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We put science to work.™

Innovations

from Savannah River National Laboratory

U.S. DEPARTMENT OF ENERGY • SAVANNAH RIVER SITE • AIKEN • SC
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Impact

P and R Reactors at SRS were successfully decommissioned in 2011. In-situ decommissioning (ISD) was demonstrated as a viable alternative to standard demolition and disposal practices.

The cost to ISD the two reactor complexes saved at least $400 million. Actual ISD cost of $70 million compared to a cost estimated at greater than $250 million for demolition of one reactor complex and transportation of debris to a disposal facility (excluding burial costs).

Development and deployment of the ISD approach established a roadmap for ISD of other reactors and nuclear facilities at SRS and elsewhere in the U.S. and around the globe.

Contact Information

SRNL Office of Communications
803.725.4396

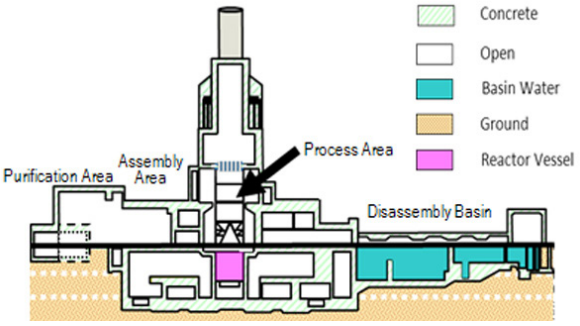
Innovative solutions for decommissioning large nuclear facilities

Demolish and dispose is standard practice

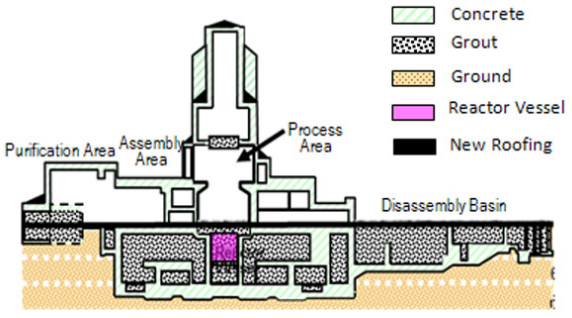
The conventional process for decommissioning nuclear facilities involves decontamination, physical dismantling of structures, debris removal, and disposal of waste in permitted burial facilities. Demolition and disposal is costly, generates large volumes of waste, and incurs risk of exposure to workers, the public, and the environment.

Environmental risk from legacy SRS reactors

This concept reduced both cost and schedule to decommission the P and R Reactor facilities at the Savannah River Site. It also helped avoid potential hazards associated with generating an estimated 137,000 tons (5,400,000 cubic feet) of disposal debris and cost in excess of $500 million.



P Reactor before ISD



P Reactor after ISD

Out-of-the-box thinking: In-situ decommissioning

Excess de-fueled nuclear facilities are often sturdy, hardened structures with enclosed contaminated equipment and process systems, including miles of piping and tons of contaminated materials. This innovative solution uses the existing structure as the disposal site. It permanently entombs and stabilizes residual contamination and debris in the subsurface areas of the P and R Reactor facilities at SRS while leaving the sound above-ground structures intact.

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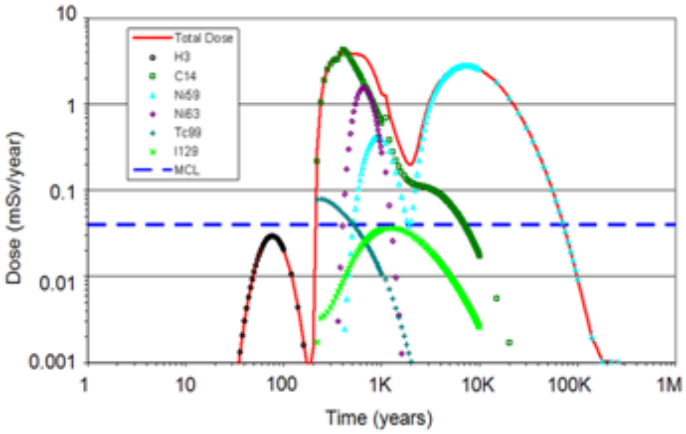
Innovation from science to successful deployment

- Modeled the structural stability of the reactor facilities. The structural stability of major facility elements was projected beyond 1,000 years.
- Developed and tested special grout compositions capable of stabilizing residual. Since reactor vessel cores contain many aluminum parts, standard grouts could not be used because they would react with aluminum and generate flammable amounts of hydrogen. A non-Portland-cement-based grout having a moderate pH to avoid reaction with aluminum and generation of hydrogen was invented. The grout was also formulated to meet criteria, including flowability, redox behavior and long-term stability.
- Developed 3-D CAD models of the facilities to assist in planning and provide a means to conduct worker task walk down safely in virtual media before execution.
- A remote sensor network is under development to provide assurance of long-term mechanical and structural stability. That monitoring capability verifies sustained performance to immobilize residual contamination for the long-term.
- Transferred proprietary grout compositions to vendors to scale up and implement in commissioning project.
- Used modeling and sensors to provide a transparent technical basis needed to assure regulators, DOE and the public of the long-term stability of in-situ decommissioned facilities.

Partners in Success

- National Laboratories: Savannah River, Argonne, Idaho
- Department of Energy: Office of Deactivation and Decommissioning and Facility Engineering, Savannah River Operations Office
- Universities: Applied Research Center at Florida International University, University of South Carolina, Mississippi State University, University of Houston
- Contractor: Savannah River Nuclear Solutions
- Commercial: Baker Concrete, Gibson Pressure Grouting Service
- Other Government Agencies: U.S. Environmental Protection Agency Region IV, South Carolina Department of Health and Environmental Control



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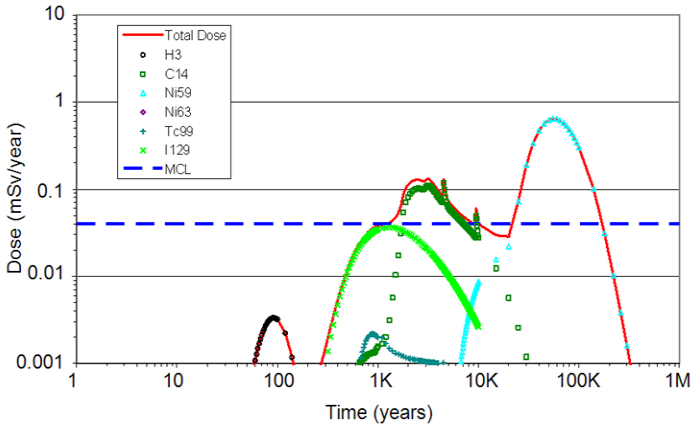

In-situ decommissioning

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