

Decommissioning and Technology Development

Program Overview

Program Description

Decommissioning a nuclear power plant requires expertise in safe industrial dismantling and demolition, nuclear power plant operations, radiation protection, radiological characterization, environmental protection, radwaste management, and other specialized disciplines. Because of the complex, multi-disciplinary activities involved in decommissioning nuclear power plants, experience must be captured to serve as guidance for ongoing and future decommissioning projects around the world.

The Decommissioning and Technology Development Program provides a structured approach for capturing lessons learned from decommissioning efforts and incorporating them into guidance for the entire nuclear power industry. Several nuclear power plants, for example, have gained experience in addressing both technical and regulatory challenges. These challenges include final site surveys and site release criteria, license termination planning, transition of regulations from operation to decommissioning plants, plant structure demolition, reactor vessel segmentation, and waste disposal.

Research Value

The Decommissioning and Technology Development Program develops guidance and assesses technologies that can assist in the safe, cost-effective decommissioning of a nuclear power plant. Program participants gain access to the following:

- Data and information leading to lower decommissioning costs and risks
- Enhanced planning tools to guide decommissioning
- Lessons learned from decommissioning activities at other plants
- Application results from the use of advanced technology
- Guidance on unresolved issues in low-level waste management, site characterization, radiation dose modeling for site release, and license termination plans

Approach

The Decommissioning and Technology Development Program evaluates industry practices to distill generic guidance that nuclear plant owners can incorporate into decommissioning plans. Members use lessons-learned reports and advanced technologies to establish and implement efficient decommissioning programs at plant sites. Members also enhance technology transfer through participation in Electric Power Research Institute (EPRI) decommissioning workshops and plant-specific decommissioning support meetings.

- Archive experience and lessons learned related to decommissioning regulations and technology
- Identify critical elements associated with maintaining an effective decommissioning plan
- Evaluate options for disposing wastes from decommissioning plants
- Develop and demonstrate advanced technologies and improved methodologies for decommissioning
- Anticipate and address needs arising from premature (unplanned) shutdown of nuclear units

Accomplishments

The Decommissioning and Technology Development Program supports nuclear power industry activities to safely and cost-effectively decommission nuclear power plants. EPRI has archived best practices, lessons learned, and technology experiences ranging from decommissioning planning and execution to final site release and license termination. This information has been available to members through technical reports and through direct interaction with decommissioning experts.

- Developed decommissioning pre-planning and planning guidance reports
- Compiled decommissioning experience reports on several completed U.S. decommissioning projects:
 - Maine Yankee Nuclear Power Plant
 - Connecticut Yankee Nuclear Power Plant
 - Rancho Seco Nuclear Generating Station
 - San Onofre Nuclear Generating Station
- Compiled decommissioning experience reports on several decommissioning tasks:
 - Reactor vessel and internal segmentation
 - Concrete radiological characterization and remediation
 - Final status survey and license termination
 - Groundwater protection
- Developed decommissioning waste management software tools
- Built international participation spanning France, Spain, Sweden, Japan, the United Kingdom, Italy, and the United States

Current Year Activities

Decommissioning and Technology Development Program R&D for 2010 will focus on continued collection and evaluation of industry decommissioning experience to derive effective guidance for future plant decommissioning efforts.

- Characterization, Dose Modeling, and Remediation of Contaminated Soil and Bedrock
- U.S. Nuclear Plant Decommissioning Lessons Learned-Yankee Rowe Decommissioning Report
- Software for the Automatic Estimation of the Radiological Inventory for the Dismantling of Nuclear Facilities
- Decommissioning Staffing Optimization
- Technical Justification for the Development and Application of Derived Concentration Guidance Levels (DCGL)
- Origins of Carbon-14: Resolution of Uncertainties in the Characterization of the Chemical Form and Physical Location of Carbon-14 in Irradiated Graphite for Power Reactors
- Alternative Methods for Graphite Removal: Graphite Nibbling Technical Feasibility Study for Graphite Moderated Nuclear Power Plant Dismantling
- Decommissioning Planning Manual
- Decommissioning Lessons Learned, Experiences, and Their Impacts on Decommissioning Costs

Estimated 2010 Program Funding

1.0M

Program Manager

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Summary of Projects

Project Number	Project Title	Description
P41.09.02.01	Decommissioning Technology Development	The EPRI Decommissioning Technology Development Project provides technical support and technology development for cost-effective, safe, and environmentally sound decommissioning of nuclear power plants.

Decommissioning Technology Development (052386)

Key Research Question

Decommissioning a nuclear power plant requires expertise in safe industrial dismantling and demolition, nuclear power plant operations, radiation protection, radiological characterization, environmental protection, radwaste management, and other specialized disciplines. U.S. and international experience in decommissioning nuclear power plants can guide decommissioning efforts around the world. Several nuclear power plants have gained experience in both technical and regulatory challenges, such as final site surveys and site release criteria, license termination planning, transition of regulations from operation to decommissioning plants, plant structure demolition, reactor vessel segmentation, and waste disposal. Applying lessons learned and experiences from previous projects to the planning and execution of current and future projects will provide opportunities to optimize costs, increase safety, and reduce waste and impact on the environment.

Approach

This project assists members in minimizing the cost and risks of decommissioning through enhanced planning, applying lessons learned from other retired plants, and using advanced technology. Guidance is developed on unresolved issues in low-level waste management, site characterization, radiation dose modeling for site release, and license termination plans. Key project objectives include anticipating and addressing the needs arising from premature (unplanned) shutdown of nuclear units and capturing the lessons learned from current decommissioning work. Best practices, lessons learned, experiences, and recommendations are documented in Electric Power Research Institute (EPRI) technical reports and archived for access by EPRI members. This information also is available to members through direct interactions with decommissioning experts at technical workshops and through site-specific member support. As new technologies are developed to address challenges from past decommissioning projects and as new technical challenges create the need for new technologies, EPRI works with technology vendors and utilities to evaluate and demonstrate technologies for application in nuclear power plant decommissioning.

Impact

The successful decommissioning of nuclear power plants demonstrates responsible management of a nuclear power plant's complete life cycle. Applying the lessons learned and experiences of previous decommissioning projects will allow current and future nuclear power plants to plan and execute successful decommissioning projects that are cost-effective, safe, minimize waste, and minimize impact on the environment, while increasing public acceptance and support for nuclear power.

- Archive experience and lessons learned related to decommissioning regulations and technology
- Reduce cost in developing and maintaining an effective decommissioning plan
- Reduce costs associated with disposing wastes from decommissioning plants
- Reduce cost of implementing advanced technologies and improved methodologies for decommissioning

How to Apply Results

Members use lessons-learned reports and advanced technologies to establish and implement efficient decommissioning programs at plant sites. Members also enhance technology transfer through participation in EPRI decommissioning workshops and plant-specific decommissioning support meetings. Plant-specific decommissioning support meetings allow members to tailor technical support to site-specific concerns.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
<p>Application of In-Situ Gamma Spectroscopy in Nuclear Plant Decommissioning: In situ gamma spectroscopy has been used in nuclear power plant decommissioning for building and site characterization. Innovative application of this technology has allowed decommissioning staff to execute characterization projects safely and more effectively while incurring less worker dose. These experiences will be documented in this technical report.</p>	12/31/10	Technical Report
<p>Origin of Carbon-14 in Irradiated Graphite from Graphite Moderated Nuclear Power Plants: Understanding the origin of radioactive carbon-14, whether from the carbon in the graphite matrix or the activation of nitrogen, may facilitate the development and application of innovative graphite processing technologies. This research project will explore the state of science and knowledge on the origin of carbon-14 in graphite.</p>	12/31/10	Technical Report
<p>Development of Derived Concentration Guidance Limits for Site Release: Derived concentration guidance limits (DCGLs) are the radionuclide concentration limits that nuclear power plants must meet upon site release and license termination. These limits are determined through a model of the site's future use. This report will document the regulatory developments and associated technical justifications for the development of DCGLs.</p>	12/31/10	Technical Report
<p>Decommissioning Lessons Learned: This technical report will document key lessons learned from past decommissioning projects that affected project costs and schedule. The purpose of this project will be to document these lessons learned so that future decommissioning projects can identify, prevent, or mitigate them in the planning process.</p>	12/31/10	Technical Report

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
<p>Automatic Estimation of Radiological Inventory: The Automatic Estimation of Radiological Inventory (AERI) software tool was developed by Enresa to characterize and estimate waste volumes from the decommissioning of the Jose Cabrera Nuclear Power Plant. The Electric Power Research Institute (EPRI), Enresa, and Iberinco will collaborate to upgrade and enhance this software for use by the EPRI decommissioning membership.</p>	12/31/12	Software
<p>International Decommissioning Experience Reports: The Electric Power Research Institute (EPRI) will continue to document the experiences and lessons learned from international decommissioning projects. These reports will add to the existing EPRI archive of experiences reports and will cover specific decommissioning tasks and full decommissioning projects.</p>	12/31/12	Technical Report