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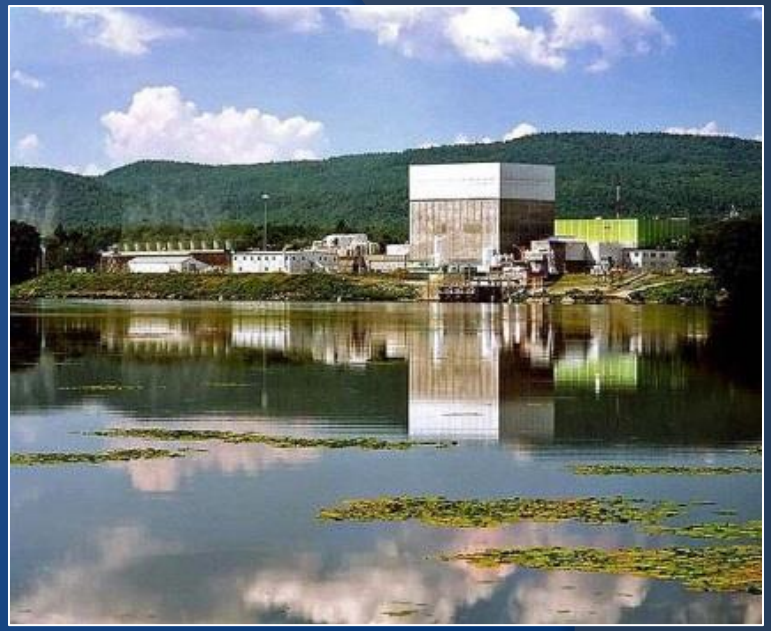
NRC WEBINAR

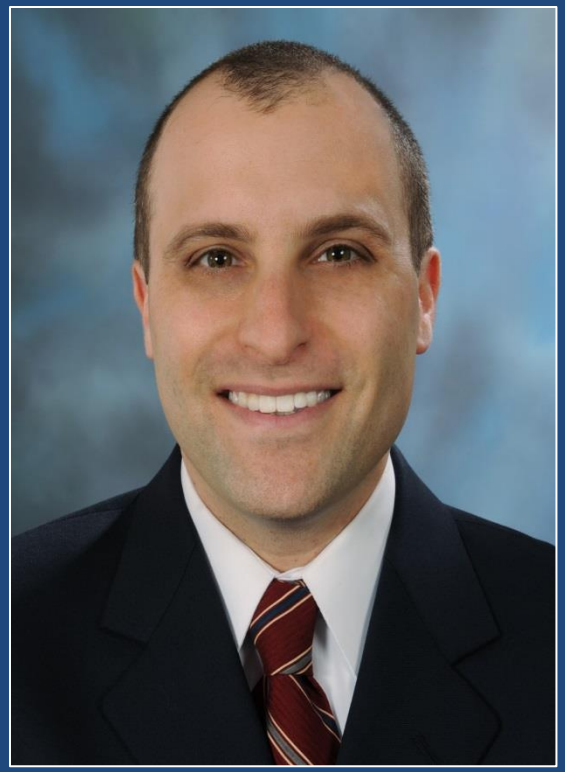
FEB. 5, 2015



VERMONT YANKEE NUCLEAR POWER PLANT DECOMMISSIONING

Today's Presenters

Bruce Watson

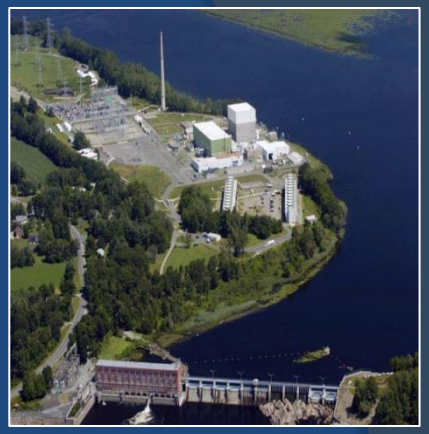


Marc Ferdas

Vermont Yankee History

- **Dec. 11, 1967** – Construction Permit issued
- **March 21, 1972** – Operating License issued
- **Nov. 30, 1972** – Commercial operations commence
- **March 21, 2012** – End of initial 40-year Operating License period

Major Shutdown Milestones @ Vermont Yankee



- **Aug. 27, 2013** -- Entergy announces plan to permanently shut down Vermont Yankee
- **Sept. 23, 2013** -- Entergy provides notification of plans to permanently cease operations at Vermont Yankee
- **Dec. 29, 2014** -- Vermont Yankee is permanently shut down
- **Jan. 12, 2015** – Entergy completes the transfer of all fuel in the Vermont Yankee reactor vessel to its spent fuel pool

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Near-term Developments

- Certification of permanent cessation of operations
- Certification of permanent removal of fuel from reactor
- Review of Post-Shutdown Decommissioning Activities Report (PSDAR)

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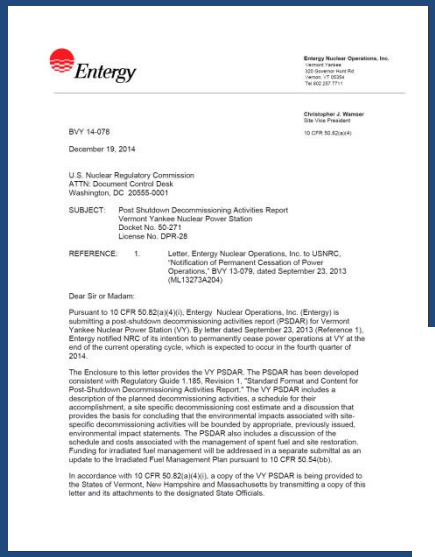
Post-Shutdown Decommissioning Activities Report (PSDAR)

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



Entergy

Entergy Nuclear Operations, Inc.
Vermont Yankee
320 Governor Hunt Rd
Vernon, VT 05354
Tel 802 257 7711

Christopher J. Wamser
Site Vice President

BVY 14-078

10 CFR 50.82(a)(4)

December 19, 2014

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

SUBJECT: Post Shutdown Decommissioning Activities Report
Vermont Yankee Nuclear Power Station
Docket No. 50-271
License No. DPR-28

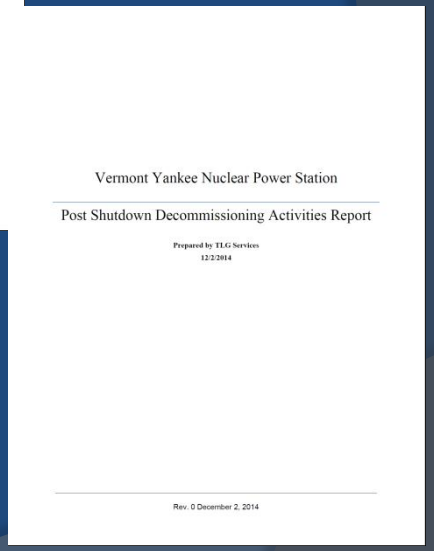
REFERENCE: 1. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Notification of Permanent Cessation of Power Operations," BVY 13-079, dated September 23, 2013 (ML13273A204)

Dear Sir or Madam:

Pursuant to 10 CFR 50.82(a)(4)(i), Entergy Nuclear Operations, Inc. (Entergy) is submitting a post-shutdown decommissioning activities report (PSDAR) for Vermont Yankee Nuclear Power Station (VY). By letter dated September 23, 2013 (Reference 1), Entergy notified NRC of its intention to permanently cease power operations at VY at the end of the current operating cycle, which is expected to occur in the fourth quarter of 2014.

The Enclosure to this letter provides the VY PSDAR. The PSDAR has been developed consistent with Regulatory Guide 1.185, Revision 1, "Standard Format and Content for Post-Shutdown Decommissioning Activities Report." The VY PSDAR includes a description of the planned decommissioning activities, a 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 costs associated with the management of spent fuel and site restoration. Funding for irradiated fuel management will be addressed in a separate submittal as an update to the Irradiated Fuel Management Plan pursuant to 10 CFR 50.54(bb).

In accordance with 10 CFR 50.82(a)(4)(i), a copy of the VY PSDAR is being provided to the States of Vermont, New Hampshire and Massachusetts by transmitting a copy of this letter and its attachments to the designated State Officials.



Vermont Yankee Nuclear Power Station

Post Shutdown Decommissioning Activities Report

Prepared by TLG Services
12/2/2014

Rev. 0 December 2, 2014

Where to find it:
http://www.nrc.gov/info-finder/reactor/vy.html

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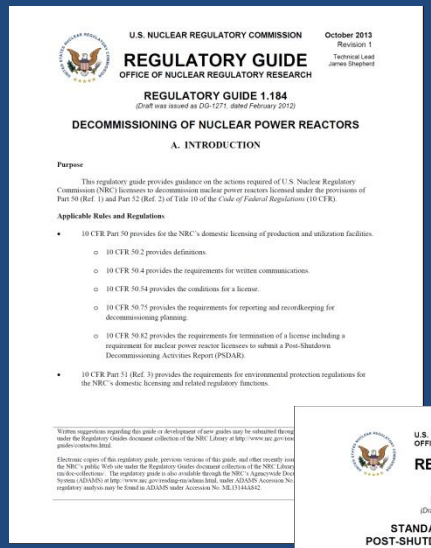
PSDAR Review Process

- NRC notices receipt of the PSDAR in the Federal Register and requests public comments
- NRC schedules a public meeting to discuss PSDAR & solicit public comments
- NRC considers public comments
- Plant owner may begin decommissioning work 90 days after NRC receives the PSDAR



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October 2013
Revision 1
Technical Lead
James Shepherd

REGULATORY GUIDE
OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 1.184
(Draft was issued as DG-1277, 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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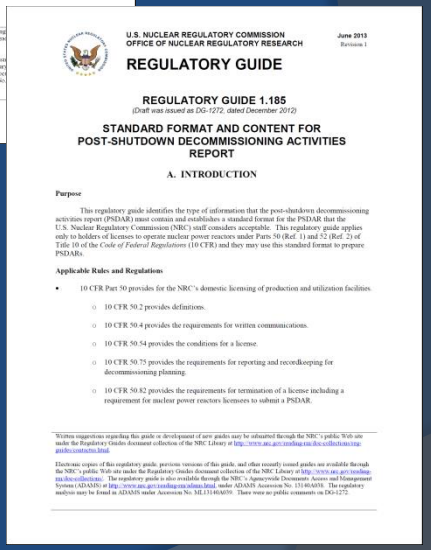
  - 10 CFR 50.54 provides the conditions for a license.
  - 10 CFR 50.75 provides the requirements for reporting and recordkeeping for decommissioning planning.
  - 10 CFR 50.82 provides the requirements for termination of a license including a requirement for nuclear power reactor licensees to submit a Post-Shutdown Decommissioning Activities Report (PSDAR).
- 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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OFFICE OF NUCLEAR REGULATORY RESEARCH

June 2013
Revision 1

REGULATORY GUIDE

REGULATORY GUIDE 1.185
(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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This regulatory guide identifies the type of information that the post-shutdown decommissioning activities report (PSDAR) must contain and establishes a standard format for the PSDAR that the U.S. Nuclear Regulatory Commission (NRC) staff considers acceptable. This regulatory guide applies only to holders of licenses to operate nuclear power reactors under Parts 50 (Ref. 1) and 52 (Ref. 2) of Title 10 of the *Code of Federal Regulations* (10 CFR) and they may use this standard format to prepare PSDARs.

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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

Maine Yankee

AFTER

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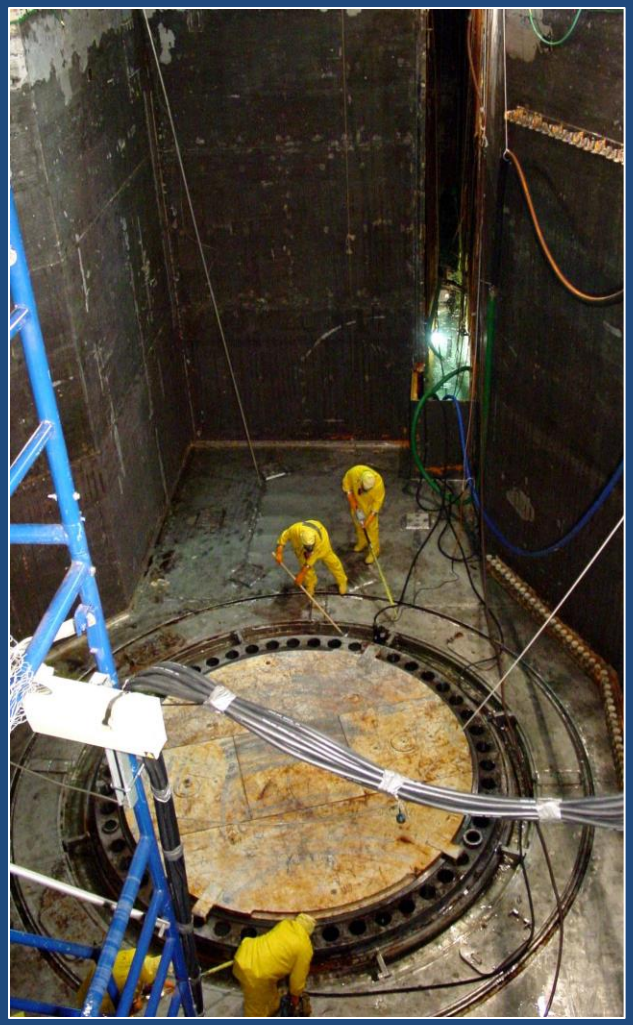
Decommissioning Options



- **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
- **ENTOMB** – Encasing of key reactor structures

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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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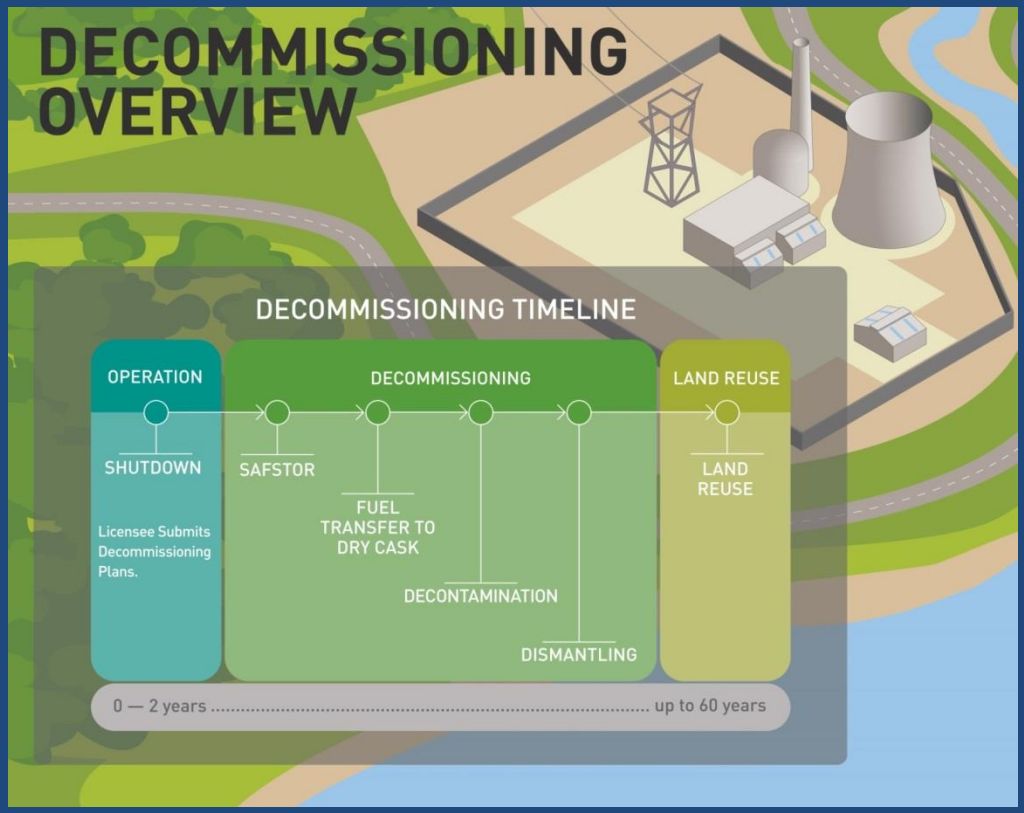
Decommissioning Process - Phases



- Before Cleanup
- During Cleanup
- After Cleanup

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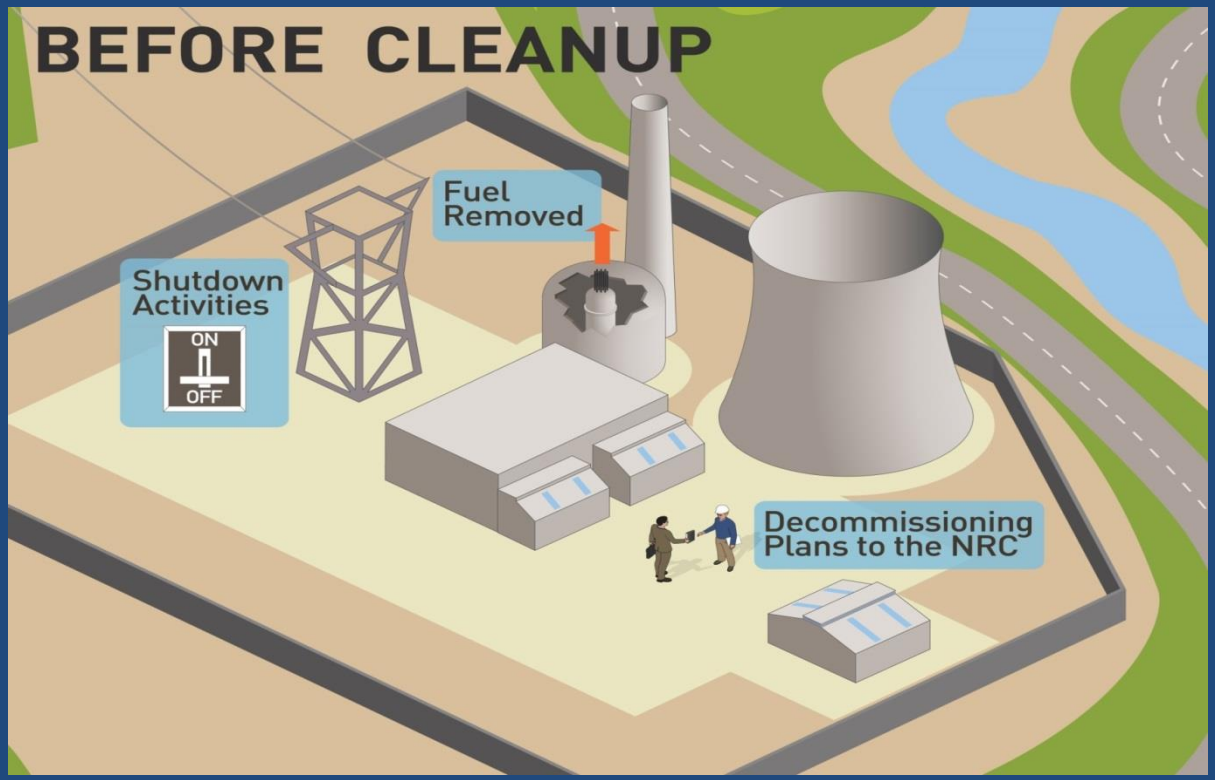

- Ready the plant for decommissioning
- Move spent nuclear fuel to dry cask storage
- Submit & update PSDAR

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

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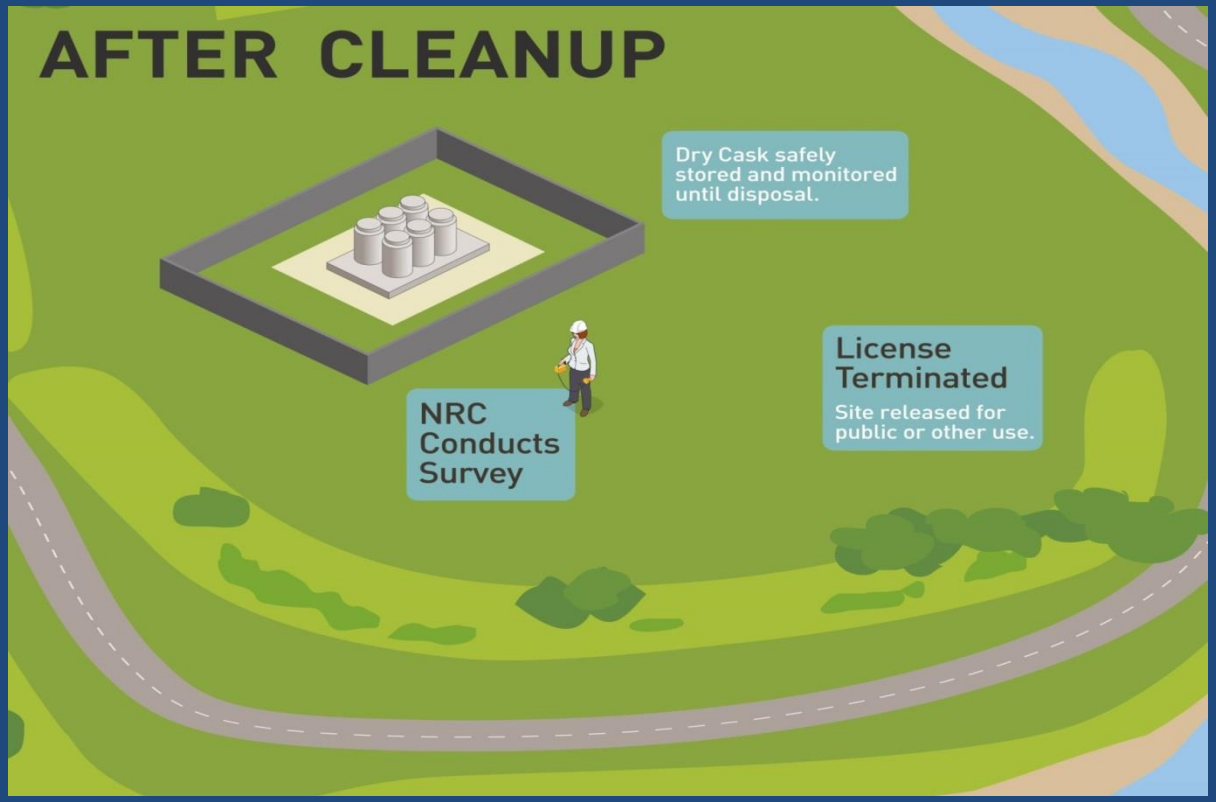

- Site restoration
- NRC license termination
- Spent fuel management

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Vermont Yankee Decommissioning Schedule & Cost Summary

Table 2.1
Decommissioning Schedule and Plant Status Summary

Decommissioning Activities / Plant Status	Start	End	Approximate Duration (years)
Pre-Shutdown Planning	August 2013	December 2014	1.3
Transition from Operations			
Plant Shutdown	December 29, 2014	--------	--------
Preparations for SAFSTOR Dormancy	December 29, 2014	April 30, 2016	1.3
SAFSTOR Dormancy[3]			
Dormancy w/Wet Fuel Storage	2016	2020	4.2
Dormancy w/Dry Fuel Storage	2020	2052	32.5
Dormancy w/No Fuel Storage	2053	2067	15
Preparations for Dismantling & Decontamination (D&D)[3]			
Preparations for D&D	2068	2069	1.5
Dismantling & Decontamination (D&D)[3]			
Large Component Removal	2069	2070	1.3
Plant Systems Removal and Building Decontamination	2070	2073	2.5
License Termination	2073	2073	0.7
Site Restoration[3]			
Site Restoration	2073	2075	1.5
Total from Shutdown to Completion of License Termination	---------	--------	59

[3] "Subject to the commitments regarding the commencement of radiological decommissioning in the Settlement Agreement (Section 1.2)."

Table 2.2
Decommissioning Cost Summary
(Thousands of 2014 dollars)

Decommissioning Periods	License Termination	Spent Fuel Management	Site Restoration
Planning and Preparations	$119,981	$23,068	na
Dormancy w/Wet Fuel Storage	$45,746	$217,244	na
Dormancy w/Dry Fuel Storage	$137,229	$128,035	na
Dormancy w/No Fuel Storage	$54,016	na	na
Site Reactivation	$43,277	na	$578
Decommissioning Preparation	$36,283	na	$456
Large Component Removal	$141,032	na	$25
Plant Systems Removal and Building Remediation	$208,167	na	$4,118
License Termination	$30,668	na	na
Site Restoration	$823	na	$51,968
Total [a]	$817,219	$368,347	$57,145

[a] Columns may not add due to rounding

2.1 Discussion of Decommissioning Activities

The following narrative describes the basic activities associated with decommissioning the VYNPS. The site specific DCE (detailed in Attachment 1) is divided into phases or periods based upon major milestones within the project or significant changes in the annual projected expenditures. The following sub-sections correspond to the five major decommissioning periods within the estimate.

2.1.1 Preparations For Dormancy:

The NRC defines SAFSTOR as, "A method of decommissioning in which a nuclear facility is placed and maintained in a condition that allows the facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use." The facility is left intact (during the dormancy period), with structures maintained in a stable condition. Systems that are not required to support the spent fuel, HVAC, Emergency Plan or site security are drained, de-energized, and secured. Minimal cleaning/removal of loose contamination and/or fixation and sealing of remaining contamination is performed. Access to

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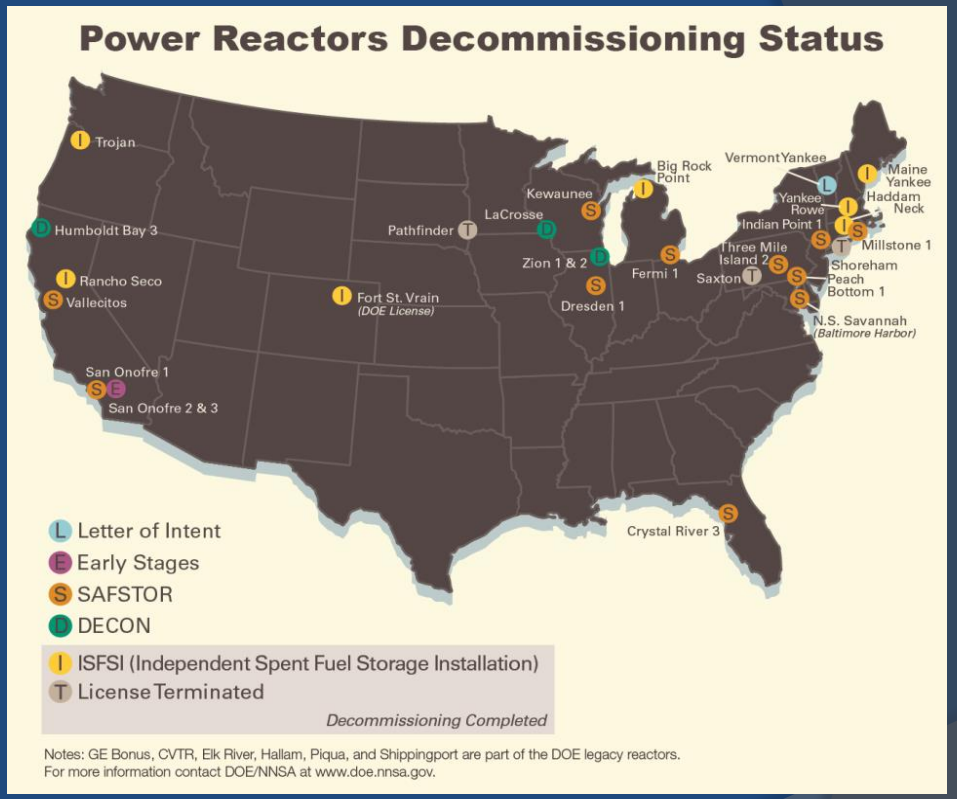
Power Reactors in Decommissioning

- **5** units in active decommissioning
- **14** units in SAFSTOR

VERMONT YANKEE has selected the SAFSTOR option



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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 Chapter (IMC) 2561 & 2690

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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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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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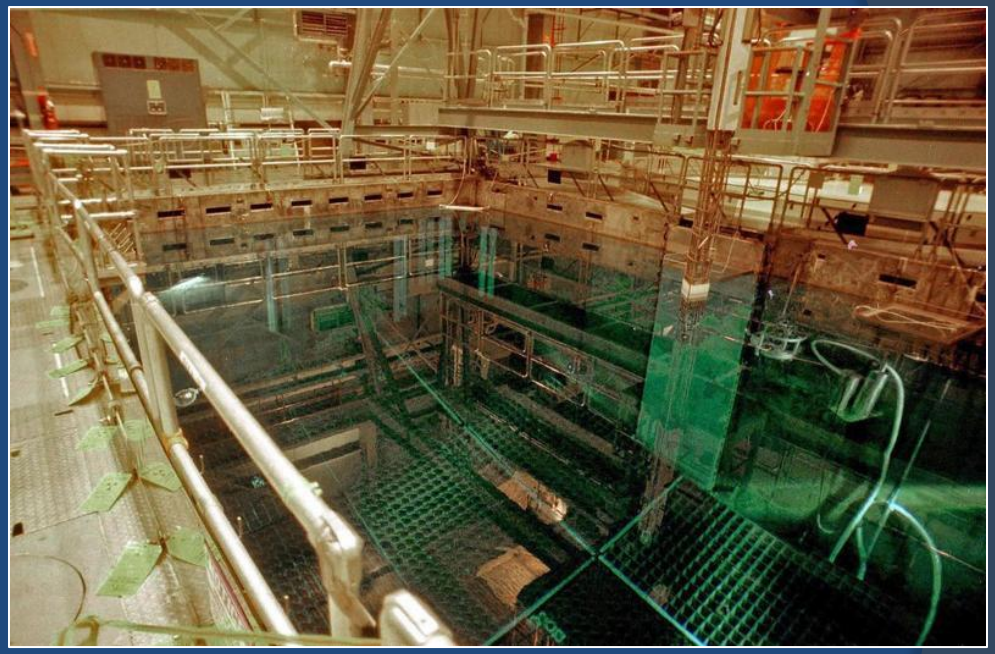
Is the Spent Fuel Pool Safe?

- 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 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 until spent fuel is removed from the site

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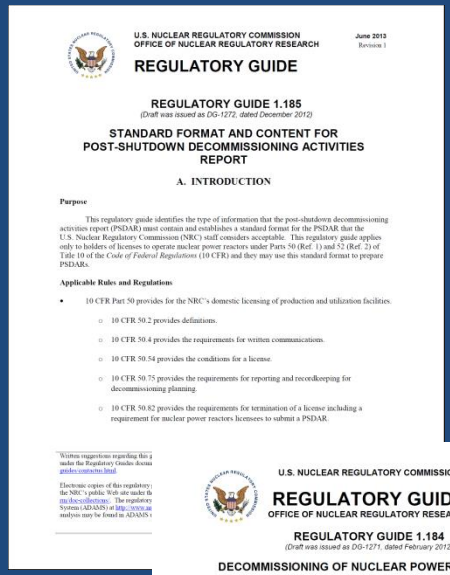
Public Involvement on Decommissioning

- 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
- Public meeting on License Termination Plan

NRC References



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OFFICE OF NUCLEAR REGULATORY RESEARCH

June 2013
Revision 1

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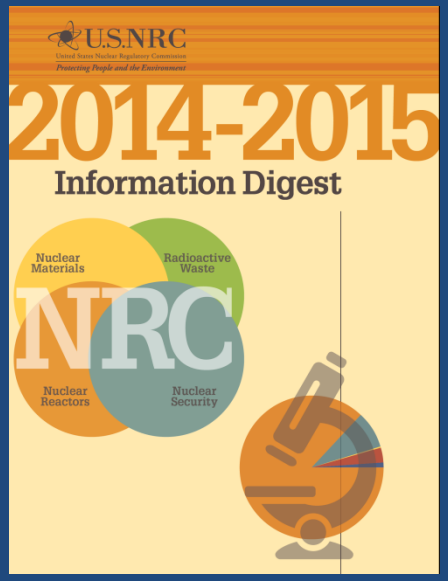
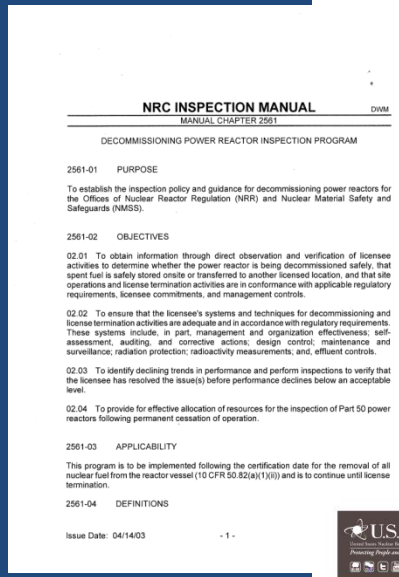




NRC INSPECTION MANUAL
MANUAL CHAPTER 2561

DWM

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.

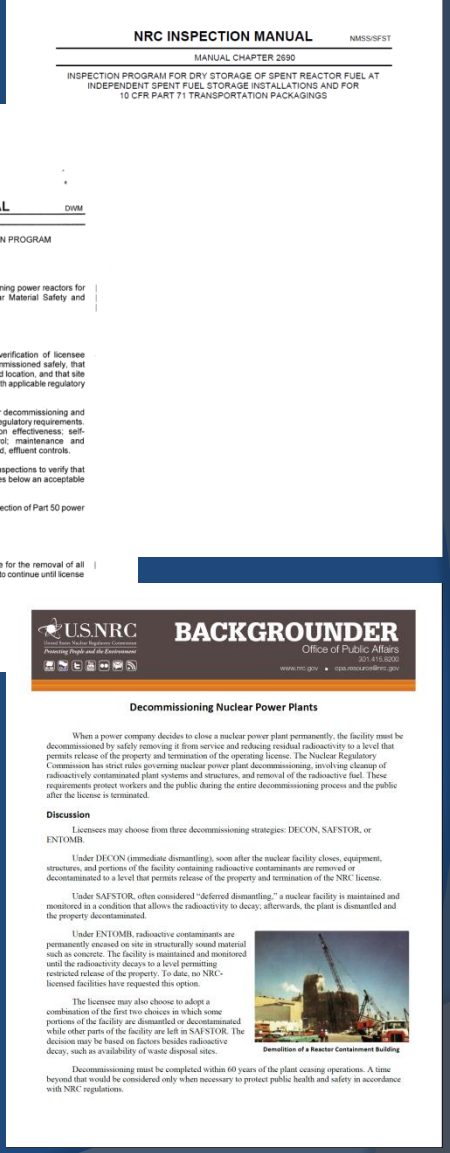
02.04 To provide for effective allocation of resources for the inspection of Part 50 power reactors following permanent cessation of operation.

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

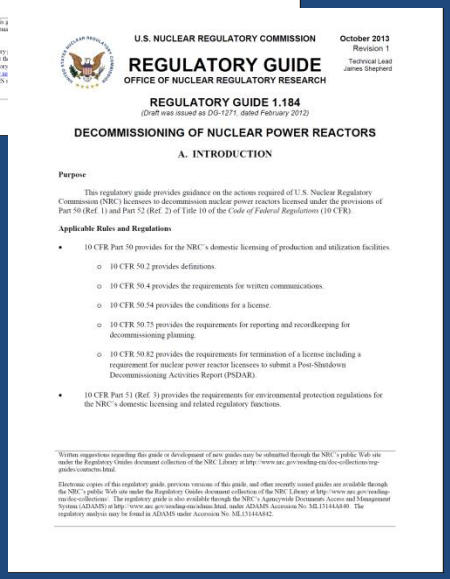
Issue Date: 04/14/03 - 1 -



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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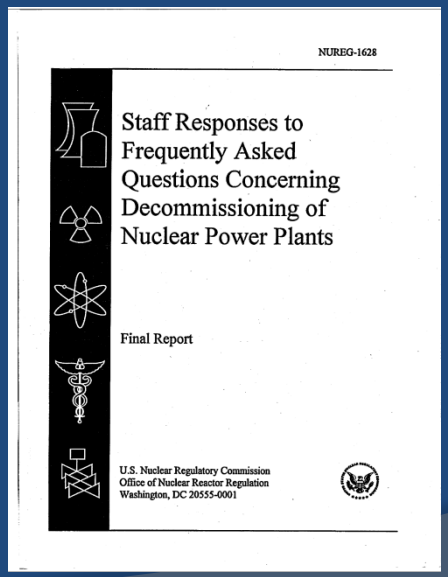

NUREG-1628

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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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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