

In-Situ Decommissioning Services

Leverage US DOE in-situ decommissioning concepts, approaches and facilities to conduct research, design end-states, and assist in regulatory interactions in broad national and international government and private industry decommissioning applications.

Provide critical services based upon the SRS experience in decommissioning and reactor entombment technology:

- Facility Disposition Manual/regulatory accepted process tailored for facility disposition
- Grout formulation/deployment expertise
- Experience in modeling groundwater and vadose zone impacts which are tied to end states; use of specialized tools (VZCOMML, GoldSim)
- Real examples/demonstrated ISD End States
- Inactive nuclear facilities (e.g., C-Reactor, F-Canyon) as potential test/demonstration sites.



Contacts

Inquiries regarding **in-situ decommissioning of large nuclear facilities** may be directed to:

Bob Aylward, Manager

Environmental Restoration Technologies
Savannah River National Laboratory
(803) 725-5190
bob.aylward@srnl.doe.gov

The Savannah River National Laboratory welcomes new business opportunities through Work for Others (WFO) Agreements. For information regarding WFO Agreements with SRNL, please contact:

Steve Wach, Manager

Research and Technical Partnerships
Savannah River National Laboratory
(803) 725-3020
steve.wach@srnl.doe.gov



Specially engineered grout fill being pumped into a P Reactor building.



U.S. DEPARTMENT OF
ENERGY

In-Situ Decommissioning of Large Nuclear Facilities Pioneering Strategy for Global Application



Entombed P Reactor at Savannah River Site

August 2012

In-Situ Decommissioning of Large Nuclear Facilities

Pioneering Strategy for Global Application

Objectives for Decommissioning Nuclear Facilities

The two primary decommissioning end-states for nuclear facilities are demolition and in-situ decommissioning.

The objectives of both are the same:

- Achieve the end-state in accordance with established regulatory review and approval processes.
- Attain an end-state requiring minimal long-term stewardship.
- Protect the industrial worker.
- Protect groundwater.
- Protect the public.

Demolition of non-hardened structures containing little residual contamination is appropriate. However, because demolishing nuclear facilities incurs risk of exposure to workers, the public, and the environment, requires transportation, generates waste, and is costly, DOE has pursued an alternative decommissioning end-state for hardened, robust nuclear facilities.



**P Reactor at Savannah River Site
Undergoing In-situ Decommissioning**

ISD of Large & Robust Nuclear Facilities

IN-SITU DECOMMISSIONING (ISD) is the permanent entombment in place of a facility containing radiological contamination, with or without chemical contamination.

Using its multidisciplinary expertise, the US DOE has developed the scientific basis for evaluating ISD technologies and has successfully decommissioned excess large nuclear facilities using ISD strategies in compliance with regulatory requirements and authorities.

Key criteria that support ISD success include:

- Hardened, concrete structures
- Low residual contamination and/or radiation
- Sufficiently large and robust so that entombment has clear advantages over removal
- Ability to maintain institutional controls.

ISD entails

- Characterization and fate & transport modeling to ensure long-term protectiveness of end-state
- Demolishing or dismantling unstable structural elements
- Filling spaces, vessels, and equipment with specially engineered grout formulations to stabilize contamination
- Sealing external openings with reinforced concrete
- Monitoring the facility periodically to confirm that ISD goals are maintained.

Advantages of ISD are

- Entombment limits worker exposure by drastically reducing the handling and movement of radioactive or contaminated substances.
- Encapsulation in grout prevents migration of contaminants and radiation emission, thereby ensuring the safety of on-site personnel and the public.
- ISD costs a fraction of the cost of demolition.

Global Impact

- The US DOE has demonstrated that ISD is a safer and less costly alternative to the conventional decommissioning practice of demolishing the largest and most contaminated nuclear facilities.
- US DOE development and deployment of the ISD approach has established a roadmap for ISD of other large nuclear facilities in the United States and around the globe.
- US DOE ISD experience and expertise are recognized internationally.

Case Study:

ISD of P & R Reactor Complexes at SRS

In December 2011, the US DOE completed the successful ISD of two large reactor complexes at SRS, avoiding the potential hazards and cost associated with generating and disposing of an estimated 137,000 tons (5,400,000 cubic feet) of contaminated debris per reactor.

The buildings' radiological contamination, heights, extensive basements, and thick concrete walls made the effort complex and difficult. Extensive planning and hazard analysis ensured the ISD was completed safely. The two reactor ISD projects met contractual and regulatory objectives/ standards for residual contamination and physical/ chemical hazards, and the two projects fully supported an overall effort to remediate the P and R-Areas at the SRS.

Actual, fully-burdened costs for each of the reactor in-situ decommissioning projects was about \$73M, significantly less than the estimated cost of about \$250M for full demolition of the above-grade structures along with Reactor Vessel removal and below-grade decontamination of each reactor complex.