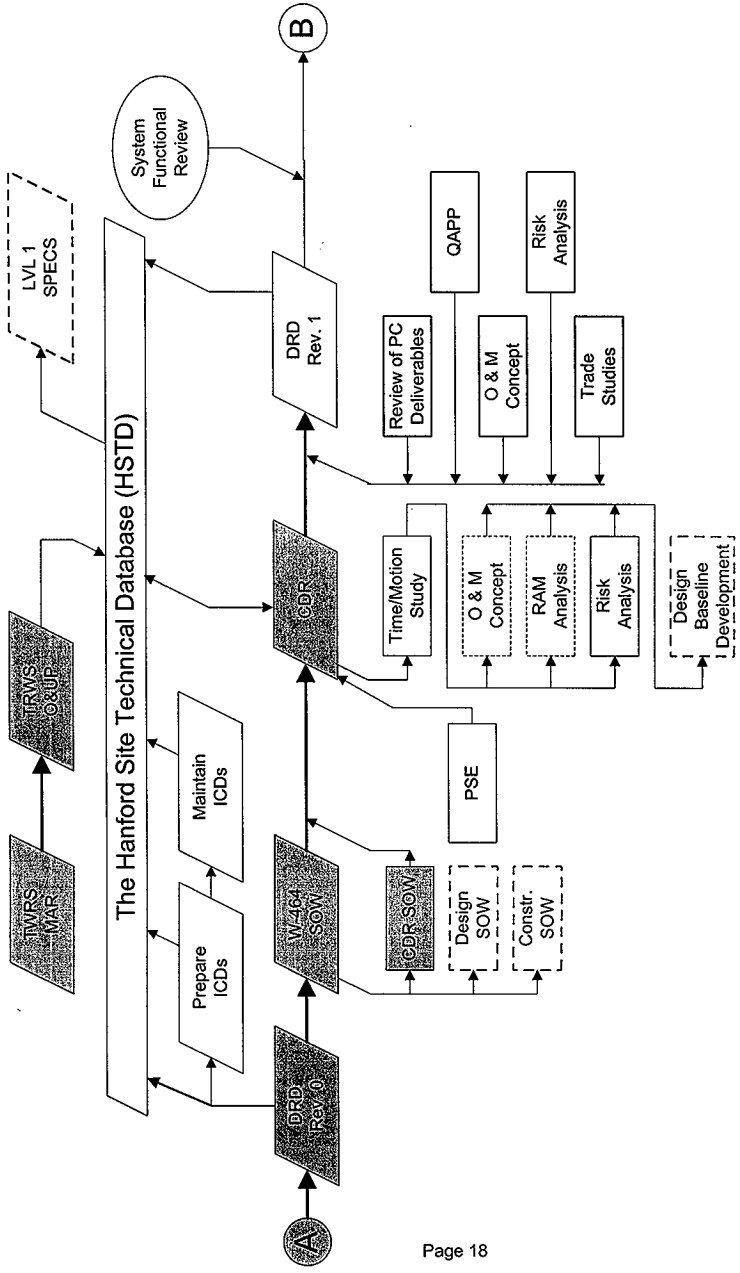


Fig. 3.3: Project W-464 Technical Baseline Development
Design Baseline

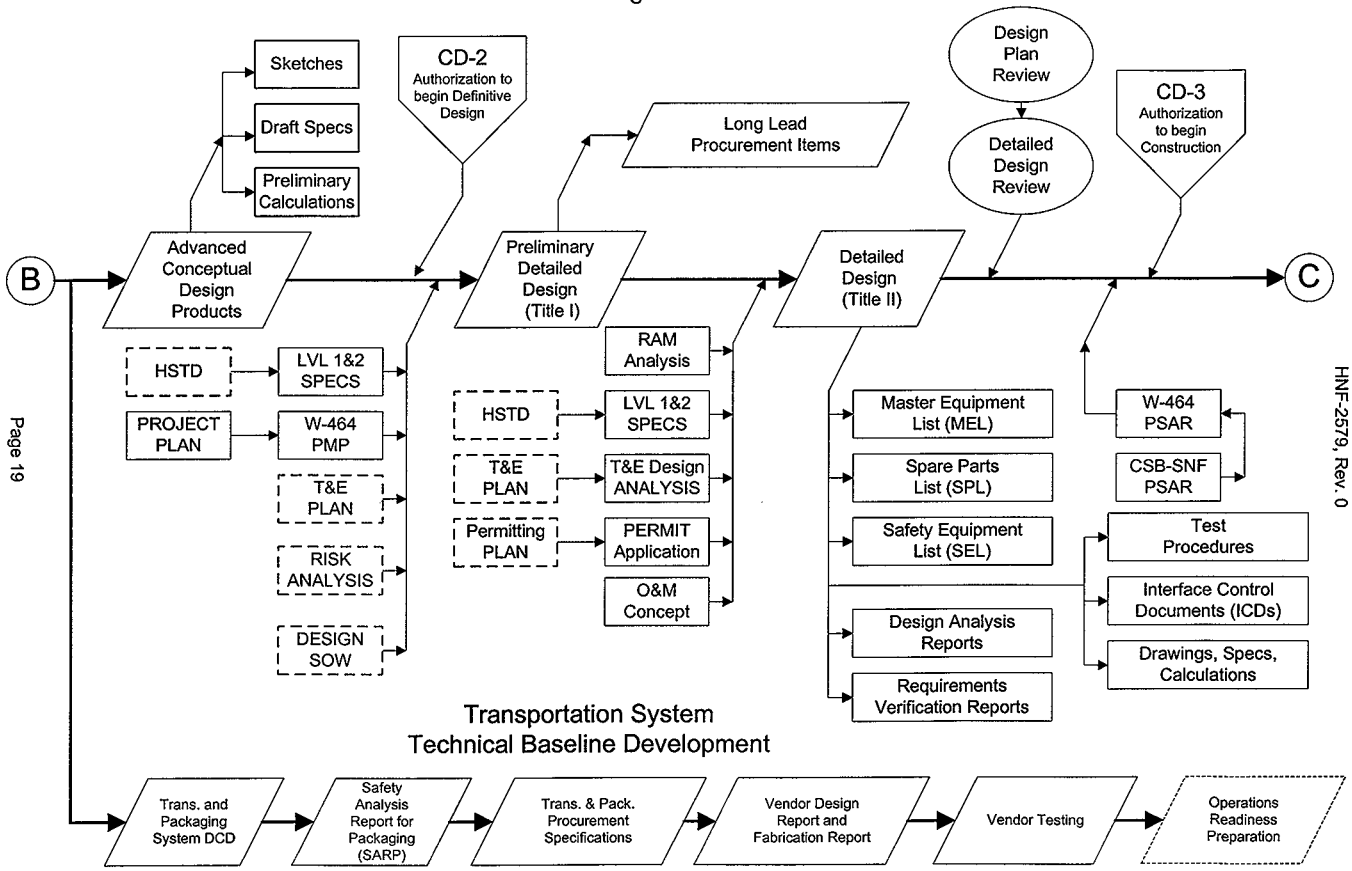
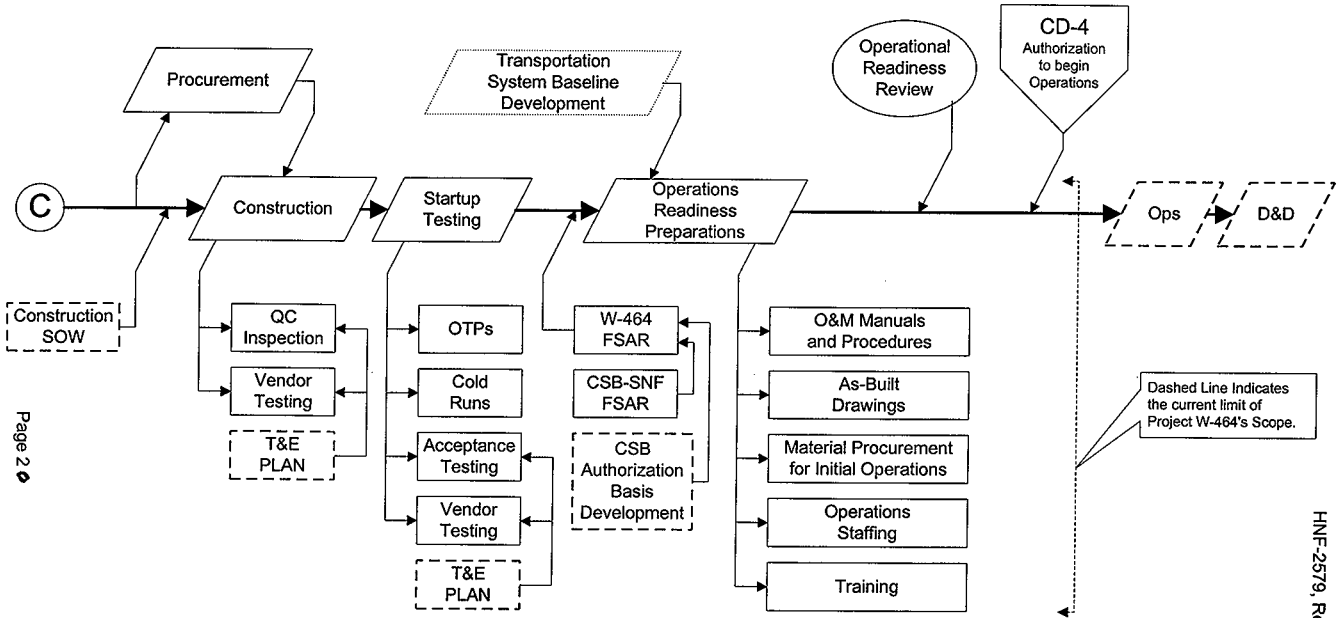


Fig. 3.4: Project W-464 Technical Baseline Development
Operations Baseline



3.3 MAJOR TECHNICAL BASELINE PRODUCTS

Table 3.1 identifies the major SE products that comprise the Project baseline. These baseline products parallel those specified in the corresponding sections of the TWRS SEMP (LMHC 1998b). The SE products (deliverables) identified in these tables are the products that the Project has adopted or developed to satisfy corresponding process requirements. Descriptions of project deliverables were derived in part from the *TWRS Retrieval and Disposal Mission, Immobilized High-Level Waste Storage Plan*, Rev. 0, HNF-1751 (FDH 1997e).

Table 3.1. SE Processes/Products Required for Baseline Development

TWRS SEMP Process Requirement	W-464 Deliverable	Description
Functions and Requirements	1. IHLW Interim Storage F&RD.	See TWRS SEMP, Table 2.
	2. DRD Rev. 0 (WHC 1996c)	See TWRS SEMP, Table 2 (Level 1 Specs).
	3. DRD Rev. 1	Will incorporate updated project functions and performance requirements.
	4. HSTD Revision: W-464 F&Rs to be added to HSTD after DRD revision.	HSTD will be updated periodically throughout project evolution.
Alternative Analysis	1. AGA for IHLW Interim Storage (Calmus 1996a).	See TWRS SEMP, Table 2.
O&M Concept and RAM Analysis	1. O&M Concept: To be developed.	See TWRS SEMP, Table 2.
	3. RAM Analysis: To be developed.	Reliability, Availability, Maintainability Analysis of W-464 SSCs, based on O&M Concept.
Decision Documents	1. Environmental Impact Statement Record of Decision for TWRS, Hanford Site, Richland Washington (Fed. Register vol. 62, No. 38, Feb. 97)	HLW will be stored on-site for future off-site disposal.
	2. HLW Interim Storage Architecture Selection - Decision Report (WHC-SD-WM-TA-183).	Documents decision-making process used for the selection of the IHLW IS architecture.
	3. Critical Decision 1: letter, A. L. Alm to Manager (DOE-RL, 1996c).	Provides DOE-HQ authorization to initiate conceptual design.

TWRS SEMP Process Requirement	W-464 Deliverable	Description
Decision Documents (Continued)	4. Tank Waste Retrieval RTP Independent Review (Lerch, 1997).	Documents status of TWRS program plans and capabilities to support Privatization Phase 1B. and Readiness To Proceed.
	5. Project Validation Package and Decision (to be completed following CDR approval).	Basis for budget request.
	6. Critical Decision 2.	Authorization to begin definitive design.
	7. Critical Decision 3.	Authorization to begin construction.
	8. Critical Decision 4.	Authorization to begin operations.
ICDs and Memoranda of Agreement	1. Most interfaces are summarized in LMHC Memo (LMHC 1998d)	See TWRS SEMP, Table 2.
	2. Contract Modifications.	Document administrative interfaces between site contractors.
Specialty Engineering Analysis: Safety and QA/QC	1. QAPP.	Identifies QA/QC requirements for project.
	2. Preliminary Safety Evaluation (FDH 1998d)	Initial safety analysis of storage system. Requirements to be included in revised DRD.
	3. SARP for packaging system.	Safety analysis of IHLW packaging and shipping container.
	4. PSAR (may be an addendum to the SNF CSB SAR [preliminary or final]).	Provides analysis assumptions and required preventive and mitigative design features for input to Preliminary Design.
	5. Storage Facility FSAR (or addendum to SNF CSB FSAR) or TWRS Authorization Basis Amendment.	See TWRS SEMP, Table 2.
Specialty Engineering Analysis Reports: Regulatory	1. Permitting Plan for IHLW Project (LMHC 1997c)	Environmental permitting requirements for transport and interim storage during Privatization Phase 1.
	2. RCRA Part A Permit Application. (Possibly a modification of HWVP Part A application).	Establishes regulatory commitments for RCRA compliance.
	3. RCRA Part B Permit Application.	Establishes final regulatory requirements for RCRA compliance.

TWRS SEMP Process Requirement	W-464 Deliverable	Description
Specialty Engineering Analysis : Risk Management	1. Storage and Disposal Project Risk Management Plan (WHC 1995b).	Establishes basis for project risk management.
	2. Project Risk Management List (LMHC 1998d).	Project-specific risk tracking list, reviewed monthly.
Specialty Engineering Analysis: Project Management	1. TWRS Retrieval and Disposal Mission, IHLW Storage Plan (HNF-1751).	Project Plan specific to IHLW interim storage.
	2. Systems Engineering Implementation Plan (Parsons 1998d).	Defines SE application to W-464, according to TWRS SEMP guidance.
	3. Project Management Plan	Identifies plans, interfaces, management control systems, and reporting requirements for W-464.
Trade Studies	Engineering and Design Optimization Studies: Resolve CDR Uncertainties.	TBD after the conceptual design phase.
Design Criteria	1. W-464 DRD Rev. 0.	Defines project scope by identifying specific SSCs the project will develop and construct
	2. W-464 DRD Rev. 1	Will incorporate revised functions and requirements and transport design criteria.
	3. Level 1 Specifications.	Requirements for SSCs. Information will be input into the HSTD.
	4. Transportation/Packaging Design Criteria	Will provide detailed functions and requirements for transportation and packaging system.
Project Conceptual Design	1. IHLW Interim Storage Facility Project W-464 Conceptual Design Report (Preliminary)	Provides conceptual design, schedule and estimated cost of CSB outfitting.
Requirements Baseline Review	System Functional Review.	First of three project reviews required by the TWRS SEMP (LMHC 1998b). Review is required following completion of conceptual design.

TWRS SEMP Process Requirement	W-464 Deliverable	Description
Preliminary and Detailed Design	1. ISF Preliminary Detailed Design (Title I) 2. ISF Detailed Design (Title II)	Preliminary and detailed designs advance the conceptual design with input from specialty engineering, trade studies, etc. Completion of detailed design will satisfy all project performance requirements.
	3. Transportation System Design	A stand-alone document for vehicle and shipping container design may not be necessary; fabrication and procurement specs may be developed directly from design criteria documents and SARP.
	4. Master Equipment List	See TWRS SEMP, Table 2.
	5. Fabrication and Construction Drawings	See TWRS SEMP, Table 2 (Design Drawings).
	6. Construction and Procurement Specifications	See TWRS SEMP, Table 2.
	7. Design Analysis Reports	See TWRS SEMP, Table 2.
Test and Evaluation	1. T&E Plan	Document the specific SSC test and evaluation methods, procedures used to verify SSC performance at various stages of baseline development. Also implements elements of QA/QC plan.
	2. Test Procedures (ATPs, OTPs)	See TWRS SEMP, Table 2.
	3. Test Reports	See TWRS SEMP, Table 2.
Design Baseline Review	Detailed Design Review.	Second of three remaining reviews required by the TWRS SEMP.
Interface Control	ICD Drawings: Detailed drawings/sketches of physical interface systems.	Document the physical geometry, materials, manufacturing methods, etc. for project interfaces.
As-Built Drawings and Equipment Labeling	P&IDs (One-line diagrams), and essential drawings as defined by Cognizant Engineer.	Specify the physical configuration, materials, and other information on the installed configuration of SSCs. Used for management and modification of SSCs.
O&M Procedures	O&M Concept.	Provided by project prior to operational testing.

TWRS SEMP Process Requirement	W-464 Deliverable	Description
Safety Equipment List	Safety Equipment List (Part of Detailed Design.)	Identifies specific operations and maintenance SSCs that are designated as important to safety. Used to manage safety class equipment and as reference to safety and Authorization Basis documents.
Operations, Maintenance, Engineering and Support Staff Training	1. Job Task Analysis (JTA), classroom and on-the-job training (OJT) for certified operators. 2. Training Certification Products prepared for Maintenance, Engineering, Operations Support Personnel.	Documents that operators, craftsmen, and technicians have been trained to a required proficiency level for system operation and maintenance. Also includes training and certifications as required for management, engineers, and other staff.
Licenses and Permits	Required RCRA, construction, and other permits and licenses.	See TWRS SEMP, Table 2.
Operational Readiness	Operational Readiness Review and/or Readiness Assessment by Contractor and DOE.	Third of three remaining project reviews required by the TWRS SEMP.

3.4 BASELINE PRODUCT ROLES AND RESPONSIBILITIES

Table 3.2 provides a matrix of organization/positions defined in the Immobilized High-Level Waste Storage Plan (FDH 1997e) and the baseline products identified in Sec. 3.3. The matrix indicates several levels of responsibility, including: approval authority, concurrence, review, preparation lead, and support preparation. This matrix describes roles and responsibilities internal to the PHMC organization.

Table 3.2. Roles and Responsibilities Matrix for Major Technical Baseline Products.

Product		Approval	Concurrence	Review	Preparation Lead
Requirements Baseline Products					
AGA (IS IHLW)		See Note 1.	See Note 1.	See Note 1.	See Note 1.
D R D	Level One Specs	M&I Contractor PM	QA SE Operations TE	Project Mgr.	Project Engr.
	Level Two Specs	PM TE	QA SE Operations	EQS Project Mgr. Construct. Rep. Design Agent	TE
IHLW Storage Plan		See Note 1.	See Note 1.	See Note 1.	See Note 1.
O&M Concept		PM Operations	EQS TE	Project Engr. Construct. Rep. Maintenance	TE Operations
RAM Analysis		PM Operations	TE	Construct. Rep.	TE
Project Validation Package		M&I Contractor PM Project Mgr.	Business Mgr.	TE EQS SE Operations	Project Mgr.
QAPP		EQS, PM, Project Mgr.	TE Operations	SE	EQS
Preliminary Safety Evaluation		M&I Contractor TE PM Project Mgr. TE	Operations	Tier 1,2,3 SE EQS	TE
Permitting Plan		EQS PM	Project Mgr. SE	Operations TE	EQS

Product	Approval	Concurrence	Review	Preparation Lead
RCRA Permit Applications	M&I Contractors	PM Project Mgr.	TE SE Operations	EQS
Trade Study Reports	TE PM	Operations SE Project Mgr.	Business Mgr. QA	TE
ICDs between W-464 and Privatization Vendors	M&I Contractors PM	EQS TE Project Mgr.	SE Business Mgr. Operations Rep.	Project Mgr.
Infrastructure ICDs	M&I Contractors Program Mgr.	TE EQS Project Mgr.	SE Operations Business Mgr.	Project Mgr.
Contract Documents for Programmatic Agreements between Contractors	M&I Contractor Program Mgr. Project Mgr.	Business Mgr. TE SE EQS Legal	Business Mgr.	Program Mgr.
Transportation/ Packaging Design Criteria	TE Program Mgr.	Project Mgr. Operations EQS	SE	TE
Conceptual Design Report	See Note 1.	See Note 1.	See Note 1.	See Note 1.
Decision Documents	Project Mgr. Program Mgr.	TE, Operations, SE, EQS	Business Mgr.	TE

Product	Approval	Concurrence	Review	Preparation Lead
Design Baseline Products				
Project Management Plan	PM		Business Mgr. Project Engr. M&I Contractor TE, SE, EQS	TE
PSAR	M&I Contractor TE PM	Project Mgr. Operations	Tier 1,2,3 SE EQS	TE
SARP	M&I Contractor TE PM	Project Mgr. Operations	Tier 1,2,3 SE EQS Packaging Engr.	TE WMNW
IHLW Transportation/ Packaging System Specs	DynCorp Project Mgr.	Operations TE, EQS Project Engr. SE	Business Mgr.	Project Mgr. TE
W-464 Preliminary Design (Title I)	Program Mgr. Project Mgr.	TE&NS Project Mgr. Operations	M&I Contractor Business Mgr. SE, EQS	Project Mgr. Design Agent
W-464 Detailed Design (Title II)	Project Mgr.	TE Operations	Business Mgr. M&I Contractor SE, EQS, Construct. Rep.	Project Mgr. Design Agent
Master Equipment List (MEL)	Project Mgr.	Project Engr. TE Operations	SE Operations EQS	TE Design Agent
P&IDs and Essential Drawings	Project Mgr.	Operations TE Project Engr.	Project Engr. Construct. Rep. SE, EQS	Project Mgr. Design Agent
Construction & Procurement Specifications	Project Mgr.	Operations TE	SE, EQS Project Engr. Construct. Rep. Operations Rep. Business Rep.	Project Mgr. Design Agent
Test Procedures	Project Mgr.	Operations Construct. Rep. TE EQS	SE Construct. Rep.	Project Mgr. Design Agent
Test Reports	Project Mgr.	Operations Construct. Rep. TE EQS	SE	Project Mgr. Design Agent

Product	Approval	Concurrence	Review	Preparation Lead
Design Analysis Report	Project Mgr.	TE	Project Mgr. SE, EQS Operations	Project Mgr Design Agent
Operations Baseline Products				
FSAR or TWRS Authorization Basis Amendment	M&I Contractor Program Mgr.	TE Operations	Tier 1,2,3 SE EQS	TE
Safety Equipment List (SEL)	Project Mgr. TE	TE EQS Operations	Design Agent	TE Design Agent
Job Task Analysis	Program Mgr.	Operations	Project Mgr. EQS	Operations
Training Certification Products	Program Mgr.	TE Operations	Project Mgr. SE, EQS	Operations
O&M Manuals and Procedures	Project Mgr. Operations	TE	EQS	Operations TE
Permits and Licensing	M&I Contractor PM	EQS Project Mgr. Operations	SE TE	EQS
As-Built Drawings	Project Mgr. TE	Operations Construct. Rep. Design Agent	EQS Operations	Project Engr. Design Agent

Product	Approval	Concurrence	Review	Preparation Lead
Cross-Baseline Products				
T&E Plan	Program Mgr.	Project Mgr. SE, EQS Operations TE	Project Engr. Business Mgr.	Project Mgr.
SEMIP	Program Mgr.	Project Mgr. TE SE	Operations EQS	SE
Level One Logic Diagrams	Program Mgr.	Project Mgr. TE Operations SE	EQS	Project Engr.
HSTD Change Requests	Project Mgr.	SE TE	Project Engr. EQS	SE
Risk Management List	Program Mgr. Project Mgr.	TE SE EQS Operations	Program Mgr. Project Mgr.	Program Mgr. Project Mgr.

Note 1: Product completed at time of writing.

Legend:

TE	TWRS Engineering and Nuclear Safety
EQS	Environmental, Quality, and Safety
PM	Program Manager/Engineer
M&I	Management and Integration

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APPENDIX A

PROJECT W-464 SE GRADED ASSESSMENT TABLES

Table A.1. SE Graded Assessment of the W-464 ISF and Equipment

RISK/COMPLEXITY FACTOR	ASSESSMENT	RISK			COMMENTS
		L	M	H	
Technology	Proven/state-of-the-art technology, Engineered equipment, Testing.		✓		Standard construction application required.
Time	Compressed time frame to perform work DOE commitments with other agencies such e.g., the EPA.			✓	There is potential for project delays due to future extensions of the time to complete Project W-379.
Interfaces	Potential major impact on site operations, other contractors, projects, programs, etc.			✓	Several high-level interfaces between participants.
Number of Key Participants	3 or more			✓	Several Hanford Site contractors plus two private vendors.
Contractor Capabilities	Proven track record	✓			CSB modification construction capability risk is low.
Magnitude and Type of Environmental Contamination	Hazardous and HLW, fully characterized	✓			Waste will be fully characterized and packaged on receipt by the project.
Regulatory Involvement	EPA, NRC, or States		✓		EPA and WA State involvement.
NEPA	Environmental Assessment and ordinary permitting required.		✓		Using existing EIS. May have to develop an Environmental Assessment for storage of the Cs-137 Product.
Environmental Permits (RCRA, CWA, CAA, etc.) or Licensing			✓		RCRA permitting required. Other permit waivers or deviations may be necessary.
Number of Locations	1	✓			Single interim storage location for Phase 1 waste, on DOE site.
Site Ownership	DOE property	✓			Interim storage facility site is DOE owned.
Site Improvement/ Access	No infrastructure improvements required and accessible.	✓			Standard utilities, communications, and road access to be constructed for facility.

RISK/COMPLEXITY FACTOR	ASSESSMENT	RISK			COMMENTS
		L	M	H	
Labor Skills Availability Staff Build-Up Productivity	Moderate or highly skilled labor. Readily available Gradual Low or average productivity assumed and moderate schedule risk	 ✓ ✓	✓ ✓		Project management and design teams are in place. Construction contractors are readily available. Project will require close management and design interface with Duke-SNF.
Quality Requirements	Moderate quality tolerances (re-work likely) and moderate productivity risk.		✓		Project risk assumed for waste quality is low. Quality risk for storage facility construction is also low.
Funding	2-3 year duration Other Line Item Project size		✓		Project funding must be maintained for several years, and is vulnerable to congressional budget cycles.
Political Visibility	None	✓			Little to no political visibility.
Cost Sharing	None	✓			None required.
Public Involvement	None	✓			No public involvement anticipated.
OVERALL COMPLEXITY	Moderate		✓		Moderate technology level for construction, low political visibility, cost sharing and public involvement. However, high risk associated with time constraints and number of interfaces.

Table A.2. SE Graded Assessment - W-464 Transportation System

RISK/COMPLEXITY FACTOR	ASSESSMENT	RISK			COMMENTS
		L	M	H	
Technology	Common/off-the-shelf technology and conventional construction.	✓			Standard construction application required.
Time	Ample time to perform work.	✓			Little to no schedule risk anticipated.

RISK/COMPLEXITY FACTOR	ASSESSMENT	RISK			COMMENTS
		L	M	H	
Interfaces	No major impact on site operations, other contractors, projects, programs etc.	✓			Only interface is with the vendor for the transportation system equipment.
Number of Key Participants	2-3		✓		Several Hanford Site contractors plus two private vendors.
Contractor Capabilities	Proven track record	✓			Transportation system construction capability risk is low.
Magnitude and Type of Environmental Contamination	Hazardous and HLW, fully characterized	✓			Although fully characterized, HLW and mixed waste transport involved.
Regulatory Involvement	None	✓			EPA and WA State involvement.
NEPA Environmental Permits (RCRA, CWA, CAA, etc.) or Licensing	Categorical Exclusion and no permitting.	✓ ✓			No permitting required.
Number of Locations Site Ownership Site Improvement/ Access	1 Not Applicable	✓ ✓	 N A		Site Improvement falls under the facility construction scope.
Labor Skills Availability Staff Build-Up Productivity	Moderate or highly skilled labor. Readily available Gradual Low or average productivity assumed and moderate schedule risk	 ✓ ✓ ✓	✓		Project management and design teams are in place. Construction contractors are readily available. Project will require close management and design interface with private vendors.
Quality Requirements	Moderate quality tolerances (re-work likely) and moderate productivity risk		✓		

RISK/COMPLEXITY FACTOR	ASSESSMENT	RISK			COMMENTS
		L	M	H	
Funding	2 or more year duration.		✓		Project funding must be maintained for several years, and is vulnerable to congressional budget cycles.
Political Visibility	None	✓			High state and congressional visibility.
Cost Sharing	None		N A		Not Applicable.
Public Involvement	None	✓			None anticipated.
OVERALL COMPLEXITY	Low technology level for construction, low funding complexity and political visibility.	✓			Moderate risk/complexity results in a reduced set of SE processes and products, tailored to the project as described in the draft 0842 guidance.

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