DISTRIBUTION SHEET

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Equipment Engineering	Equipment Engineering	Date 10/10/94
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SNFP/K Basin Engineering Project		ECN No. N/A

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Page 1 of 1

1. EDT 600505

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SNFP/K Basin Engineering Project	L. M. McWethy	N/A
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		10. System/Bldg./Facility: 105-KE Basin
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16. KEY

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L. M. McWethy 10/12/94 Signature of EDT Originator Date	C. J. Alderman 10/12/94 Authorized Representative for Receiving Organization Date	C. J. Alderman 10/12/94 Cognizant Manager Date	[] Approved [] Approved w/comments [] Disapproved w/comments

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SUPPORTING DOCUMENT

1. Total Pages 18

2. Title	3. Number	4. Rev No.
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5. Key Words	6. Author
Project Management Plan, Sludge Retrieval and Packaging	Name: L. M. McWethy Signature Organization/Charge Code 2C130 /L221E

7. Abstract

This Project Management Plan establishes the organizational responsibilities, control systems, and procedures for the execution of project activities for KE Basin sludge retrieval and packaging, to meet programmatic requirements within authorized funding and approved schedules.

8. RELEASE STAMP

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CONTENTS

FIGURES

ACRONYMS

ALARA	As Low As Reasonably Achievable
DOE	Department of Energy
DOE-RL	Department of Energy Richland Field Office
NEPA	National Environmental Protection Act
PMP	Project Management Plan
PTS	Performance Tracking System
SE	System Engineer
SNF	Spent Nuclear Fuel
TPA	Tri-Party Agreement
WBS	Work Breakdown Structure
WHC	Westinghouse Hanford Company
WP	Work Plan

PROJECT MANAGEMENT PLAN
105-KE BASIN SLUDGE RETRIEVAL AND PACKAGING

1.0 INTRODUCTION

1.1 PURPOSE

This Project Management Plan (PMP) establishes the organizational responsibilities, control systems, and procedures for the execution of project activities for KE Basin sludge retrieval and packaging, to meet programmatic requirements within authorized funding and approved schedules.

1.1.1 Background

The 105-KE Basin (referred to as "KE Basin" hereafter) was constructed during the early 1950's, as an integral component of the 105-KE reactor building. Similar basins were provided in all Hanford weapons production reactor buildings to receive fuel elements discharged from the reactors and stage them for rail transport to 200 Area fuel reprocessing plants. The 105-KE reactor and its nearby twin (the 105-KW reactor) began operation in 1955. Although the 105-KE reactor was shut down in 1971, the KE Basin was reactivated several years later to store spent fuel from N-Reactor. This allowed N-Reactor to continue operation during outages at the Plutonium Uranium Extraction Plant.

The KE Basin contains over 1100 metric tons of spent nuclear fuel (SNF). The bulk of this inventory consists of over 50,000 zircaloy clad, uranium metal N-Reactor fuel element assemblies, along with less than half a metric ton of single-pass reactor fuel elements, stored in over 3600 open top canister assemblies ("canisters").

A recent Department of Energy (DOE) assessment of the environmental, safety, and health (ES&H) vulnerabilities associated with storage of SNF throughout the DOE complex (DOE 1994) identified a number of concerns at KE Basin. These included:

- Sludge accumulation containing fissile and fission product material from damaged/degraded fuel.
- Two previous incidents during which water is known to have leaked from the basin, and assumed to have released radioactive materials to the environment.
- A potential seismic vulnerability, due to a lack of adequate reinforcement at a construction joint.
- The assumption that up to half of the fuel assemblies may have experienced cladding failure.

- The assumption that a majority of the canisters contain at least one fuel assembly with breached clad, resulting in the release of significant amounts of fission products to the pool.

- Lack of precise detail as to the material condition of some of the SNF in storage.

Additional information regarding the status of the KE Basin is provided in DOE's environmental assessment for repackaging the fuel (DOE 1991). That document specifically addresses the current baseline process alternative for mitigating potential hazards associated with storage of SNF in open top canisters at the KE Basin.

The Summary, Findings, and Recommendations in the DOE EM-37 SNF Assessment of 105-KE Basin Report (DOE 1992) states that "prototype testing of sludge packaging methods should be initiated as soon as reasonably possible" and that these "methods should be evaluated in parallel with current fuel encapsulation efforts rather than after this effort as specified by the Hanford Tri-Party Agreement." The report also recognizes "that near-term sludge encapsulation campaign probably will not produce packages that can be moved directly to long-term interim storage during basin cleanout -- a further conditioning/re-encapsulation campaign is likely to be required."

The sludge, particularly the fines, impacts basin operations by clouding the water and making activities requiring a clear view impossible to complete until after sludge settles. Since this can take up to two days depending upon the level of clouding, significant delays can be created. Even minor clouding can delay activities thereby increaseing the dose to operators as they wait for the sludge to settle. Packaging gets the sludge out of the operator's way and allows it to be moved within the basin in a more manageable state.

1.1.2 Program Objectives

The primary project objective is to develop, procure, and qualify the equipment needed to remove all sludge from the KE Basin with minimal dose commitment, minimal cost, and on schedule. The project will provide: 1) the development, testing, and installation of equipment for sludge retrieval and packaging; 2) understanding of and experience with actual sludge through near-term sludge packaging feature tests in the KE Basin; 3) sludge removal and handling equipment required to support debris removal, fuel handling, and other activities involving sludge within the KE Basin; and 4) enlist industry expertise in all phases of the project.

Other objectives include using cold testing to the maximum extent possible to minimize personnel exposures and evaluating vendor demonstrated systems to establish the concepts for the retrieval and packaging systems. Industry advises gaining experience as soon as possible with the actual material to avoid the pitfalls of relying exclusively on simulants during the system development phase. Hot feature testing will be used to develop the specific set of functions and requirements and procurement specifications for the retrieval and packaging systems. Simulants will be developed to mock up the physical properties of the sludge and data gathered during hot testing will be used to perfect the simulant recipes. The resulting simulants will be used by commercial vendors to demonstrate proposed systems for retrieval and

packaging concepts. The concepts will be judged against the functions and requirements and the winner to receive the system procurement contract.

Given the number of alternatives associated with sludge dispositioning, a final objective is to support the disposition decision process. The project will either direct or participate in surveys of handling and processing options and participate in characterization efforts to obtain data for these options. This way, the project can provide support to the decision process and be prepared with a viable system that can be implemented once a decision is reached.

1.1.3 Technical Objectives

The technical objectives are to develop and procure sludge removal equipment required to retrieve and package sludge while supporting general KE Basin activities. Specific technical data will be obtained through characterizing the sludge and performing both cold and hot integrated feature tests of retrieval and packaging equipment to gain knowledge on component efficiency and compatibility with the sludge. These feature tests will use sludge presently stored in the weasel pit and sludge from general basin cleanup campaigns (e.g., from the storage racks prior to the barrier installation or debris removal activities). Any sludge retrieval and packaging equipment used in the basin for these support and test activities that have not been previously qualified to be operated in the basin shall first be cold tested and approved for use in the basin.

The technical baseline for the development activities assumes the sludge will be removed from the KE Basin to pre-interim wet storage until the determination is made on its ultimate disposition. Designs will be directed toward developing systems that minimize the impact to all recognized sludge disposition alternatives.

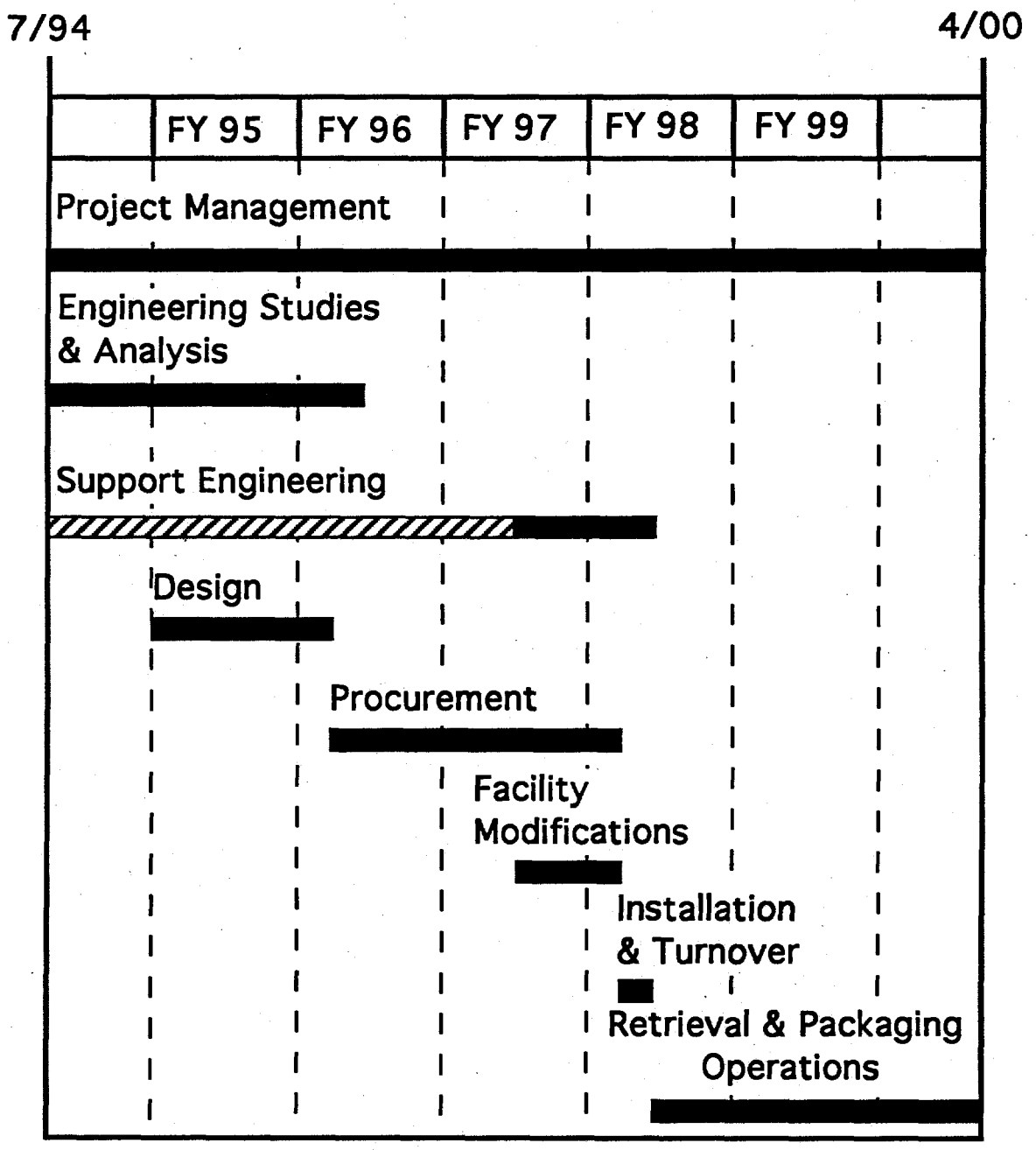
1.1.4 Schedule Objectives

The sludge project schedule, developed to support expedited fuel and sludge removal from the basin, is shown in Figure 1. Decision milestones represent points at which programmatic guidance is needed to proceed with minimum risk. Design and procurement efforts will proceed at risk under the present technical baseline until guidance is provided. Equipment testing and systems evaluation culminating with detailed functions and requirements and product specifications will continue through FY 1996. Procurements will be placed in FY 1996 for commercial vendors to design and build the systems for the actual cleanup campaign. Sludge removal activities support overall SNF project objectives for removing fuel from the K Basins by 2002. Schedule impacts resulting from decisions on the final disposition of the sludge shall be assessed and managed in accordance with Section 3.3.

1.1.5 Budget Objectives

The total estimated cost for the project is $27M. The cost breakdown for this project is shown in Figure 2. The budget objectives are to manage the project costs such that the budgetary risks involved in the installed systems are minimized.

Figure 1
Project Schedule



1.1.6 Project Description

The KE Basin sludge retrieval and packaging work scope will be limited to retrieval and packaging of the sludge from the KE Basin. Details of the program objectives are provided in WHC-SD-SNF-FRD-003, *Functions and Requirements for 105-KE Basin Sludge Retrieval and Packaging.*

2.0 ORGANIZATION

2.1 GENERAL

A project organization chart, showing the relationship of the sludge retrieval and packaging project to Westinghouse Hanford Company (WHC) and DOE organizations, is provided in Figure 3. Responsibilities of these organizations are provided below:

- **DOE EM-30** This department has overall responsibility for disposal and stabilization of SNF in the United States.

- **DOE-RL** The DOE Richland Operations Office, Nuclear Material Division, will administer SNF programs for EM-30. The DOE-RL Spent Nuclear Fuel Division Chief will be responsible for coordinating all involved RL divisions and staff.

- **WHC** As the operations and engineering contractor for the Hanford site, WHC is responsible for providing the management structure and resources to support the SNF project. This project supports the overall Hanford site cleanup mission and national SNF stabilization and disposition objectives.

- **Spent Nuclear Fuel Project** The SNF Project has responsibility for all SNF stabilization, handling, transportation, interim storage, and staging for final disposition on the Hanford site. These responsibilities include K Basin facilities and associated operations. The SNF Project will provide all management, engineering, administrative and operational resources required to support the project.

- **K Basin Engineering Project Manager** The K Basin Engineering Project is responsible as an organization to provide day-to-day direction and management of the resources and personnel to meet program, technical, budget and schedule objectives. Responsibilities are to:

  - Provide resources to manage K Basin fuel mitigation activities
  - Assure day-to-day needs of the DOE-RL/HQ program principals are met
  - Prepare and maintain the activity level schedules
  - Monitor performance of the participants and comparing their progress to the completion of project work planned to meet those objectives

Figure 2
Project Cost Estimate (1994-2002)

Task	Cost ($K)
Project Management	2,000
Engineering Studies	1,200
Design	6,600
Support Engineering	2,400
Procurement	7,600
Facility Modifications	1,300
Installation	900
Retrieval and Packaging Operations	5,000
TOTAL	27,000

Figure 3
Organization Chart

Organization Title	Responsibilities
Waste Management (DOE-EM-30)	Manages all SNF projects and sub-projects
Richland Operations (DOE-RL)	Administers SNF projects and sub-projects
Westinghouse Hanford Company (WHC)	Is the Operations and Engineering contractor at Hanford which conducts the SNF Projects
Spent Nuclear Fuel Project	Provides project management and required resources for achieving project objectives
KE Basin Engineering Project Manager	Manages the K Basin fuel mitigation project
Equipment Engineering Manager	Manages the sludge retrieval and packaging activities
System Engineer (SE)	Performs specific engineering functions identified in work plans

- **Equipment Engineering Manager** The Equipment Engineering Manager has the following responsibilities:

  - Manage resources to meet the project goals
  - Provide all engineering and analysis support required for the project
  - Recommend changes to scope, budgets, schedules, deliverables and provide change orders as needed
  - Assure technical integration between other project elements
  - Maintain cognizance of technical activities performed for the project
  - Coordinate and direct the funded tasks in support of the project
  - Prepare and maintains the cost account level schedule
  - Manage costs associated with the cost account
  - Review and approve technical documents
  - Coordinate personnel assignments and responsibilities
  - Ensure resources are supplied to meet project schedules

- **System Engineer** System engineers (SE) are the responsible engineers for the sludge retrieval and packaging systems. They prepare work plans, schedules and implement work needed to accomplish that scope. In addition, they direct the work needed to accomplish their respective tasks, and report progress, including weekly highlights, and input to the work package level schedules. Their responsibilities include:

  - Lead facility and process system design and installation
  - Prepare work plans, detailed schedules and cost estimates
  - Follow procurement and fabrication of equipment
  - Plan and implement equipment tests

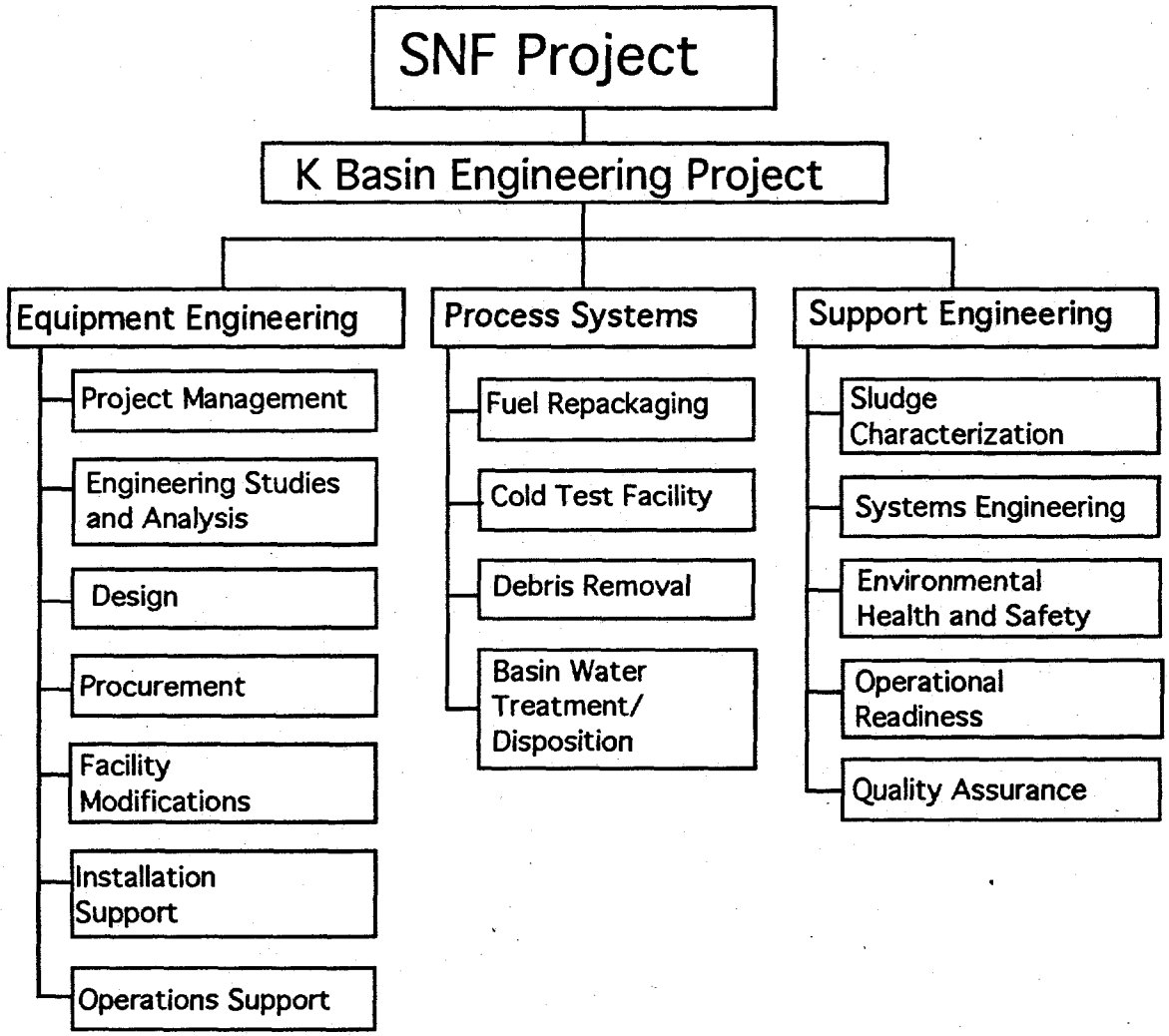
2.2 PRINCIPAL PROJECT PARTICIPANT RESPONSIBILITIES

The project organization is shown in Figure 4. This is a matrixed organization reporting to the K Basin Engineering Project Manager. The primary responsibilities of each organization are shown with the organization chart and will cover the scope of the project. This is an activities based organization.

3.0 PROJECT MANAGEMENT AND CONTROL

The sludge retrieval and packaging project will be managed in accordance with the policies and guidelines defined in the WHC Management Guide, WHC-CM-2-5, *Management Control System*. The major management aspects are: 1) description of plans required for implementing program/project and supporting policies; and 2) internal management control systems to administer the project.

Figure 4
Sludge Retrieval and Packaging Functional Organization



3.1 BASELINE DEFINITION

The project baseline consists of four elements:

- Technical Scope - functions and requirements document, WHC-SD-SNF-FRD-003, *Functions and Requirements for 105-KE Basin Sludge Retrieval and Packaging.*
- Work Breakdown Structure (WBS) - See Appendix A and WHC-SP-1104, *Multi-Year Program Plan.*
- Schedule - The Sludge Project Schedule as shown in Figure 1.
- Cost Baseline - The total order of magnitude is as shown in Figure 2.

3.2 CONTROLLED DOCUMENTS

Controlled project documents that will be used to support the project are shown in Figure 5. These are baseline and management control documents to be developed by the project specifically for the sludge retrieval and packaging. This figure also shows the approval matrix for these documents. The approval matrix is to be used as a guide. Documents important to the environment, safety, or quality will be given an approval designator of E, S, or Q (D for documents requiring DOE approval). Approval designators will be assigned to documentation in accordance with WHC-CM-3-5, *Document Control and Records Management Manual*, Section 12.7, "Approval of Environmental, Safety, and Quality Affecting Documents."

3.3 SCHEDULE CONTROL

Schedules will be developed by WBS element and used to create an integrated sludge retrieval and packaging schedule. This schedule will have sufficient detail to manage and control activities. Weekly meetings will be held to review and update the schedule. A master copy of this schedule with a backup will be maintained. This schedule will be integrated into the K Basin master schedule.

3.4 COST CONTROL

Project cost and schedule control will be maintained as part of the overall SNF project control system. This system is based on the WHC management control system as described in WHC-CM-2-5, *Management Control System Description.*

The sludge retrieval and packaging project cost and schedule controls will be based on the WBS used site wide at Hanford (WHC-SP-1104). The WBS consists of cost accounts divided into work packages and task packages. Incurred costs and financial commitments will be summarized against this structure. Actual costs will be tracked against original projections permitting identification of problems if they occur and responses to those problems.

Figure 5
Document Creation, Review and Approval Matrix

Document	SE	EEM	KEPM	SNFP	QA	ES	TPO
Project Management Plan	I	A	C/A	A	A	A	R
Functions and Requirements	C/A	A	A	R	A	A	R
Procurement Specifications	C/A	A	R	I	A	A	I
Design Plan	C/A	A	R	I	I	I	I
Design Drawing	C/A	A	I	I	A	A	I
Test Plans/Procedure Forms	C/A	A	R	I	A	I	I
Test Procedures	C/A	A	I	I	A	A	I
Test Reports	C/A	A	I	I	A	I	I
Design Review Reports	C/A	A	R	I	A	A	I
Work Plans	C/A	A	R	I	I	I	I
Sub Project Level Schedules	I	I	A	C/A	I	I	A
Activity Level Schedules	I	A	C/A	A	I	I	I
Cost Account Level Schedules	I	C/A	A	R	I	I	A/I
Work Package Level Schedules	C/A	A	R	R	I	I	I

C = Create
A = Approve
R = Review
I = Information
SE = System Engineer
EEM = Equipment Engineering Manager
KEPM = K Basin Engineering Project Manager
SNFP = Spent Nuclear Fuel Project
QA = Quality Assurance
ES = Environmental, Safety & Health
TPO = Technical Program Office (DOE-RL)

3.5 CONFIGURATION CONTROL

Configuration control will be maintained for documents prepared for the project. Controlled documents shall be issued per WHC-CM-4-2, QR 6.0, "Document Control" and WHC-CM-6-1, EP 1.12, "Supporting Documents."

3.6 WORK CONTROL

3.6.1 Process Equipment

Process equipment design, fabrication and installation will be controlled through work plans as specified in WHC-CM-6-1, *Standard Engineering Practices*. All design activities shall follow the guidance in the Pilot Run Design Plan (WHC-SD-SNF-WP-001).

3.6.2 K Basin Modifications

105-KE Basin facility modifications will be controlled through work packages and the site job control system.

3.7 PROCUREMENTS

Procurements will be made and/or expedited based on a procurement plan to be developed. These costs will be tracked by WBS element.

3.8 PROJECT FILE

A SNF project file is being maintained to store documentation for the project. Since the sludge retrieval and packaging project is subordinate to SNF all supporting documents written should have an SNF project indicator and a copy placed in the project file.

4.0 REPORTING

Sludge retrieval and packaging activities and progress will be reported to DOE-RL through weekly reports from the Engineering and Systems Integration organization within the SNF Project.

5.0 QUALITY ASSURANCE

Interim guidance for the sludge retrieval and packaging quality assurance program is provided by WHC-SD-SNF-QAPP-001, *Quality Assurance Program Plan* (QAPP) for 105-KE Basin Spent Nuclear Fuel Pilot Run. This is a plan to assure overall compliance with requirements applicable to the pilot run. A comprehensive QAPP for K Basins will be developed later. Upon release, the K Basins QAPP will supersede the pilot run QAPP.

6.0 ENVIRONMENTAL, SAFETY AND HEALTH

Permits required for sludge retrieval and packaging operations in the KE Basin will include air permits from the Department of Health for the State of Washington and review for compliance with National Environmental Protection Act (NEPA) regulations. All sludge retrieval and packaging operations will consider the operator dose commitment and meet ALARA objectives. An ALARA plan will be required for the K Basin activities to provide assurance of meeting ALARA objectives. All operations will meet all DOE, WHC and KE Basin safety requirements.

The sludge retrieval and packaging operations will be reviewed for public, operator and facility safety and documented in a revision to the Safety Analysis Report (SAR) if any consequence is found to be outside of the operational and accidental consequence envelope of the facility SAR.

7.0 PERMITTING

Permits required by the Washington State Department of Health, Environmental Protection Agency and NEPA will be obtained as required for the various sludge retrieval and packaging activities. These efforts will be coordinated through the Spent Nuclear Fuel Regulatory and Public Involvement organization.

8.0 OPERATIONAL READINESS

Operational readiness for K Basin activities will be reviewed per the requirements of DOE order 5480.31 and WHC-CM-1-5, Section 1.2 as appropriate.

9.0 PROJECTS INTEGRATION

Interfaces between projects will be managed through an integrated schedule. Interface requirements will be specifically identified, schedules and monitored at the appropriate level.

10.0 REFERENCES

Department of Energy, 1991, *Environmental Assessment of 105-KE and 105-KW Basins Fuel Encapsulation and Repackaging, 105-K Area*, DOE/EA-C535, Richland, Washington.

Department of Energy, 1992, *Interim Report Hanford's 105-K East Basin*, EM-37 SNF Assessment Report, Predecisional, Office of Spent Fuel Management and Special Projects, U.S. Department of Energy, Washington DC.

Department of Energy, 1994, *Plan of Action to Resolve Spent Nuclear Fuel Vulnerabilities, Phase 1*, Richland, Washington.

DOE Order 5480.31, *Startup and Restart of Nuclear Facilities*, Richland, Washington.

WHC-CM-1-5, *Standard Operating Procedure, Section 1.2*, Operational Readiness Review, Westinghouse Hanford Company, Richland Washington.

WHC-CM-2-5, *Management and Control System*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-3-5, *Document Control and Records Management Manual*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-4-2, *Quality Assurance Manual*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-6-1, *Standard Engineering Practices*, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-SNF-FRD-002, *105-KE Pilot Run Functions and Requirements*, D. L. Sherrell, 1994, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-SNF-FRD-003, *Functions and Requirements for 105-KE Basin Sludge Retrieval and Packaging*, L. V. Feigenbutz, October 1994, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-SNF-QAPP-001, *Quality Assurance Program Plan*, D. W. Smith, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-SNF-WP-001, *105-KE Basin Pilot Run Design Plan*, D. L. Sherrell, 1994, Westinghouse Hanford Company, Richland, Washington.

WHC-SP-1104, *Spent Nuclear Fuels Project FY 1995 Multi-Year Program Plan WBS #1.4*, J. L. Denning, September 1994.

APPENDIX A

WORK BREAKDOWN STRUCTURE

1.4.2.2.1 Sludge Retrieval and Packaging

1 Project Management
- 1 Project Plans
- 2 Work Plans
- 3 Costs/Schedules
- 4 Progress Reports
- 5 Personnel Management

2 Engineering Studies and Analysis
- 1 Technology Survey
- 2 Candidate Analysis
- 3 Evaluation

3 Design
- 1 Engineering Documentation
- 2 Development and Testing
- 3 Definitive Design

4 Support Engineering
- 1 Sludge Characterization
- 2 Systems Engineering
- 3 Environmental Health and Safety
- 4 Operational Readiness
- 5 Quality Assurance

5 Procurement
- 1 Purchase Requisitions/SOW
- 2 RFP Preparation
- 3 Evaluate Proposals
- 4 Contract Preparation

6 Facility Modifications
- 1 Mechanical Modifications
- 2 Piping Modifications
- 3 Electrical Modifications
- 4 Instrumentation and Control
- 5 Installation

7 Installation/Turnover
- 1 Work Package
- 2 Installation Procedures
- 3 Craft Support
- 4 Engineering Support
- 5 System Turnover

8 Retrieval and Packaging Operations
- 1 Training
- 2 Pre-Cleanup Activities
- 3 Sludge Cleanup
- 4 Contract Support