



## *United States Nuclear Regulatory Commission*

---

# **Stakeholder Involvement in the Decommissioning of Trojan and Maine Yankee Nuclear Power Plants**

*Bruce A. Watson, CHP, Health Physicist*

*Decommissioning Directorate*

*Division of Waste Management and Environmental  
Protection*

*Office of Nuclear Material Safety and Safeguards*

*U.S. Nuclear Regulatory Commission*

*Washington, DC 20555*

*BAW1@NRC.GOV*



# *United States Nuclear Regulatory Commission*

---

## **Presentation Content**

- **U. S. Decommissioning Status**
- **Trojan and Maine Yankee Background Information**
- **Approach to Decommissioning**
- **Stakeholder Impacts**
- **Conclusions**

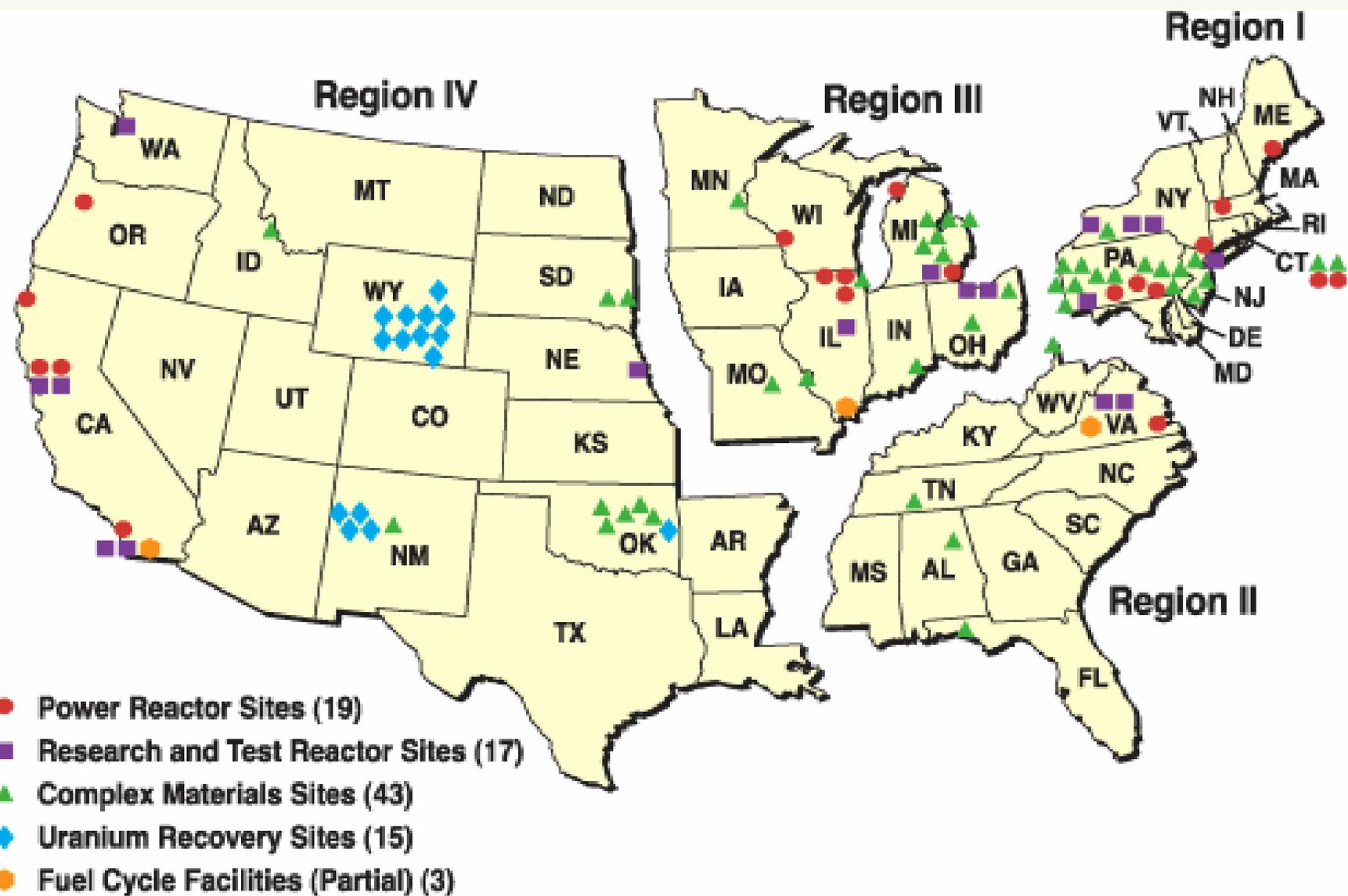


## *United States Nuclear Regulatory Commission*

---

### **NRC's Complex Decommissioning Site Work Scope**

- **18 Power Reactors**
- **15 Research and Test Reactors**
- **38 Complex Materials Sites**
- **12 Uranium Recovery Sites**
- **3 Fuel Cycle Sites with Partial Decommissioning**



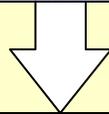
Source: Status of the Decommissioning Program - 2004 Annual Report (Tables 9-1, 9-2, 10-1, 10-3, and 10-4).

# General Decommissioning Process

## Materials/Fuel Cycle Facilities

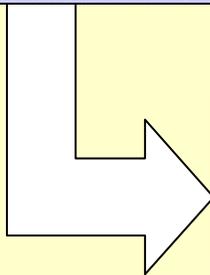
### Before Cleanup

- Licensee ceases operations and notifies NRC
- Licensee submits decommissioning plan to NRC for review
- NRC holds Public Meeting**
- NRC reviews and approves plan, if it is acceptable



### During Cleanup

- Licensee conducts cleanup work
- NRC conducts inspections



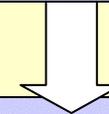
### After Cleanup

- Licensee conducts final status survey
- NRC conducts confirmatory surveys
- NRC approves final status survey report and terminates license

## Power Reactor Facilities

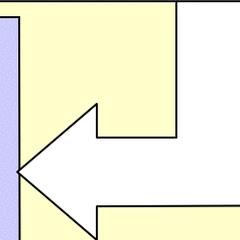
### Before Cleanup

- Licensee ceases operations and notifies NRC
- Licensee submits post-shutdown decommissioning activities report to NRC for information
- Licensee waits 90 days before starting any major decommissioning activities



### During Cleanup

- Licensee conducts cleanup activities
- Licensee submits license termination plan (LTP) to NRC 2 years before termination
- NRC holds Public Meeting**
- NRC approves LTP if acceptable
- NRC conducts inspections



### After Cleanup

- Licensee conducts final status survey
- NRC conducts confirmatory surveys
- NRC approves final status survey report and terminates license



## *United States Nuclear Regulatory Commission*

---

### **NRC's Current Approaches to Decommissioning for Nuclear Power Plants**

- **SAFSTOR (11)**
  
- **DECON (7)**



## *United States Nuclear Regulatory Commission*

---

### **Unrestricted Release Criteria**

- **10 CFR 20.1402 Radiological Criteria for unrestricted release**
  - **25 mrem (0.25 mSv) per year TEDE to an average member of the critical group**
  - **Includes all pathways**
  - **Residual radioactivity levels that are “as low as reasonably achievable or ALARA”**



## *United States Nuclear Regulatory Commission*

---

### **Portland General Electric – Trojan Plant**

<b>Plant Start-Up</b>	<b>November 1972</b>
<b>Nuclear Steam System</b>	<b>Westinghouse 2 Loop PWR</b>
<b>Power Ratings</b>	<b>3411 MW Thermal 1130 MW Electric</b>
<b>Onsite Interim Spent Fuel Storage Installation</b>	<b>September 2003 – 816 Assemblies in 34 Casks</b>
<b>Plant size</b>	<b>623 Acres</b>
<b>Location: Rainier Oregon</b>	<b>~ 50 miles north of Portland, Oregon</b>



## *United States Nuclear Regulatory Commission*

---

### **Maine Yankee Atomic Power – Maine Yankee**

<b>Plant Start-Up</b>	<b>December 1972</b>
<b>Nuclear Steam System</b>	<b>CE/Westinghouse 3 Loop PWR</b>
<b>Power Ratings</b>	<b>2700 MW Thermal 931 MW Electric</b>
<b>Onsite Interim Spent Fuel Storage Installation</b>	<b>February 2004 – 1432 Assemblies in 60 Casks</b>
<b>Plant size</b>	<b>820 Acres</b>
<b>Location: Wiscasset, Maine</b>	<b>~ 50 miles north of Portland, Maine</b>



## *United States Nuclear Regulatory Commission*

---

### **Decommissioning Schedules**

	<b>Trojan</b>	<b>Maine Yankee</b>
<b>Shutdown Date</b>	<b>November 1992</b>	<b>December 1996</b>
<b>Decommissioning Started</b>	<b>January 1993</b>	<b>August 1997</b>
<b>Radiological Decommissioning completed</b>	<b>January 2005</b>	<b>September 2005</b>
<b>NRC Licensing Action</b>	<b>Part 50 - License Termination May 2005</b>	<b>Part 50 – License Amendment September 2005</b>



## *United States Nuclear Regulatory Commission*

---

### **Trojan Decommissioning Approach to Unrestricted Release**

- **Complete decommissioning based on financial assets**
- **License Independent Spent Fuel Storage Installation Facility (ISFSI) per 10 CFR 72**
- **Recycle materials, including the non-contaminated systems, turbine and condenser**
- **Decontaminate the plant to allow non-radiological demolition**
- **Terminate 10 CFR Part 50 License**
- **Recycle concrete debris and metal**



# *United States Nuclear Regulatory Commission*

---

## **Trojan – Before Decommissioning**





## *United States Nuclear Regulatory Commission*

---

### **Maine Yankee Decommissioning Approach to Unrestricted Release**

- **Comply with the State of Maine requirements**
- **Dismantle and dispose of most materials as radioactive waste**
- **License the ISFSI under a Part 50 General License and reduce the land to the ISFSI**
- **Remove all structures to 3 feet (1m) below grade**
- **Return the Site to “Greenfield”**



# *United States Nuclear Regulatory Commission*

---

## **Maine Yankee Before Decommissioning**





## ***United States Nuclear Regulatory Commission***

---

### **Licensing Approaches for Independent Spent Fuel Storage Installation**

<b>Trojan - ISFSI Part 72 Specific License</b>	<b>Maine Yankee - ISFSI Part 50 General License</b>
<b>Licensee request termination of the Part 50 License</b>	<b>Licensee requests license amendment to reduce the site to the ISFSI footprint.</b>
<b>NRC issues <u>Federal Register</u> Notice</b>	<b>NRC issues <u>Federal Register</u> Notice</b>
<b>NRC approves license termination and publishes <u>Federal Register</u> Notice</b>	<b>NRC approves the license amendment and publishes <u>Federal Register</u> Notice</b>



## *United States Nuclear Regulatory Commission*

---

### **Decommissioning Performance**

	<b>Trojan</b>	<b>Maine Yankee</b>
<b>OSHA Reportables</b>	<b>83</b>	<b>65</b>
<b>OSHA Rate</b>	<b>&lt;&lt; 7.8</b>	<b>2.6</b>
<b>Total Dose</b>	<b>335 Rem</b>	<b>515 Rem</b>
<b>Radioactive Waste</b>	<b>12,375 m<sup>3</sup></b>	<b>100,000 m<sup>3</sup></b>
<b>Cost</b>	<b>~ \$ 422 M USD</b>	<b>~ \$ 510 M USD</b>



# *United States Nuclear Regulatory Commission*

---

## **Decommissioning Policy Issues Trojan**

- **License Termination Plan – Specific**
- **Price Anderson – Insurance**
- **Clearance**



## *United States Nuclear Regulatory Commission*

---

### **Decommissioning Policy Issues Maine Yankee**

- **License Termination Plan – General**
- **Use of 50.59 to change LTP requirements**
- **Confirmatory Surveys**



# *United States Nuclear Regulatory Commission*

---

## **Decommissioning Technical Issues Trojan**

- **Paint Removal**
- **Embedded Pipe**



## *United States Nuclear Regulatory Commission*

---

### **Decommissioning Technical Issues Maine Yankee**

- **Fore Bay Underwater Measurements**
- **E-600 Instrument Issues**
- **Determination of Background Activity**
- **Groundwater**



## *United States Nuclear Regulatory Commission*

---

### **Opportunities for Stakeholder Involvement in the Decommissioning Process**

- **Public Meeting for License Termination Plan Approval**
- **NRC meetings with licensee**
- **NRC Inspection Process and Independent Confirmatory Surveys**
- **NRC Federal Register Notices**
- **NRC participation with Citizen Advisory Panel and State Regulators**



## *United States Nuclear Regulatory Commission*

---

### **Trojan Stakeholder Impacts**

- **No Non-Governmental Authority Groups**
- **State of Oregon – no additional requirements**
- **Oregon Energy Siting Board**



## *United States Nuclear Regulatory Commission*

---

### **Maine Yankee Stakeholder Impacts**

- **Friends of the Coast and other groups**
- **State of Maine legislation**
- **Additional State requirements during and post decommissioning**



## *United States Nuclear Regulatory Commission*

---

### **Maine Yankee Stakeholder Impacts**

- **Unrestricted release criteria – 10 mrem (0.1mSv) including 4 mrem (0.04mSv) per year from groundwater pathways**
- **State of Maine Nuclear Inspectors**
- **All waste to be disposed of out of State, including all concrete debris**



## *United States Nuclear Regulatory Commission*

---

### **Maine Yankee Stakeholder Impacts**

- **Citizens Advisory Panel**
- **Post Decommissioning – install additional groundwater monitoring wells**
- **Post Decommissioning – groundwater monitoring for additional 5 years**



# *United States Nuclear Regulatory Commission*

---

## **Trojan Containment**





# *United States Nuclear Regulatory Commission*

---

## **Trojan Turbine Building**





# *United States Nuclear Regulatory Commission*

## **Trojan Spent Fuel Pool**





# *United States Nuclear Regulatory Commission*

---

## **Trojan Cooling Tower**





## *United States Nuclear Regulatory Commission*

---

### **Maine Yankee Before Decommissioning**





## *United States Nuclear Regulatory Commission*

---

### **Maine Yankee Containment Building Demolition**





## *United States Nuclear Regulatory Commission*

---

### **Maine Yankee – “Greenfield”**





## *United States Nuclear Regulatory Commission*

---

### **Trojan Summary**

<b>LTP – Specific</b>	<b>18 Months for NRC Approval</b>
<b>Final Status Surveys – 510 Surveys in 10 Supplements</b>	<b>14 Months for NRC Approval</b>
<b>NRC Requests for Additional Information</b>	<b>3 RAIs in 3 of 10 Supplements</b>
<b>Public Meetings During NRC Review to Resolve Issues</b>	<b>None</b>
<b>Results - On or Ahead of Trojan Schedule</b>	<b>Final Dose – ~ 1 mRem (0.01mSv)</b>



## *United States Nuclear Regulatory Commission*

---

### **Maine Yankee Summary**

<b>LTP – General</b>	<b>37 Months for NRC Approval Multiple Revisions</b>
<b>Final Status Surveys – 180 Surveys in 12 Supplements</b>	<b>15 Months for NRC Approval</b>
<b>NRC Requests for Additional Information</b>	<b>21 RAIs in 11 of the 12 Supplements</b>
<b>Public Meetings During NRC Review to Resolve Issues</b>	<b>3 Public Meetings, plus 2 Management Meetings</b>
<b>Results - 8 months behind the Maine Yankee Schedule</b>	<b>Final Dose – ~ 1 mRem (0.01mSv)</b>



## *United States Nuclear Regulatory Commission*

---

### **Conclusions**

- **High Quality Decommissioning Submissions are Critical**
- **Individual States may vary in their role in the decommissioning process and their concerns must be addressed**
- **Stakeholder interest can vary and must be addressed.**



# *United States Nuclear Regulatory Commission*

---

## **Discussion**

- Factors Contributing to Stakeholder Confidence