

# Overview of the United States Reactor Decommissioning Program

Congressman Salud Carbajal (D- 29)  
Public Meeting  
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# NRC's Mission



- NRC's mission is to ensure plant safety, whether the plant is operating, or transitioning from operating to decommissioning, and through the entire process until the plant has been radiologically decommissioned and the license is terminated.

## Present Status

- 6 Power Plants in active decommissioning
- 14 Power Plants in SAFSTOR
- 8 Announced, more shutdowns are anticipated

# Reactor Decommissioning

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- Reactor Decommissioning Background
- Decommissioning Process (10 CFR 50.82)
- Decommissioning Inspection Program
- Decommissioning Topics of High Public Interest
- Decommissioning Trust Funds
- Power Reactor Decommissioning in California
- Summary

# Reactor Decommissioning Background

- Current 1997 decommissioning regulations are performance-based and risk-informed
- Extensive decommissioning experience
- A total of 10 power reactor sites have completed decommissioning:

Fort St. Vrain, Colorado

Haddam Neck, Connecticut

Maine Yankee, Maine

Yankee-Rowe, Massachusetts

Big Rock Point, Michigan

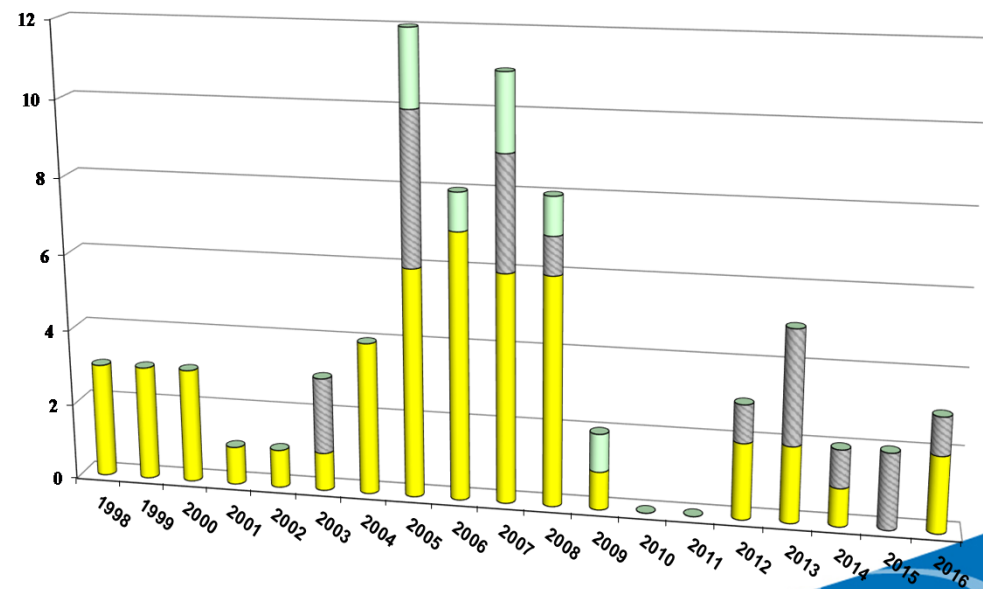
Trojan, Oregon

Rancho Seco, California

Saxton, Pennsylvania

Shoreham, New York

Pathfinder, South Dakota



■ Materials Sites ■ Research Reactors ■ Power Reactors

# Decommissioning Process

## 10 CFR 50.82/Regulatory Guide 1.184



- Notification of intent to permanently shut down
- Submission of certifications of permanent shutdown and permanent removal of fuel from reactor vessel\*
- Submittal of Post Shutdown Decommissioning Activities Report (PSDAR) and NRC public meeting
- Decommissioning must be completed within 60 years of permanent cessation of operations.
- License Termination Plan (LTP) is submitted 2 years prior to requesting license termination and NRC public meeting to obtain public comments on the LTP.
- NRC terminates the license by letter

\* 2<sup>nd</sup> certification -- licensee cannot return fuel to the reactor and operate the plant

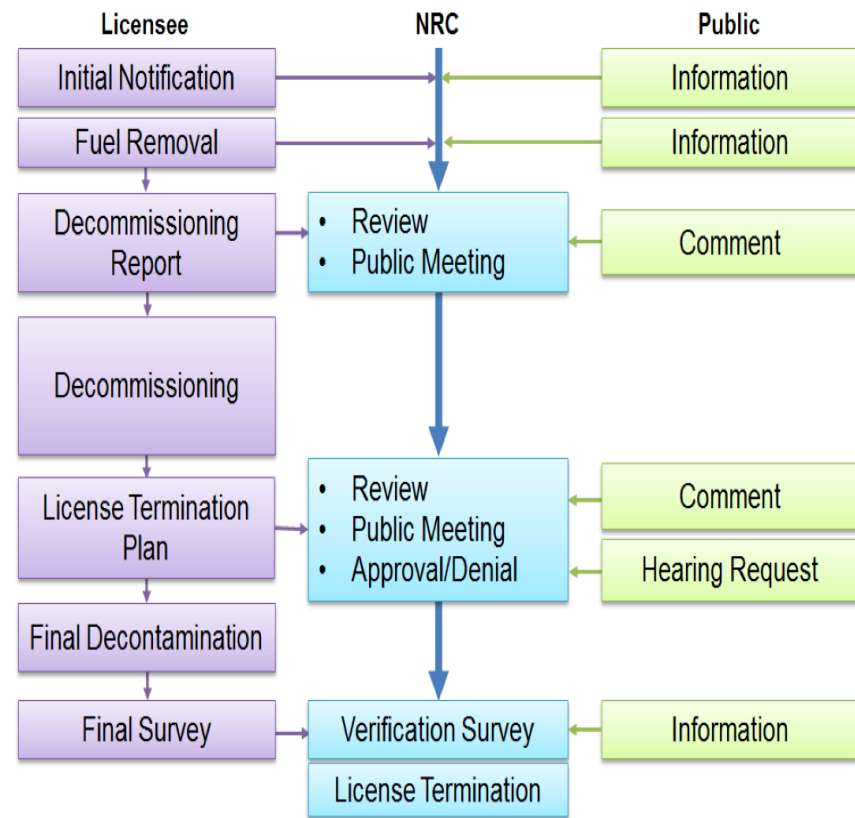
# Decommissioning Program Regulatory Framework



## Decommissioning Process

### Decommissioning Program

- Statutory authority
  - Integrated Decommissioning Program
- Comprehensive regulations:
  - Public involvement
  - Environmental review
  - Financial assurance
  - Site characterization
  - Site remediation/Radiological clean-up
  - Final site surveys
- Regulatory guidance
- Oversight and inspection



# Reactor Decommissioning Program Status



- 10 power reactors have terminated their licenses and have been released for unrestricted use
- 20 power reactors in decommissioning
  - 6 power reactors in active DECON (active dismantling):
    - Zion 1 & 2 (IL), Humboldt Bay 3 (CA), LaCrosse (WI), and San Onofre 2 & 3 (CA)
  - 14 power reactors in SAFSTOR (deferred dismantlement) with the addition of Fort Calhoun (NE) that ceased operations October 24, 2016 and is expected to select SAFSTOR
- 8 power reactors have announced they will permanently cease operations:
  - Palisades (MI) and Three Mile Island 1 (PA) in 2018; Pilgrim (MA) and Oyster Creek (NJ) in 2019; Indian Point 2 & 3 (NY) in 2020/2021; and Diablo Canyon 1 & 2 (CA) by 2025/2026
  - Additional near-term shutdowns are possible

## Phase 1

- Reactor is permanently shut down and nuclear fuel is transferred to the spent fuel pool
- Plant is prepared for decommissioning
- Modifications are typically made to facilitate decommissioning



# Reactor Decommissioning Process U.S. NRC

United States Nuclear Regulatory Commission  
*Protecting People and the Environment*

## Phase 1 (Continued)

### Post Shutdown Decommissioning Activities Report (PSDAR) (Reg Guide 1.185)

- Decommissioning strategy – DECON or SAFSTOR - 60 years to complete decommissioning
- Site Decommissioning Funding Status
- Affirmation of the Environmental Review

NRC holds Public Meeting for comments

NRC does not approve the PSDAR

# Reactor Decommissioning Process

## Phase 2 – Decommissioning Phase

- DECON – immediate dismantlement
- SAFSTOR – deferred dismantlement
- 60 years to complete (50 years for radioactive decay + 10 years to dismantle)

## Phase 3 – last 2 years

- License Termination Plan (License Amendment)
- NRC holds a Public Meeting

# Reactor Decommissioning Inspection Program

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- Continues until the license is terminated
- Inspection Manual Chapter 2561
- 40 inspection procedures
- Minimum annual inspection - 12 core procedures are required each year
- Resident Inspector up to 1 year after shutdown, but can be extended
- Inspection Reports are publically available

# Trojan, Oregon

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# Big Rock Point – Charlevoix, Michigan



# Yankee-Rowe – Rowe, Massachusetts



# Maine Yankee – Wiscasset, Maine



# Connecticut Yankee Haddam Neck, Connecticut





# Zion 1 & 2 - New Business Model

## Progress and Expected End Point



# Decommissioning Topics of High Public Interest

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- Economic losses to the local community
  - Loss of Jobs and Tax Revenues
  - Employee Retention
- Community involvement - advisory groups
- High-level waste time in storage and transport
- Interim Spent Fuel Storage Installations (ISFSI)
- Reactor decommissioning - timeliness - 60 years to complete
- Reductions in emergency plans
- Decommissioning fund adequacy
- Future use of the site

# Reasonable Assurance of Decommissioning Funding

- Initial certification of financial assurance
- Maintains the NRC Minimum Funding Amounts throughout the life of the reactor
- Uses one or more funding methods specified in the regulation
- Monitoring and updating of decommissioning funding -
  - Operating licensee provides decommissioning fund status report to the NRC (every 2 years)
  - Licensee must provide Site Specific Cost Estimate 5 years prior to permanent cessation of operations & in PSDAR

# Rancho Seco – Sacramento, California

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# San Onofre - San Clemente, CA



# Humboldt Bay – Eureka, CA



# GE Vallecitos – Pleasanton, CA



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## Vallecitos Nuclear Center



# Diablo Canyon 1, 2

- **Location:** Avila Beach, CA (12 miles WSW of San Luis Obispo, CA) in [Region IV](#)  
**Operator:** Pacific Gas & Electric Co.

## Unit 1

- **Operating License:** Issued - 11/02/1984  
**License Expires:** 11/02/2024  
**Docket Number:** 05000275
- **Reactor Type:** Pressurized Water Reactor  
**Licensed MWt:** 3,411  
**Reactor Vendor/Type:** Westinghouse Four-Loop  
**Containment Type:** Dry, Ambient Pressure

## Unit 2

- **Operating License:** Issued - 08/26/1985  
**License Expires:** 08/26/2025  
**Docket Number:** 05000323
- **Reactor Type:** Pressurized Water Reactor  
**Licensed MWt:** 3,411  
**Reactor Vendor/Type:** Westinghouse Four-Loop  
**Containment Type:** Dry, Ambient Pressure





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