United States Nuclear Regulatory Commission

The US NRC's Power Reactor Decommissioning Process

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Bruce A. Watson, CHP
Chief, Reactor Decommissioning Branch
Office of Federal and State Material Safety and Environmental Management Programs
U.S. Nuclear Regulatory Commission

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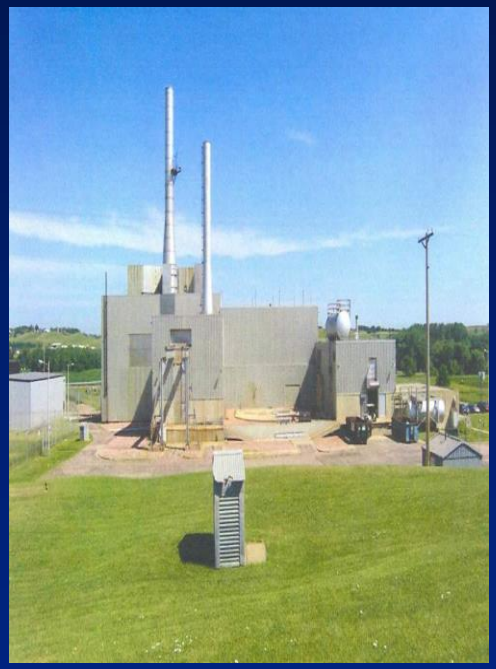
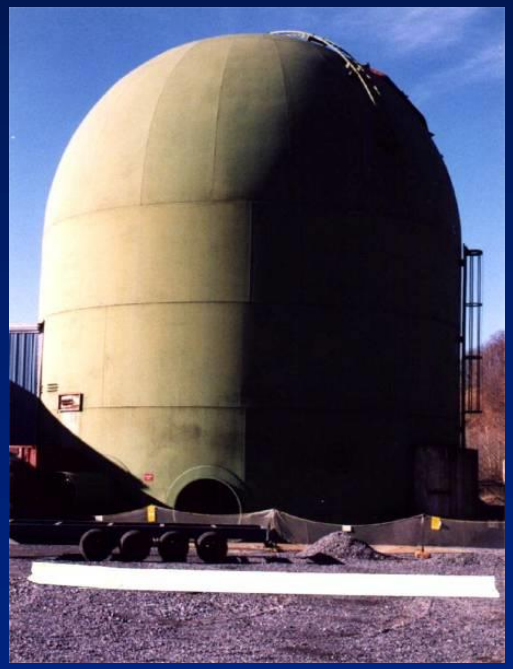
Fort St. Vrain, Pathfinder & Saxton





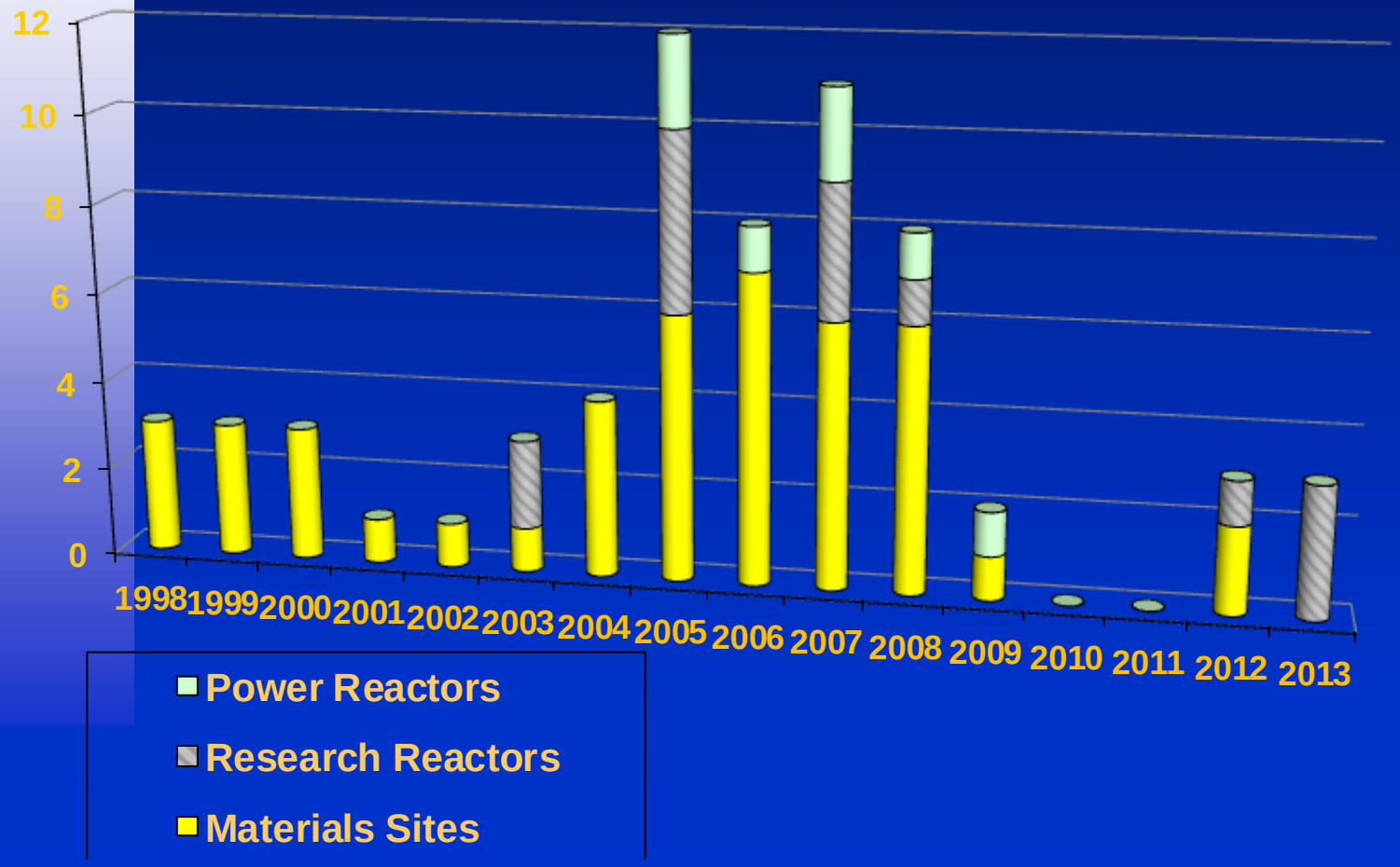
NRC Regulations

- 10 CFR Part 20 Subpart E "License Termination Rule was implemented in 1997
- 10 CFR Part 50 – Operating License
- 10 CFR Part 72 - Independent Spent Fuel Storage Installation License (ISFSI)

Reactor Decommissioning Options

- **DECON: Equipment, structures, etc. removed or decontaminated to a level that permits release**
- **SAFSTOR: Plant placed in a safe, stable condition and maintained in that state until it is subsequently decontaminated to levels that permits release**
- **ENTOMB: Plant is encased in a structurally long-lived substance to allow decay until levels permit unrestricted release (not currently available)**

NRC Decommissioned Facilities



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Materials/Uranium Recovery Facilities

Before Cleanup

Licensee ceases operations and notifies NRC.

Licensee submits decommissioning plan (DP) or reclamation plan (RP) to NRC for review.

NRC performs technical and environmental reviews of licensee plan and documents the reviews in NRC safety and environmental reports. NRC approves DP/RP if acceptable.

During Cleanup

Licensee conducts cleanup activities, as described in the DP/RP.

NRC conducts periodic inspections.

Licensee completes cleanup activities.

Power Reactor Facilities

Before Cleanup

Licensee ceases operations and notifies NRC.

Licensee submits post-shutdown decommissioning activities report (PSDAR) for NRC's information.

Licensee waits 90 days before starting any major decommissioning activities.

During Cleanup

Licensee initiates cleanup activities, as described in the PSDAR.

Licensee submits license termination plan (LTP) for review 2 years before license termination. The plan outlines remaining decommissioning activities.

NRC performs technical and environmental reviews of the licensee plan and documents the reviews in NRC safety and environmental reports. NRC approves LTP if it is acceptable.

NRC conducts periodic inspections.

Licensee completes cleanup activities.

After Cleanup

Licensee conducts final status survey and submits report.

NRC conducts confirmatory surveys and reviews licensee's report.

NRC approves final status survey report and terminates license.

Uranium Recovery Sites: Custodial agency submits Long Term Surveillance Plan (LTSP) for NRC review. Upon NRC's acceptance of LTSP, the existing license is terminated and the title to the site is transferred to the custodian under general license.

Reactor Decommissioning - 10 CFR 50.82

- Reactor Decommissioning is required to be completed in 60 years.
- Bases: 50 y in SAFSTOR + 10 y DECON
- Radiation Dose Rates reduced to 1-2 %
- Radioactive Waste Volumes reduced to 10%
- Allows Decommissioning Fund to increase
- Coincidently, 60 years corresponds well with 20 year life extension for multi-unit sites

Decision Factors for Licensees in Determining the Decommissioning Strategy

- Multi-Unit Site Safety
- Financial – Decommissioning Funds Availability
- Access to Radioactive Waste Disposal Capacity
- Future use of the Site
- Stakeholders
- New Business Model
- Special Circumstances

Power Reactor Decommissioning Process

- **Licensee notifies (certifies) NRC within 30 days of permanently ceasing operations**
- **Certification also required once the fuel has been permanently removed from the reactor vessel**
- **Licensee submits Post-Shutdown Decommissioning Activities Report (PSDAR) prior to or within 2 years of cessation of operations**

Post Shutdown Decommissioning Activities Report (PSDAR) Contents

- A description and schedule for the planned decommissioning activities
- An estimate of the expected decommissioning costs
- A discussion that provides the means for concluding that the environmental impacts associated with the decommissioning activities will be bounded by appropriately issued Environmental Impact Statements.

Power Reactor Decommissioning Process

- NRC notices the PSDAR in the Federal Register
- NRC holds a Public Meeting to discuss the PSDAR and solicit public comments
- NRC does not approve the PSDAR
- Licensee may begin decommissioning 90 days after NRC receives the PSDAR

Power Reactor Decommissioning Process

- Licensee performs site decommissioning
- NRC continues to conduct on-site inspections
- Licensee submits License Termination Plan (LTP) at least 2 years prior to requesting license termination
- NRC notices LTP in the Federal Register
- NRC holds a Public Meeting to solicit public comments on the LTP

License Termination Plan Contents

- **Site characterization information**
- **Identification of remaining dismantlement activities**
- **Plans for site remediation**
- **Detailed plans for the final radiation survey**

License Termination Plan Contents

- **A description of the end use of the site, if restricted release is requested**
- **An updated site-specific estimate of remaining decommissioning costs**
- **A supplement to the environmental report describing any new information or significant environmental change associated with the licensee's proposed termination activities.**

Power Reactor Decommissioning Process

- **NRC review of the LTP**
  - **Acceptance review and Technical review**
  - **Additional information, if necessary**
  - **Public Meeting/Opportunity for Hearing**

Power Reactor Decommissioning Process

- NRC approves LTP by amending the license
- Licensee performs remaining decommissioning activities
- NRC performs inspections, including independent in-process and confirmatory surveys to verify licensee survey results

Power Reactor Decommissioning Process

- **Licensee submits Final Status Survey Report (FSSR)**
- **NRC Reviews/approves FSSR**
- **NRC performs confirmatory surveys**
- **NRC terminates the license by letter and notices the action in the Federal Register**

Reactor Decommissioning Process Summary

Licensee Action	Time Requirement	Public Involvement	NRC Action
Permanent Ceasing of Operations Certification	Notification Within 30 Days of permanent shutdown	Information is publically available	NRC starts decommissioning clock
Certification of Nuclear Fuel has been permanently removed from the Reactor	Upon completion of fuel removal	Information is publically available	NRC initiates transfer of Reactor Oversight Program to the Decommissioning Inspection Program
Post Shutdown Decommissioning Activities Report (PSDAR)	Within 2 years of permanent shutdown	PSDAR is publically available and NRC holds Public Meeting	NRC holds Public Meeting to solicit comments on the PSDAR
Annual Report on the Decommissioning Funds	Annual, due by March 31st each year	Information is publically available	NRC reviews and approves the annual decommissioning report
Licensee completes the decommissioning by dismantling and decontaminating the plant	Must be completed within 60 years	NRC Inspection Reports are publically available	NRC conducts inspection of decommissioning activities and issues inspection reports
License Termination Plan (LTP) Submittal	Required to be submitted within 2 years of request to terminate the license	LTP is a publically available and NRC holds Public Meeting	NRC performs initial acceptance review and holds Public Meeting to obtain Public Comments. NRC performs Detailed Technical Review
License Termination Plan	Detailed NRC Technical Review typically takes 1 year to complete	Comments may be submitted to NRC	Complete Technical Review and either approve or reject the LTP
Licensee conducts Final Status Surveys (FSS)	Licensee schedule	Inspection Reports containing confirmatory surveys are publically available	NRC conducts Confirmatory Surveys to verify criteria is met
Submittal of Final Status Radiological Survey Reports (FSSR) and Request Termination of the License	Licensee determines schedule	FSSRs are publically available	NRC Reviews and Approves FSS Reports and terminates license if license termination criteria are met

Power Reactor Current Status

- **11 licenses Terminated, 7 under the License Termination Rule**
- **4 Units in active DECON (decommissioning) without an approved License Termination Plan**
- **13 Units in SAFSTOR, principally at multi-unit operating sites**

Power Reactors Decommissioned 2005-2010

- Trojan – 2005
- Maine Yankee – 2005
- Big Rock Point – 2007
- Pathfinder - 2007
- Yankee Rowe – 2007
- Connecticut Yankee – 2007
- Rancho Seco - 2009
- San Onofre 1 – Partial Site Release - 2010

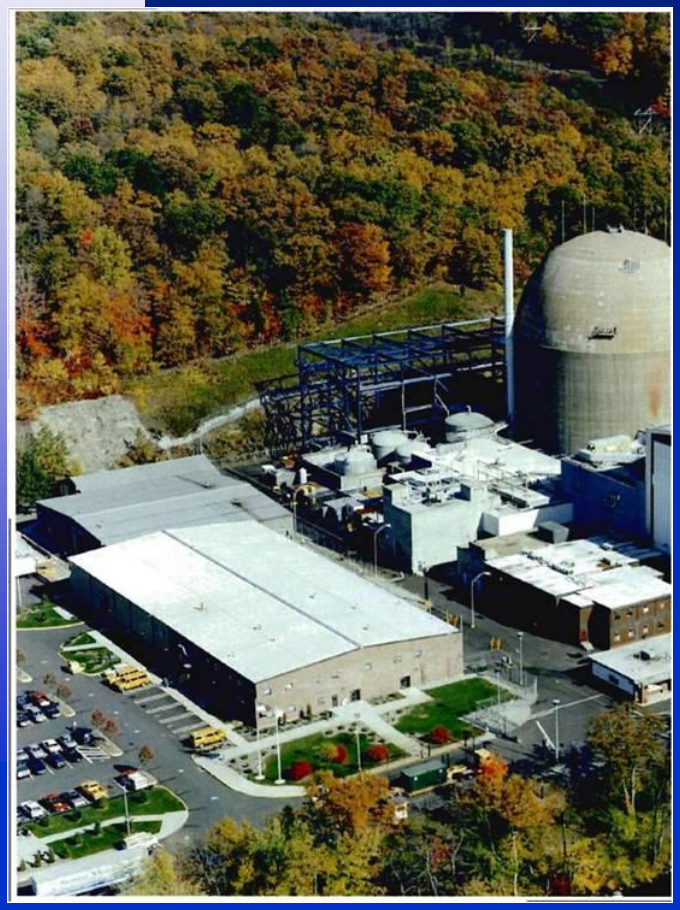
Trojan - 2005

Maine Yankee - 2005

Big Rock Point - 2007

Yankee Rowe - 2007

Haddam Neck - Connecticut Yankee - 2007



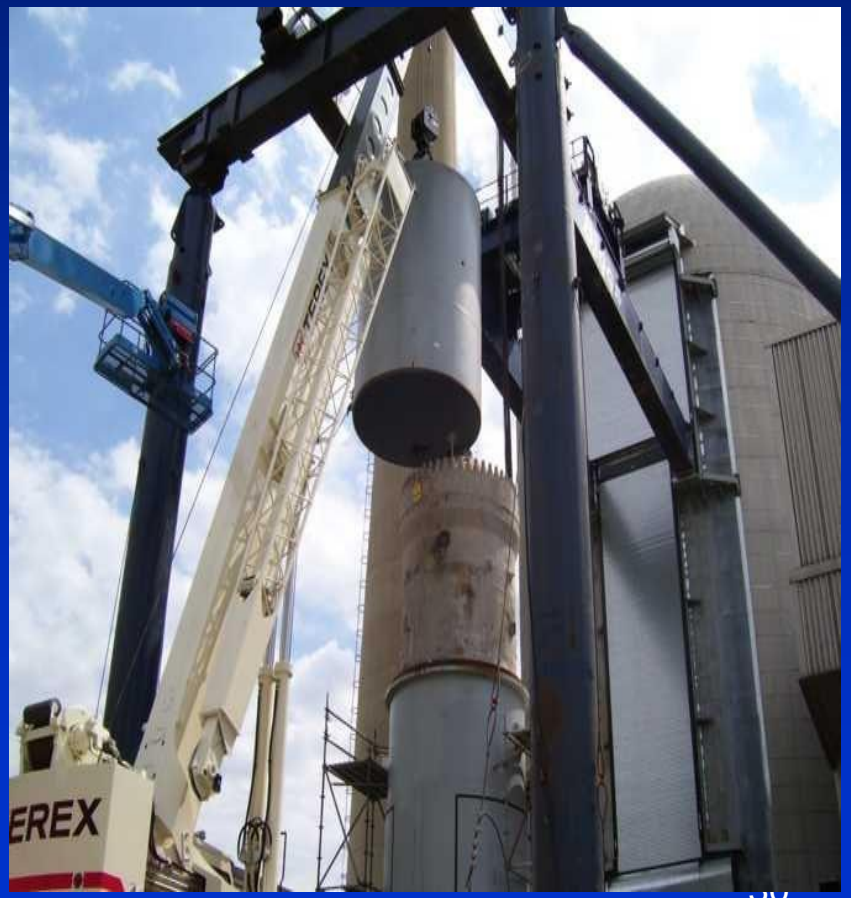
Rancho Seco - 2009

San Onofre 1 – Partial Site Release "SAFSTOR"

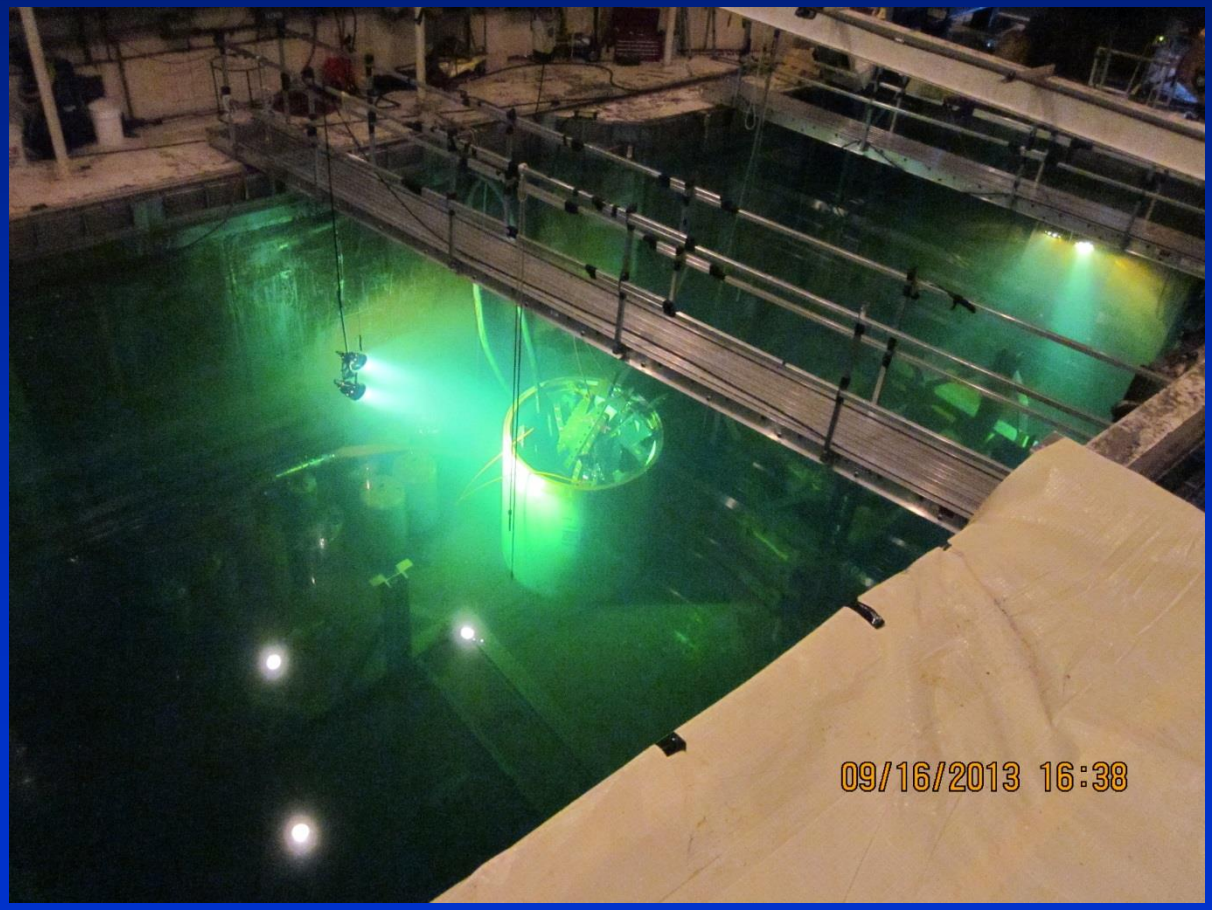
Fermi 1 – Back in SAFSTOR 2013

Humboldt Bay

LaCrosse BWR



Zion 1 & 2



Power Reactors in SAFSTOR

- Dresden 1
- Fermi 1
- Indian Point 1
- Millstone 1
- Peach Bottom 1
- San Onofre 1
- NS Savannah
- GE Vallecitos

2013

- Kewaunee

TBD

- Crystal River 3*
- San Onofre 2 & 3*

PDMS

- Three Mile Island Unit 2**

The Future?

- Vermont Yankee announced it will be permanently shutting down in 2014.
- Oyster Creek (2019) and other small single unit plants have been rumored to be considering shutting down.
- It has been speculated that as many as 6 to 12 power reactors permanently ceasing operations.

QUESTIONS?

Thank you!