

SEPARATIONS EQUIPMENT DEVELOPMENT FACILITIES DECONTAMINATION & DECOMMISSIONING PROJECT

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ABSTRACT

The Separations Equipment Development (SED) Facility was accepted into the Department of Energy (DOE) Headquarters (HQ) Environmental Restoration (EM-40) Decontamination and Decommissioning (D&D) Program in 1992. Subsequently, goals were established to D&D the facility to levels of radiological and hazardous materials consistent with its surrounding environment in a safe, timely, and cost effective manner in accordance with applicable laws and regulations. The project is currently in Phase I - Assessment.

INTRODUCTION

The SED Facility is located within the boundaries of the DOE Savannah River Site (SRS) in South Carolina. Following acceptance into the EM-40 D&D Program, the project became the first D&D project at SRS to be conducted under the auspices of EM-40 and one of the first EM-40 projects to deal with both classified and Special Nuclear Materials (SNM). The project is divided into two phases: Phase I - Assessment and Phase II - Remediation/Closeout. The Phase I - Assessment, discussed herein, prepares for decommissioning operations.

DESCRIPTION / HISTORY

The SED Facility, constructed between 1969-1971, began operation in 1973. The facility was shut down and placed in a surveillance and maintenance mode from 1976 - 1978 and accepted for D&D in 1992.

The SED Facility was designed as a plant prototype to separate plutonium isotopes from plutonium compounds. The facility consisted of laboratories that processed plutonium isotopes in separation units, known as columns. Those columns remain within the facility, along with several glove boxes and processing and ancillary equipment and systems. The D&D of the SED Facility will involve the removal of the equipment and material located within the facility, with the exception of essential services such as the fire protection main. The columns and the associated process equipment are contaminated with transuranic materials and contain accountable quantities of SNM.

The SED Facility is surrounded by a Radiologically Controlled Area (RCA) and its use restricted due to classified equipment and SNM.

MISSION

The EM-40 Mission Statement, as contained in the EM-40 Management, Policies, & Requirements Document, Revision 1, dated March 1992, is as follows:

The EM-40 mission is to remediate the inactive facilities and release, or prepare for release, sites contaminated with radioactive, hazardous and mixed waste and in so doing ensure that risk to human health and to the environment posed by inactive and surplus facilities and sites identified in the 1989 inventory are either eliminated or reduced to prescribed safe levels by the year 2019. Accomplishment of this mission requires remedial actions and decontamination and decommissioning (D&D) cleanup activities for these facilities and sites.

Consistent with the above, the SED mission is to D&D the SED Facility to levels of radiological and hazardous materials consistent with its surrounding environment in a safe, timely and cost effective manner in accordance with applicable laws and regulations.

During SED Facility D&D operations, failure of contaminant containment could cause unacceptable harm to the facility and endanger the safety of the public; therefore, the mission classification has been determined to be of vital importance to DOE programs.

The objective of the project is to remove the risk posed by storage of radioactive material in the SED Facility. The following specific objectives have been established:

- D&D activities shall be performed in accordance with SRS Health, Safety, Security, and Environmental regulations.
- Risk to the public will be reduced by moving material to interior of site.
- The SED Facility shall be decontaminated to an As Low As Reasonably Achievable (ALARA) condition.
- Radiation exposures will be kept below the limits specified in the WSRC Manual 5Q, *Radiological Control*, and ALARA.
- The costs of D&D operations shall be minimized.

PHASE I-ASSESSMENT ACTIVITIES

The assessment phase of the SED D&D Project covers preparations to conduct the decommissioning operations. Among those preparations will be Technical Data Summary, Facility Radiological/Hazardous Material Characterization, National Environmental Policy Act (NEPA) Compliance, Functional Performance Requirements, Assessment and Selection of Preferred D&D Alternatives, Safety Documentation, Functional Design Criteria, Conceptual Design Package, and Project Plan.

Technical Data Summary

The purpose of the Technical Data Summary (TDS) is to describe the physical characteristics of the facility and to assess inventories of radionuclides and chemical materials using information available at the beginning of the project.

Based on research, the TDS summarizes technical data including: physical descriptions of structures, building services and systems, characterizations of chemical and hazardous materials, and radiological characterizations. TDS is important to the project because early assessment of inventories is necessary

for the development of the decommissioning plan for the facility and for estimating manpower requirements, waste volumes, and decommissioning costs. The Technical Data Summary for the SED Facility, Rev. 0, was issued in April 1992.

Facility Radiological/Hazardous Material Characterization Protocol

The Characterization Protocol provides the basis for obtaining baseline radiological, chemical, and characterization data to support the planning for the D&D of the SED Facility. The baseline describes the radiological and hazardous material conditions of areas and equipment in sufficient detail to:

- Determine the method and extent of decontamination and dismantlement necessary to maintain ALARA and to minimize waste volume and disposal costs.
- Determine the health physics requirements for D&D.

The protocol is not intended to define the detailed procedures for conducting the characterization. Detailed procedures for sample acquisition and analysis provide the necessary controls for health physics, safety, quality assurance and control (to include sample custody and control and equipment calibration), and documentation.

The Characterization Protocol must describe pertinent D&D information such as Release Criteria, Final Configuration, Waste Acceptance Criteria, Summary of Existing Surveys, Options for Disposal of Material, and Recommended Sampling Program.

Radiological and hazardous material characterization of the SED Facility is important because it will be used to document the level, location and types of contaminants. The protocol was issued in April 1992.

NEPA Compliance (Action Description Memorandum, Compliance Determination, Environmental Assessment)

In October 1991, upon first serious contemplation of SED D&D, DOE-Savannah River (SR) sent an Action Description Memorandum/Environmental Checklist to DOE-HQ to determine NEPA compliance. Subsequently, in August 1992, DOE-HQ, (with concurrence from the Offices of Environmental Restoration and Environment, Safety and Health) provided direction for an Environmental Assessment (EA) for the SED D&D Project. In addition, Westinghouse Savannah River Company (WSRC) prepared a categorical exclusion (CX) for DOE-SR approval which allowed radiological/hazardous material characterization of the facilities. The CX was approved in January 1993. The EA is scheduled for completion prior to August 1994.

Functional Performance Requirements

The Functional Performance Requirements (FPR) should: define the purpose and need for the SED D&D Project; provide a general description of the project; and describe the project requirements. FPR is required as part of the technical baseline for a project by DOE Order 4700.1, Chapter III, Part C, No. 5, Functional Requirements Baseline. WSRC, 1E Manual, Procedure 2.02, describes the requirements for preparation, approval, issue, and control of FPR documents.

The FPR, specified by the WSRC Environmental Restoration Program, ensure achievement of the project missions and goals. The document details the following requirements: facility release criteria; reliability, availability, maintainability and inspectability criteria; waste concerns; exposure limits;

public and environmental concerns; safety requirements; and D&D considerations. Specific performance requirements and configuration requirements are also addressed.

The Functional Performance Requirements for SED Facility D&D, Rev. 0, were issued in December 1992.

Assessment and Selection of Preferred D&D Alternatives

The preliminary Alternatives Assessment for the SED Facility D&D Project evaluates mission-related alternatives which will have a significant impact on the project.

The Alternatives Assessment evaluates the advantages, disadvantages, and costs of each alternative and provides recommendations. Alternatives include disposal of columns, plutonium recovery, stabilization of radioactive contamination, and Do-Nothing. The document also provides information on facility release criteria, cost estimate bases and assumptions, differential costs of one criteria over another and distribution of contamination within the facility.

The Alternatives Assessment document will form the basis for selection of preferred alternative(s) for the project. The preliminary Alternatives Assessment, Rev. B, was issued in March 1993.

Functional Design Criteria

The Functional Design Criteria (FDC) provides the fundamental technical standards, design requirements, and reference design features necessary to develop conceptual, detailed designs and an Inspection/Acceptance Plan. The intent of the FDC is to provide control of the technical design basis of a project prior to Conceptual Design. It serves as the key basis for formal design reviews and acceptance test criteria during succeeding steps in the design process.

The FDC contains elements from the Functional Analysis and Functional Allocation steps of the systems engineering process flow defined in Attachment III-1 of DOE Order 4700.1. WSRC 1E Manual, Procedure 2.03 defines the preparation, review, approval, control and format of FDC documents.

The fundamental technical criteria and design requirements necessary to develop conceptual and detailed designs are provided in the FDC. It incorporates the technical requirements specified in the FPR.

The FDC is important to the project because it includes Project Sponsor requirements, DOE requirements, industry codes and standards, SRS Engineering Standards, engineering experience, etc., therefore, providing the basis for verification that the constructed product meets the requirements of the FPR. The Functional Design Criteria for SED Facility D&D was issued in December 1993.

Safety Documentation (Unreviewed Safety Question Document, Preliminary Safety Analyses Report)

The safety documentation for the activities pertaining to the SED Facility are governed by various DOE Orders. The Safety Analysis Report (SAR) for SED assessed the facility in the shutdown state; D&D activities will require further analysis. Documents generated in preparation for SED Facility D&D include criticality analysis, Neutron Incident Monitor (NIM) analysis, and risk analysis. Procedures are being developed to ensure that proper safeguards are in place and job-specific training is accomplished. The documents are being processed as an Unreviewed Safety Question (DOE Order 5480.21) and an appropriate SAR change.

Conceptual Design Package

The Conceptual Design Package (CDP) will satisfy program needs, operating needs, and statutory requirements; assure project feasibility and attainable technical performance levels; identify and quantify project risks; and develop a cost estimate and performance schedule.

The CDP is required by DOE Order 4700.1, which labels it a key element of project planning.

Topics included in the package are general project criteria and design parameters supported by sketches, drawings, analyses, cost estimates and schedules, and applicable codes and standards; quality assurance requirements to satisfy and project objectives; safeguards against potential environmental damage and methods for mitigating environmental hazards; health, safety, and security requirements; and identification and elimination of uncertainties.

The CDP is scheduled for completion in September 1994.

Project Plan

The Project Plan is the initial project baseline against which project progress is measured in terms of cost, schedule, and technical performance. The plan is required by DOE Order 4700.1 and constitutes the contract between DOE-HQ, DOE-SR, and the contractor organization for execution.

The Project Plan summarizes objectives, schedule, resources, priority, controlled milestones, and environmental requirements. It is an evolving document which covers the project from inception through completion. Included in the plan is the Work Breakdown Structure (WBS), which provides a framework for project management by focusing on the objectives. For the SED D&D Project, the Project Management Plan (PMP) is not required as a separate document and has been integrated into the Project Plan. The PMP establishes the plans, organization, and systems to be utilized by those responsible for managing the project.

The Project Plan was issued in September 1993.

SCHEDULE AND COST BASELINES

Chronologically, the project is divided into two phases. Phase I - Assessment is approximately three years in duration (FY 1992-FY 1994) and Phase II - Remediation/Closeout, is expected to be four years in duration (FY 1994-FY 1997). The project is scheduled for completion by June 1997. The significant schedule milestones are summarized in Table I.

The project estimate is \$20 million which includes planned work of \$16 million and a contingency of \$4 million (25%).

LESSONS LEARNED

The SED D&D project is unusual, in that, it is funded by EM-40 but does not involve a facility that has been transitioned to DOE-HQ Facility Transition (EM-60). The facility did not go through the transition process as outlined in DOE Order 5820.2A because it was accepted by EM-40 prior to the establishment of EM-60. Since only equipment will be removed and the facility decontaminated, the building will remain intact and custodian responsibilities remain with WSRC. A Memorandum of Agreement was prepared which outlined the responsibilities of the respective organizations.

The D&D of the SED Facility is one of many activities at SRS. The SED project involves numerous DOE and WSRC organizations with differing priorities; consequently, affected organizations must coordinate efforts to establish priorities; avoid project delays, and meet the expectations of DOE. In addition, pre-planning will identify interfaces to ensure that parallel reviews and information sharing continue.

To ensure coordination and concurrence in SED activities, a project team has been formed. The team includes subject matter experts from DOE, WSRC and Ebasco. The team ensures timely consideration of problems and concerns and fosters ownership in the success of SED D&D.

SUMMARY

Due to the presence of both classified equipment and special nuclear material, the SED D&D Project is more complex than the facility size and technical requirements would suggest. Lessons learned will likely provide precedents for D&D activities at SRS as well as other DOE sites and facilities.

REFERENCES

1. DOE Office of Environmental Restoration (EM-40) Management Policies and Requirements Document, Rev. 1, (March 1992).
2. Westinghouse Savannah River Company, "The Technical Data Summary for the SED Facility", Rev. 0, (April 1992).
3. Ebasco Services Inc. "Characterization Protocol for the SED D&D Project", (April 1992).
4. DOE Order 4700.1, "Project Management System", (March 1987).
5. Westinghouse Savannah River Company, 1E Manual, "Engineering and Engineered Services Procedure Manual".
6. Westinghouse Savannah River Company, "Functional Performance Requirements for Separations Equipment Development Facility D&D", Rev. 0, (December 1992).

TABLE I
Schedule Milestones

| Milestone | Responsible Organization | Due Date |
|--|--------------------------|----------------|
| Facility Acceptance by EM-40 | DOE-HQ | July 1992 |
| DOE Approval to Start Remediation (Detailed Engineering) | DOE-HQ | December 1994 |
| Start Physical D&D | SED-D&D | December 1995 |
| Complete Physical D&D | SED-D&D | March 1997 |
| Project Closeout | SED-D&D | September 1997 |