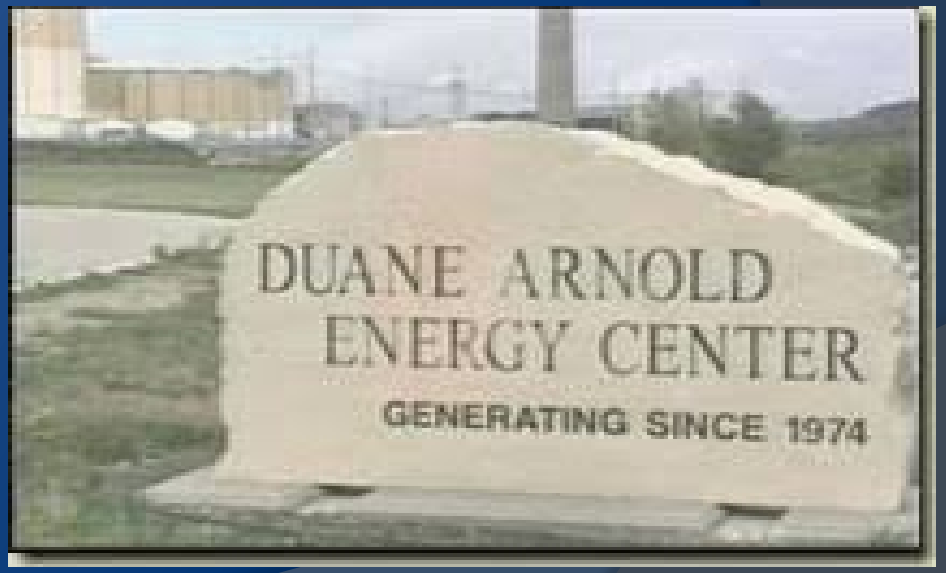
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NRC WEBINAR

SEPTEMBER 24, 2020

DUANE ARNOLD NUCLEAR POWER PLANT DECOMMISSIONING



Today's Presenters

Bruce Watson

Ted Carter

Rhex Edwards

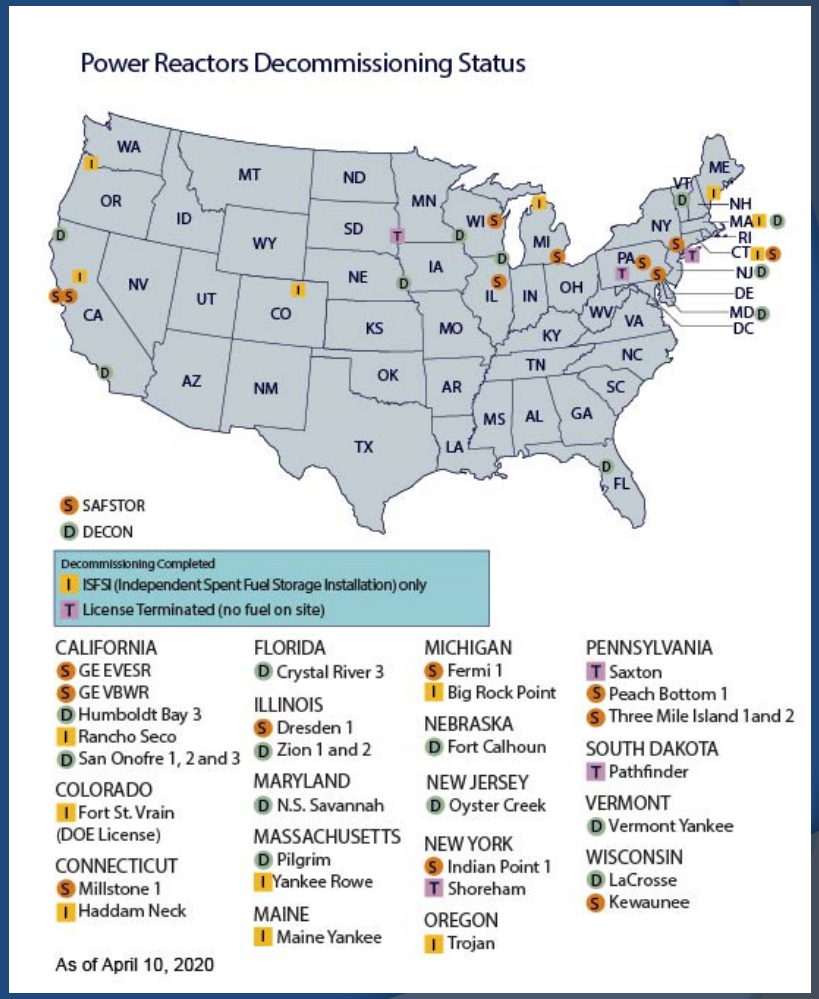
Jennifer Dalzell

NRC Staff Response to COVID-19

- NRC staff have been engaged with the industry (NEI and the Industry Working Group) on decommissioning and ISFSI-only facilities.
  - NRC management has communicated with NEI to ensure the industry maintains safety and security vigilance on decommissioning and ISFSI-only sites during these unusual times.
  - NRC Project Managers and the Regional Inspectors have frequent communications with the licensees on COVID-19 issues and are not aware of any issues that would affect public health and safety at decommissioning reactors.

Power Reactors in Decommissioning

- **13** units in active decommissioning
- **12** units in SAFSTOR
- **Duane Arnold** began planning for decommissioning after it notified NRC



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Duane Arnold History

- **Feb 22, 1974** – Operating license issued for Duane Arnold Energy Center
- **Dec. 16, 2010** – License Renewed

Near-term Developments

- August 10, 2020, Certification of permanent cessation of operations
- Certification of permanent removal of fuel from reactor

- Review of Post-Shutdown Decommissioning Activities Report (PSDAR)

  Accession No. ML20062E489

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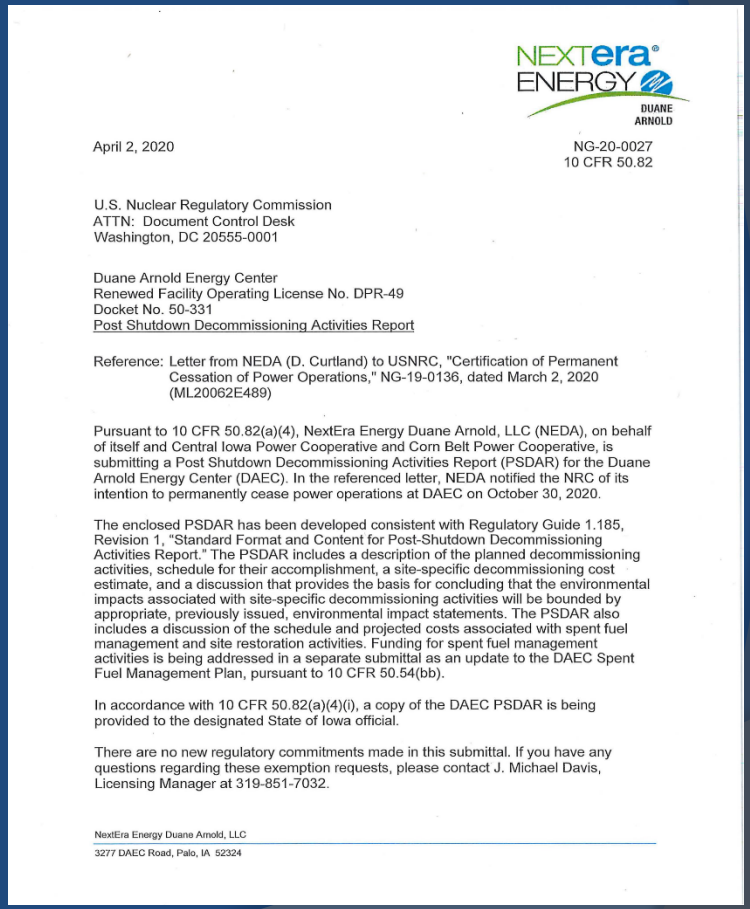
Post-Shutdown Decommissioning Activities Report (PSDAR)

It should contain:

- Description of planned decommissioning activities
- High-level schedule of planned decommissioning activities
- Site-specific cost estimate for the decommissioning
- Environmental impacts of decommissioning



NEXTera ENERGY DUANE ARNOLD

April 2, 2020

NG-20-0027
10 CFR 50.82

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Duane Arnold Energy Center
Renewed Facility Operating License No. DPR-49
Docket No. 50-331
Post Shutdown Decommissioning Activities Report

Reference: Letter from NEDA (D. Curtland) to USNRC, "Certification of Permanent Cessation of Power Operations," NG-19-0136, dated March 2, 2020 (ML20062E489)

Pursuant to 10 CFR 50.82(a)(4), NextEra Energy Duane Arnold, LLC (NEDA), on behalf of itself and Central Iowa Power Cooperative and Corn Belt Power Cooperative, is submitting a Post Shutdown Decommissioning Activities Report (PSDAR) for the Duane Arnold Energy Center (DAEC). In the referenced letter, NEDA notified the NRC of its intention to permanently cease power operations at DAEC on October 30, 2020.

The enclosed PSDAR has been developed consistent with Regulatory Guide 1.185, Revision 1, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report." The PSDAR includes a description of the planned decommissioning activities, schedule for their accomplishment, a site-specific decommissioning cost estimate, and a discussion that provides the basis for concluding that the environmental impacts associated with site-specific decommissioning activities will be bounded by appropriate, previously issued, environmental impact statements. The PSDAR also includes a discussion of the schedule and projected costs associated with spent fuel management and site restoration activities. Funding for spent fuel management activities is being addressed in a separate submittal as an update to the DAEC Spent Fuel Management Plan, pursuant to 10 CFR 50.54(bb).

In accordance with 10 CFR 50.82(a)(4)(i), a copy of the DAEC PSDAR is being provided to the designated State of Iowa official.

There are no new regulatory commitments made in this submittal. If you have any questions regarding these exemption requests, please contact J. Michael Davis, Licensing Manager at 319-851-7032.

NextEra Energy Duane Arnold, LLC
3277 DAEC Road, Palo, IA 52324

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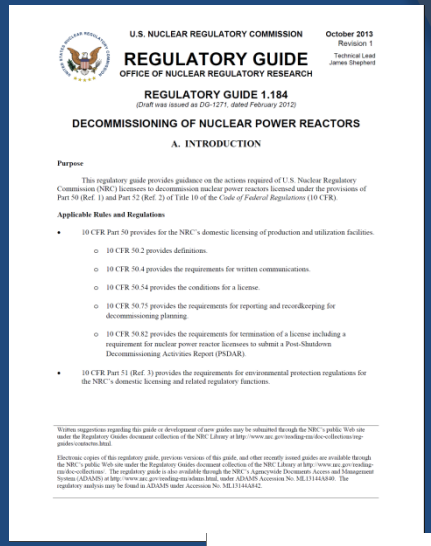
PSDAR Review Process

- Normally, the NRC notices receipt of the PSDAR in the *Federal Register* and requests public comments
- It also schedules a public meeting to discuss PSDAR & solicit public comments



U.S. NUCLEAR REGULATORY COMMISSION

October 2013
Revision 1
Technical Lead
James Shepherd

REGULATORY GUIDE
OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 1.184
(Draft was issued as DG-1271, dated February 2012)

DECOMMISSIONING OF NUCLEAR POWER REACTORS

A. INTRODUCTION

Purpose

This regulatory guide provides guidance on the actions required of U.S. Nuclear Regulatory Commission (NRC) licensees to decommission nuclear power reactors licensed under the provisions of Part 50 (Ref. 1) and Part 52 (Ref. 2) of Title 10 of the *Code of Federal Regulations* (10 CFR).

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- 10 CFR Part 51 (Ref. 3) provides the requirements for environmental protection regulations for the NRC's domestic licensing and related regulatory functions.

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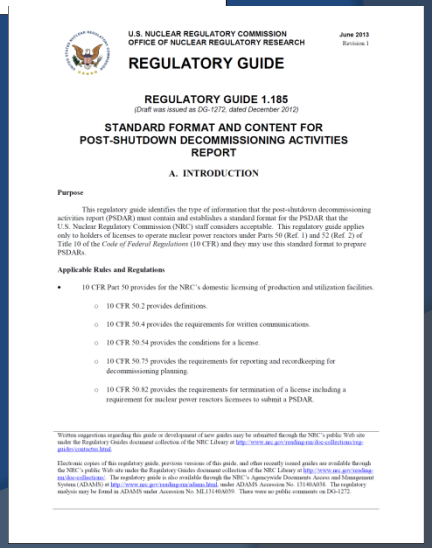

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REGULATORY RESEARCH

June 2013
Revision 1

REGULATORY GUIDE

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(Draft was issued as DG-1272, dated December 2012)

STANDARD FORMAT AND CONTENT FOR POST-SHUTDOWN DECOMMISSIONING ACTIVITIES REPORT

A. INTRODUCTION

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Duane Arnold Decommissioning Schedule & Cost Summary

- Permanently Cease Operations by October 2020
- Prepare the plant for SAFSTOR and transfer spent fuel to dry storage by 2024
- Spent Fuel to DOE by 2059
- Complete Radiological Decommissioning by 2080.

✓ 2019 Decommissioning Trust Fund Balance
$ 568 M (2018 Dollars)

✓ Estimated cost to complete Radiological Decommissioning
$724 M in (2018 Dollars)

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Duane Arnold PSDAR Comments

- This public meeting
- By Mail:

  Office of Administration, Mail Stop: TWFN–7–A60M

  U.S. Nuclear Regulatory Commission

  Washington, DC 20555–0001

  ATTN: Program Management, Announcements and Editing Staff
- Federal Rulemaking website: http://www.regulations.gov
  - Search for Docket ID NRC-2020-0148

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Reactor Decommissioning

The process of removing a reactor facility safely from the operating mode to a permanent shutdown condition and reducing the residual radioactivity to a level that permits the release of the property for unrestricted use and termination of the license

BEFORE

Big Rock Point

AFTER

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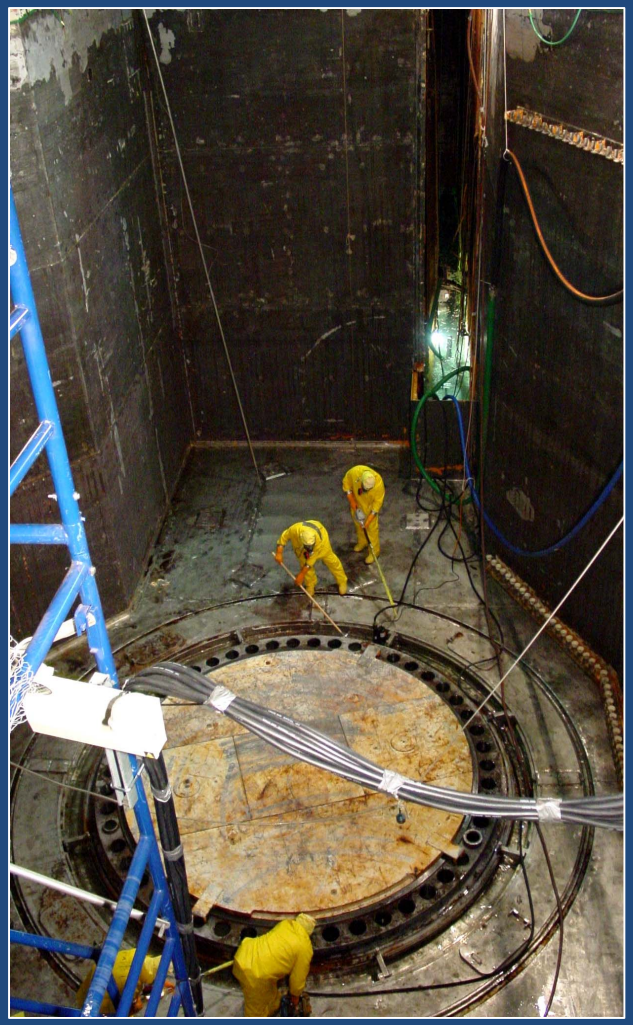
Decommissioning Options



- **DECON** – Equipment, structures, etc., are removed or decontaminated to a level that permits unrestricted release

- **SAFSTOR** – Plant is placed in a safe, stable condition and maintained in this state until it is subsequently decontaminated to levels that permit unrestricted release

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How Long to Decommission?

Under NRC regulations, the process must be completed within 60 years

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Guiding Principles of Decommissioning

- Protection of plant & workers
- Protection of the public
- Communications & outreach with external stakeholders

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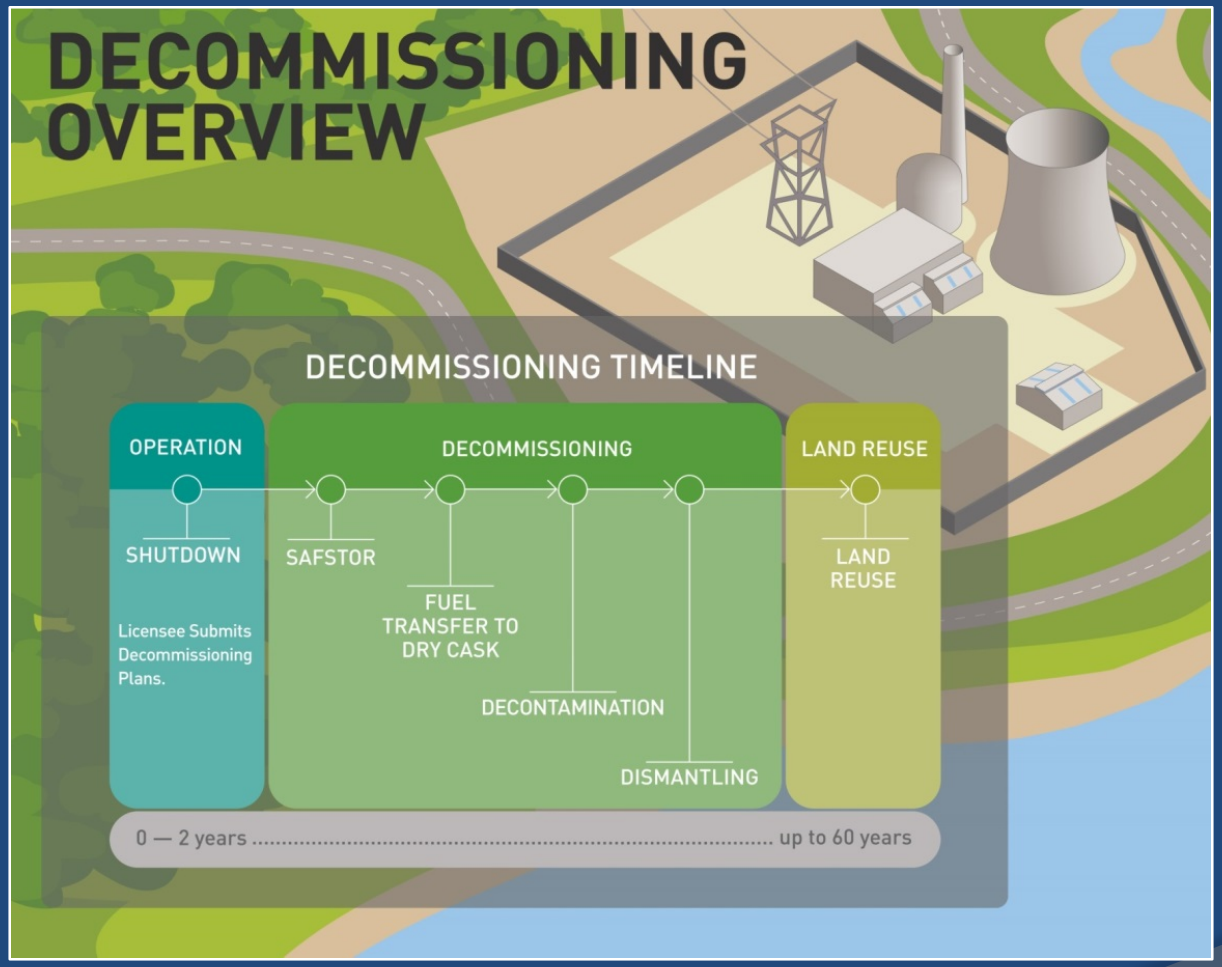
Decommissioning Process - Phases



- Before Cleanup
- During Cleanup
- After Cleanup

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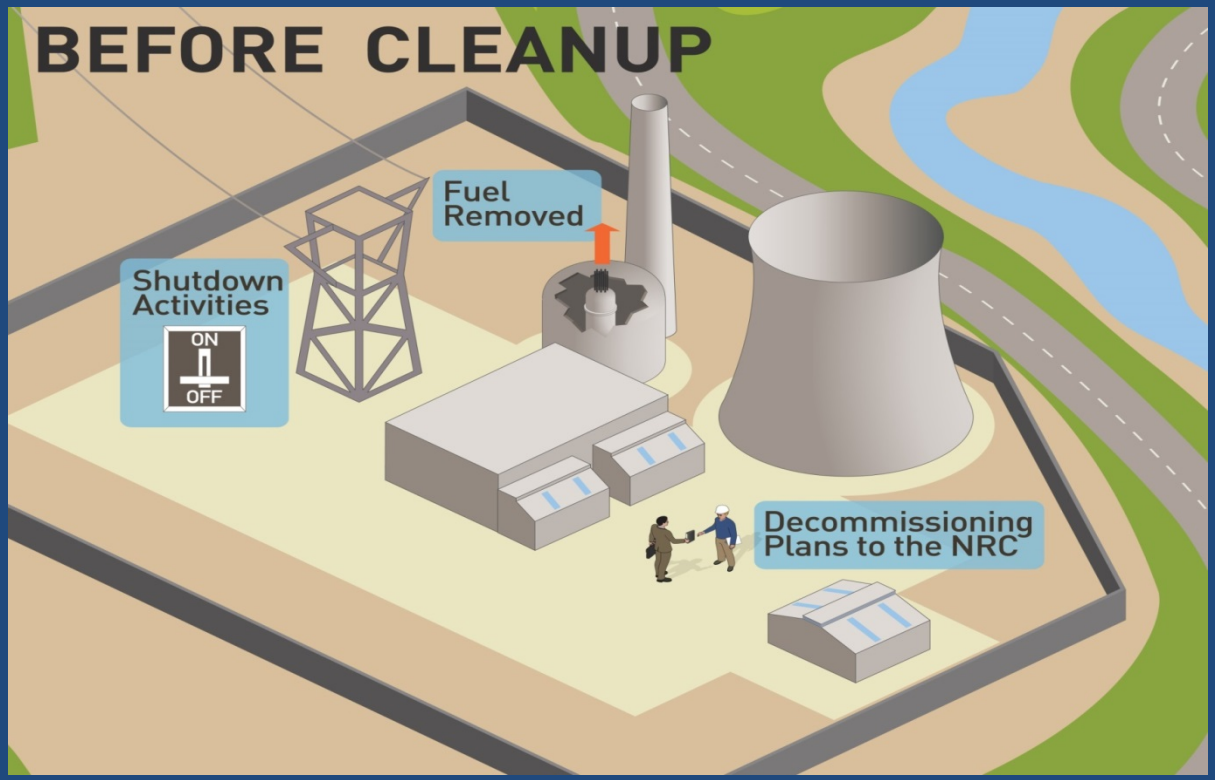

- Ready the plant for decommissioning
- Move spent nuclear fuel to dry cask storage
- Submit & update PSDAR

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- Removal of structures & components
- Soil remediation
- Radioactive waste shipments

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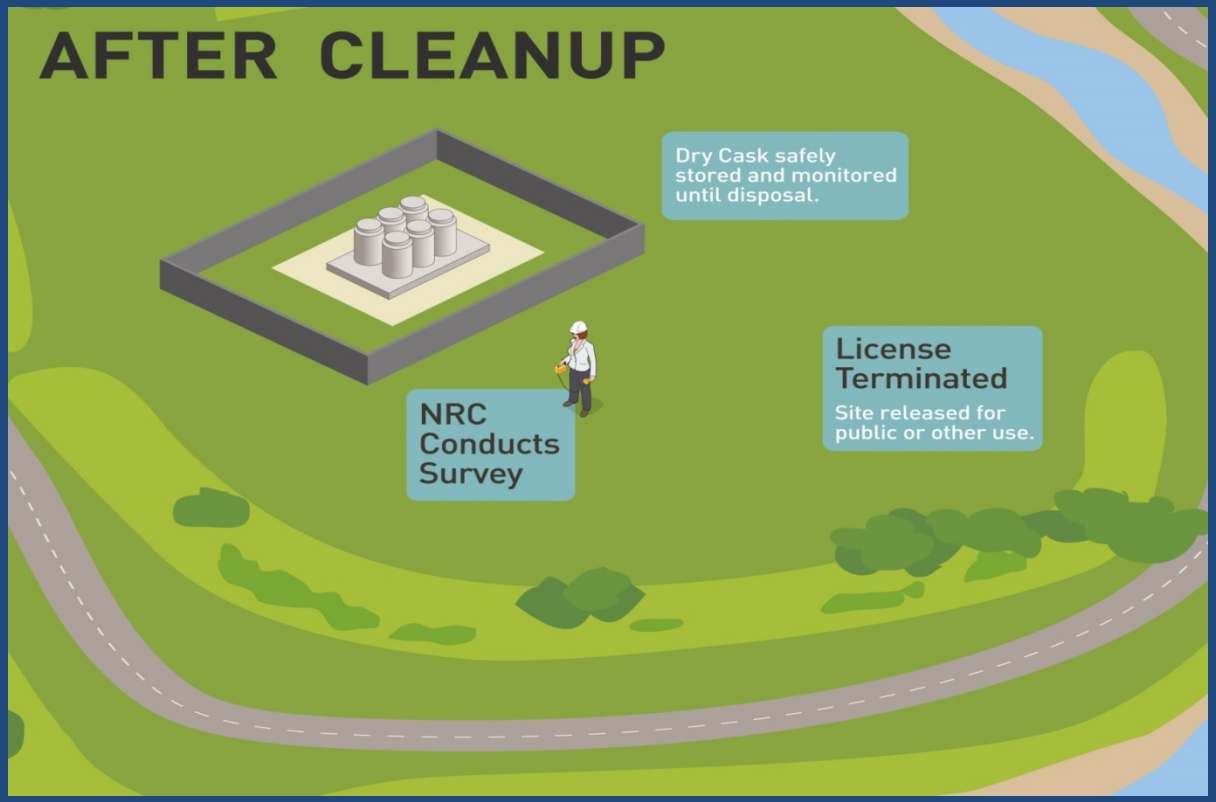

- Site restoration
- NRC license termination
- Spent fuel management

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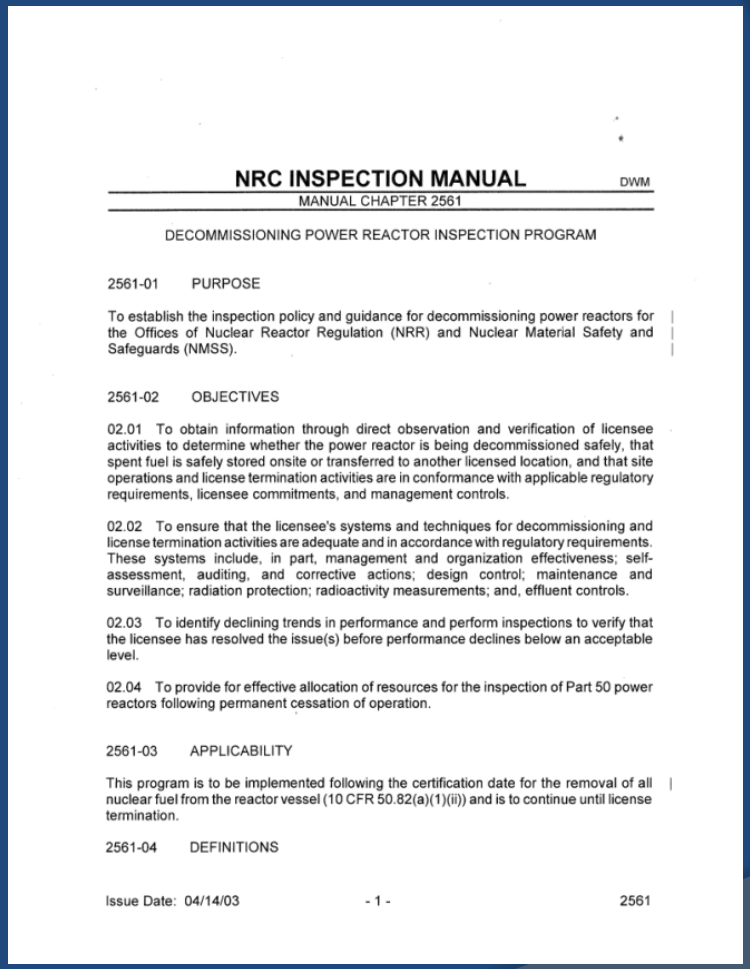
Oversight Program After Shutdown

- Oversight and monitoring conducted over the entire period of decommissioning process
- Oversight program is described in Inspection Manual Chapters (IMC) 2561, 2202 and 2690



NRC INSPECTION MANUAL DWM

MANUAL CHAPTER 2561

DECOMMISSIONING POWER REACTOR INSPECTION PROGRAM

2561-01 PURPOSE

To establish the inspection policy and guidance for decommissioning power reactors for the Offices of Nuclear Reactor Regulation (NRR) and Nuclear Material Safety and Safeguards (NMSS).

2561-02 OBJECTIVES

02.01 To obtain information through direct observation and verification of licensee activities to determine whether the power reactor is being decommissioned safely, that spent fuel is safely stored onsite or transferred to another licensed location, and that site operations and license termination activities are in conformance with applicable regulatory requirements, licensee commitments, and management controls.

02.02 To ensure that the licensee's systems and techniques for decommissioning and license termination activities are adequate and in accordance with regulatory requirements. These systems include, in part, management and organization effectiveness; self-assessment, auditing, and corrective actions; design control; maintenance and surveillance; radiation protection; radioactivity measurements; and, effluent controls.

02.03 To identify declining trends in performance and perform inspections to verify that the licensee has resolved the issue(s) before performance declines below an acceptable level.

02.04 To provide for effective allocation of resources for the inspection of Part 50 power reactors following permanent cessation of operation.

2561-03 APPLICABILITY

This program is to be implemented following the certification date for the removal of all nuclear fuel from the reactor vessel (10 CFR 50.82(a)(1)(ii)) and is to continue until license termination.

2561-04 DEFINITIONS

Issue Date: 04/14/03 - 1 - 2561

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Oversight Program After Shutdown

- Decommissioning inspection program includes both core and discretionary inspections

- Implementation depends on activities being planned or performed.
  - Post-Operation Transition Phase
  - Actively Decommissioning – Fuel in Spent Fuel Pool
  - Actively Decommissioning – No Fuel in Spent Fuel Pool
  - SAFSTOR – Fuel in Spent Fuel Pool
  - SAFSTOR – No Fuel in Spent Fuel Pool
  - Final Surveys under way

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How Does Emergency Planning Change?

- Emergency preparedness remains
- ‘All hazards’ approach utilized vs. formal pre-planned off-site radiological response plans

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How will plant security change?

- Security controls remain in place
- Some key features include: intrusion detection and response, assessment of alarms, and off-site assistance, when necessary

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What Happens to the Spent Fuel?

- Removed from spent fuel pool
- Stored on-site in dry cask storage systems
- Safety and security programs remain until fuel removed from site

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NRC ISFSI Inspection Program

- Inspections performed according to guidance in Inspection Manual Chapter 2690
- Inspections cover all activities related to ISFSIs from design to operation

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NRC ISFSI Inspection Program (cont'd.)

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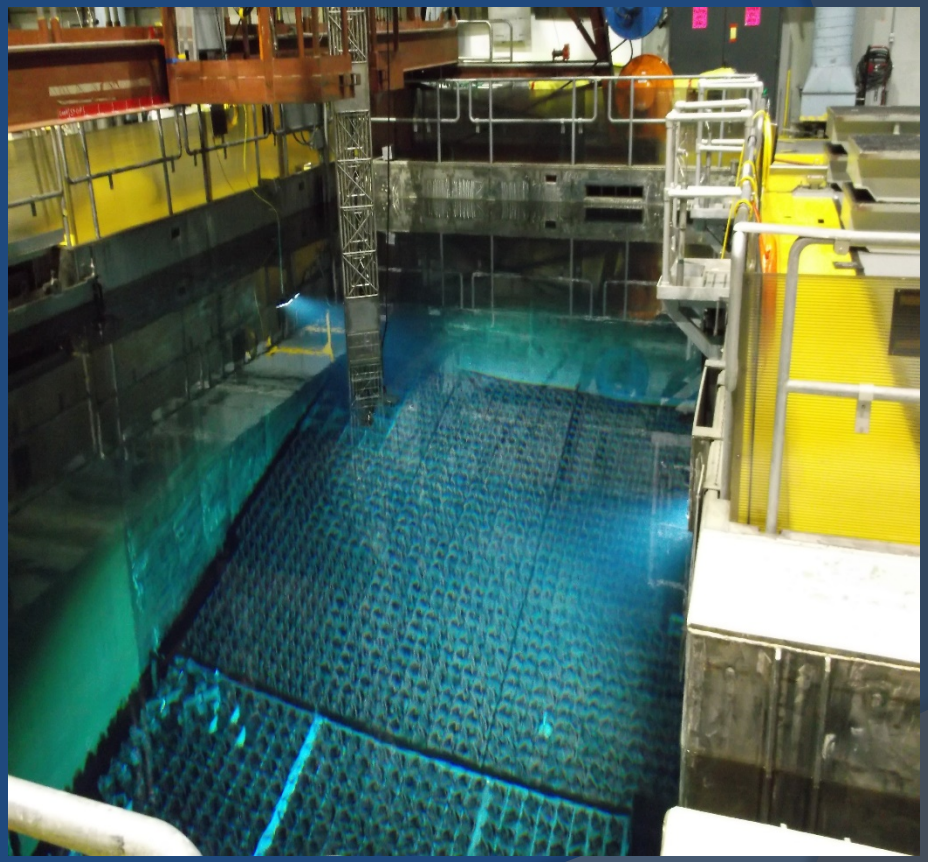
Is the Spent Fuel Pool Safe?

- Robust structures
- Designed to withstand severe natural events
- Regulated design features & operational practices implemented to maintain fuel in safe condition



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How Does the NRC Make Decisions on Post-Shutdown Changes?

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Public Involvement on Decommissioning

- Public meeting to discuss the decommissioning process and the plant's PSDAR
- NRC staff typically provide briefings at meetings of state/citizen decommissioning advisory panels
- An opportunity for a hearing
- Public meeting on License Termination Plan

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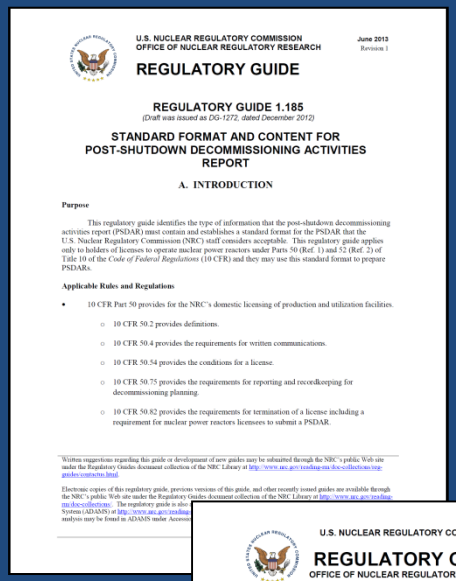
NRC References



U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REGULATORY RESEARCH
June 2013
Revision 1

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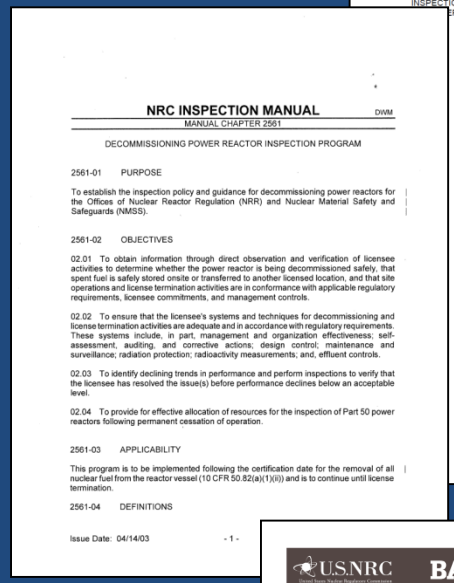
2019-2020

INFORMATION DIGEST



NRC INSPECTION MANUAL
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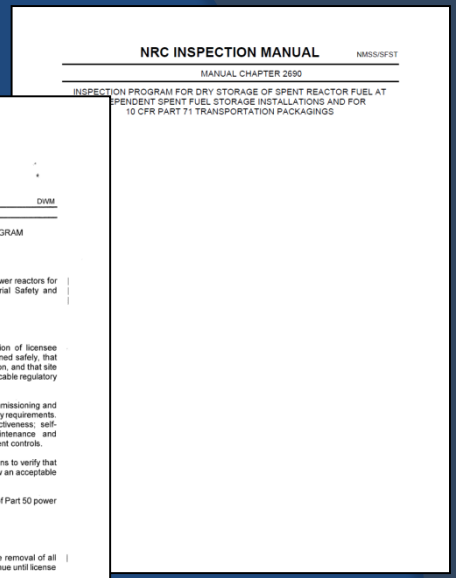
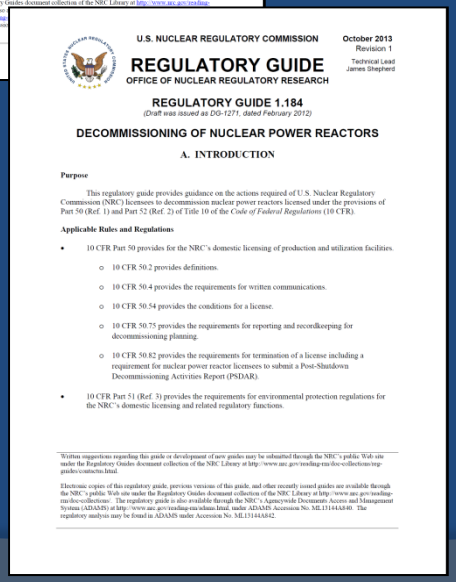
Issue Date: 04/14/03 - 1 -



NRC INSPECTION MANUAL NMSS/SFST
MANUAL CHAPTER 2690

INSPECTION PROGRAM FOR DRY STORAGE OF SPENT REACTOR FUEL AT INDEPENDENT SPENT FUEL STORAGE INSTALLATIONS AND FOR 10 CFR PART 71 TRANSPORTATION PACKAGINGS



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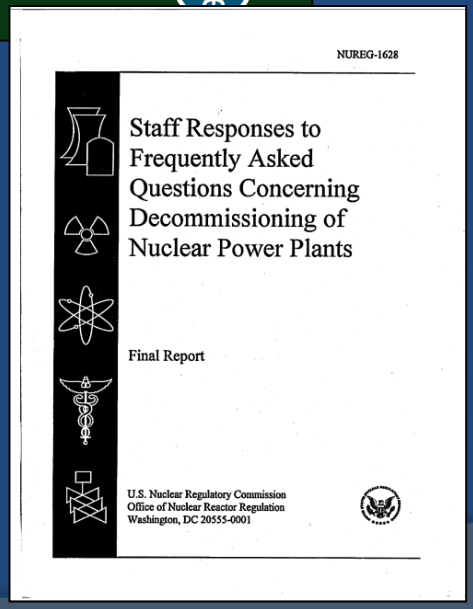
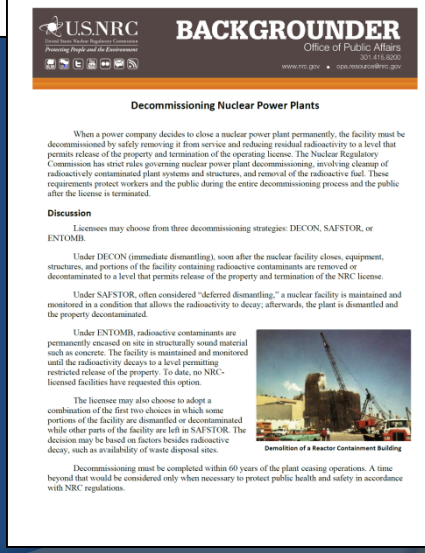


NUREG-1628

Staff Responses to Frequently Asked Questions Concerning Decommissioning of Nuclear Power Plants

Final Report

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555-0001



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BACKGROUNDER
Office of Public Affairs
301.415.8200
www.nrc.gov • opa.resource@nrc.gov

Decommissioning Nuclear Power Plants

When a power company decides to close a nuclear power plant permanently, the facility must be decommissioned by safely removing it from service and reducing residual radioactivity to a level that permits release of the property and termination of the operating license. The Nuclear Regulatory Commission has strict rules governing nuclear power plant decommissioning, involving cleanup of radioactively contaminated plant systems and structures, and removal of the radioactive fuel. These requirements protect workers and the public during the entire decommissioning process and the public after the license is terminated.

Discussion

Licensees may choose from three decommissioning strategies: DECON, SAFSTOR, or ENTOMB.

Under DECON (immediate dismantling), soon after the nuclear facility closes, equipment, structures, and portions of the facility containing radioactive contaminants are removed or decontaminated to a level that permits release of the property and termination of the NRC license.

Under SAFSTOR, often considered "deferred dismantling," a nuclear facility is maintained and monitored in a condition that allows the radioactivity to decay; afterwards, the plant is dismantled and the property decontaminated.

Under ENTOMB, radioactive contaminants are permanently encased on site in structurally sound material such as concrete. The facility is maintained and monitored until the radioactivity decays to a level permitting restricted release of the property. To date, no NRC-licensed facilities have requested this option.

The licensee may also choose to adopt a combination of the first two choices in which some portions of the facility are dismantled or decontaminated while other parts of the facility are left in SAFSTOR. The decision may be based on factors besides radioactive decay, such as availability of waste disposal sites.

Demolition of a Reactor Containment Building

Decommissioning must be completed within 60 years of the plant ceasing operations. A time beyond that would be considered only when necessary to protect public health and safety in accordance with NRC regulations.

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Links for NRC References

- IMC 2561: Decommissioning Power Reactor Inspection Program
- RG 1.184: Decommissioning of Nuclear Power Reactors
- NUREG 1628: Staff Responses to FAQs Concerning Decommissioning of Nuclear Power Reactors
- NRC Backgrounder: Decommissioning of Nuclear Power Plants
- NRC YouTube Video on Decommissioning

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Questions

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