

**SAFE, COST EFFECTIVE MANAGEMENT OF INACTIVE FACILITIES AT
THE SAVANNAH RIVER SITE**

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ABSTRACT

The Savannah River Site is part of the U.S. Department of Energy complex. It was constructed during the early 1950s to produce basic materials (such as plutonium-239 and tritium) used in the production of nuclear weapons. The 310-square-mile site is located in South Carolina, about 12 miles south of Aiken, South Carolina, and about 15 miles southeast of Augusta, Georgia.

Savannah River Site (SRS) has approximately 200 facilities identified as inactive. These facilities range in size and complexity from large nuclear reactors to small storage buildings. These facilities are located throughout the site including three reactor areas, the heavy water plant area, the manufacturing area, and other research and support areas. Unlike DOE Closure Sites such as Hanford and Rocky Flats, SRS is a Project Completion Site with continuing missions.

As facilities complete their defined mission, they are shutdown and transferred from operations to the facility disposition program. At the SRS, Facilities Decontamination and Decommissioning (FDD) personnel manage the disposition phase of a inactive facility's life cycle in a manner that minimizes life cycle cost without compromising (1) the health or safety of workers and the public or (2) the quality of the environment. The disposition phase begins upon completion of operations shutdown and extends through establishing the final end-state. FDD has developed innovative programs to manage their responsibilities within a constrained budget.

INTRODUCTION

The mission of FDD is to effectively manage SRS inactive facilities by identifying innovative solutions and reuse opportunities that will minimize risks and facility life cycle costs without compromising health, safety, or environmental quality. FDD carries out this mission by applying DOE guidance in a graded approach, whereby the nature and degree of the requirements is commensurate with the complexity and hazard of the facility. The SRS Disposition Program is based on the facility life cycle whereby four key elements define the program. These elements are deactivation, risk management, surveillance and maintenance, and decommissioning.

Deactivation places a facility in a structurally stable and known condition and includes the removal of hazardous and radioactive materials to ensure adequate protection of workers and the environment. Accomplishment of deactivation reduces periodic

surveillance and maintenance costs. Numerous SRS facilities have been deactivated by FDD over the last few years.

The Inactive Facilities Risk Management Program was developed to augment the traditional approach of facilities deactivation projects. The program reduces the risk of individual hazardous conditions based on their hazard severity, thereby ensuring that limited funds are utilized to effect the greatest overall reduction of the site's liability.

Surveillance and Maintenance (S&M) is performed on inactive facilities to ensure they are monitored and maintained in a manner that minimizes risks to workers, the public and the environment. Through a combination of facility shutdowns, risk reduction actions, requirements-based surveillance and maintenance, and deactivation and decommissioning projects, the annual S&M cost for inactive facilities has been reduced by over \$30M since 1996.

Decommissioning places a facility in its end state. FDD has devised a method, recognized and approved by DOE SR, to reduce the cost of decommissioning at SRS by use of an Assets-for-Services subcontracting approach. This transfers ownership to the subcontractor of all property in a facility to be decommissioned and other assets as necessary to offset the cost of decommissioning. Examples include the 184-1P Powerhouse, the 284-F Powerhouse and the K Area Cooling Tower Assets.

DEACTIVATION PROGRAM

Deactivation, as defined in DOE Order 430.1A, "Life Cycle Asset Management," is "the process of placing a facility in a stable and known condition including the removal of hazardous and radioactive materials to ensure adequate protection of the worker, public health and safety, and the environment, thereby limiting the long-term cost of surveillance and maintenance. Actions include the removal of fuel, draining and/or de-energizing nonessential systems; removal of stored radioactive and hazardous materials; and related actions. Deactivation does not include all decontamination necessary for the dismantlement and demolition phase of decommissioning, e.g., removal of contamination remaining in the fixed structures and equipment after deactivation."

In essence, this boils down to removing radioactive materials, hazardous materials, flammable materials and energy sources; providing structural integrity; and containing remaining hazards, all of which reduce the risk and cost to maintain.

The real challenge for deactivation projects is to define the end points. FDD has developed the expertise to readily assess the proper balance between risk reduction and cost effectiveness. Recently completed deactivation activities include removal of the High Enriched Uranium (HEU) from the 321-M Fuel Manufacturing Building; and the cleanup of the reactor disassembly basin water in the R-Reactor Disassembly. FDD removed the HEU from 321-M to the extent necessary to eliminate any potential for criticality and to allow reclassification of the facility from "radiological" to "other industrial." Subsequent deactivation actions can now proceed without the costly and time

consuming criticality controls. Also FDD completed operation of two parallel selective ion exchange process systems to remove cesium and strontium from the R Reactor Basin. These systems were deployed as an Accelerated Site Technology Deployment (ASTD) project, sponsored by the DOE Environmental Management Office of Science and Technology. These systems reduced the concentrations of cesium and strontium to below the DOE release limits.

FDD conducts deactivation projects, as funding is available, in accordance with the WSRC "Facility Disposition Manual," which implements the DOE "Deactivation Implementation Guide."

INACTIVE FACILITIES RISK MANAGEMENT PROGRAM

The SRS Inactive Facilities Risk Management Program augments the more traditional approach of conducting complete facility deactivation projects with a program that ensures that limited funding is used to reduce the risk of the highest ranked hazards, regardless of the facility in which the hazards are located. See Figure 1 for the Risk Management Flow Chart. Note how this process parallels the Integrated Safety Management System Process.

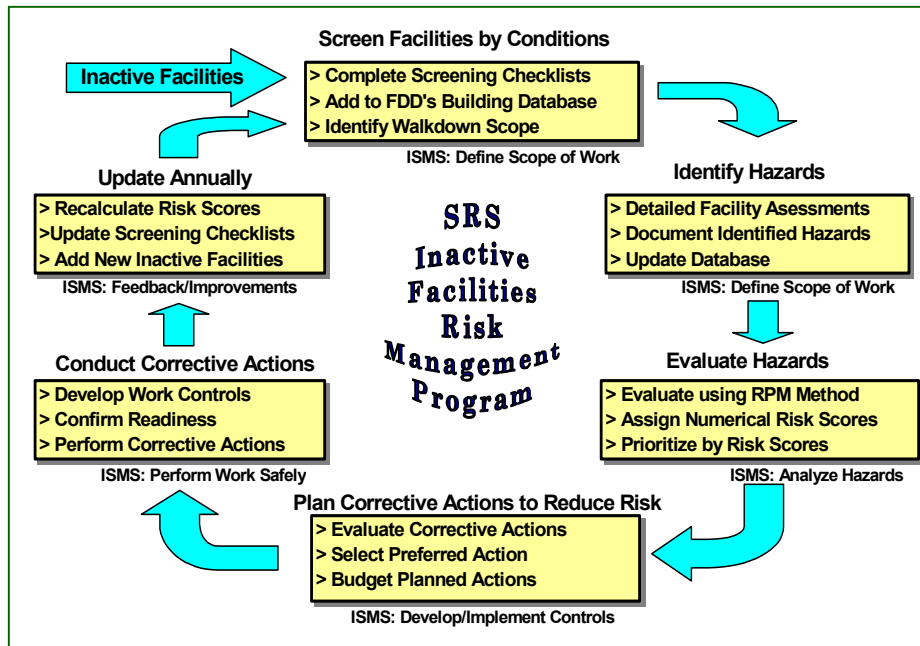


Fig. 1. Risk Management Process Flow Chart

The program has received favorable review from the Department of Energy (DOE), the Environmental Advisory Committee (EAC), the SRS Citizens Advisory Board (CAB), the Energy Facility Contractors Operating Group (EFCOG), and the Defense Nuclear Facilities Safety Board (DNFSB).

SURVEILLANCE AND MAINTENANCE PROGRAM

DOE Order 430.1A, "Life Cycle Asset Management," requires Surveillance and Maintenance programs to be applied to all facilities, regardless of lifecycle status. S&M is required to ensure that government facilities are monitored and maintained in a manner that protects the value and operability of the facility and minimizes potential risks to workers, the public, and the environment. The DOE order provides for a value added, quality-driven, graded approach based on facility conditions.

The WSRC "Facility Disposition Manual," which implements the DOE "Implementation Guide for S&M During Facility Transition and Disposition," defines the S&M drivers for facilities in the disposition phase of the lifecycle to:

- Ensure adequate containment of contamination,
- Provide physical safety and security,
- Minimize hazards to workers, the public and the environment,
- Maintain selected systems and equipment essential for future decommissioning activities,
- Comply with applicable Environmental, Safety and Health, and Safeguards and Security requirements.

There is a tendency for operating divisions to base S&M plans for transition facilities on old operations and maintenance plans. These plans often implement more extensive and more frequent activities than required. FDD has instituted a Requirements Based Surveillance and Maintenance (RBSM) process that performs a bottoms-up review of existing S&M plans to ensure that the plans are consistent with the S&M drivers listed above.

ASSETS-FOR-SERVICES DECOMMISSIONING PROGRAM

FDD has devised a method, recognized and approved by DOE SR, to reduce the cost of decommissioning at SRS by use of an Assets-for-Services (AFS) sub-contracting approach. This approach transfers ownership of all property in a facility to be decommissioned to the sub-contractor to offset the cost of decommissioning services. Ideally, the resultant sub-contract cost is \$0. If the value of the property does not have sufficient value to result in a zero dollar contract, additional surplus property can be applied to the contract to further reduce the cost.

Prior to 2000, FDD successfully used the Assets-for-Services concept to reduce the footprint of legacy facilities by over 46,000 ft². This was accomplished for a cost of less than \$500 thousand, a cost saving of over \$7 million, when compared to the estimated cost of \$7.6 million to perform using site resources.

FDD recently completed a sub-contract to decommission the 284-F Powerhouse. See Figures 2 and 3. This facility had previously been ranked as the #1 risk ranked inactive facility on site. The contract, which included surplus assets from the K Area Cooling

Tower and the 247-F Facility, was completed for less than \$800,000, a savings of ~\$2.5 million from the estimated cost of \$3.3 million to accomplish the scope using site personnel. This contract reduced the footprint of legacy facilities by over 24,000 ft².



Fig. 2. Assets for Services Program – F-Area Powerhouse (Before Demolition)



Fig. 3. Assets for Services Program – F-Area Powerhouse (After Demolition)

FDD has also established a “corral” of pre-approved decommissioning sub-contractors. This “corral” allows small, quick-turnaround, AFS sub-contracts to be placed without the need for the otherwise lengthy procurement preparation, proposal, and approval process.

SUMMARY

FDD has focused on the safe, cost effective management of inactive facilities since its inception in 1996. The division has accumulated over 1,000,000 man-hours in a five year time frame without a lost time or restricted time injury. Cost savings in the tens of millions of dollars have been achieved due to deactivation of facilities; reductions in surveillance and maintenance; and decommissioning utilizing the Assets-for-Services Program.