United States Nuclear Regulatory Commission

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Power Reactor Decommissioning – U.S. Regulatory Experience

Nuclear Energy Agency Meeting

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Decommissioning History

1997

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

2003

Commission Paper 03-0069

- Risk Informed Approach
- Realistic Scenarios
- Decommissioning Guidance

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First Reactors Decommissioned

- Prior to the 1997 License Termination Rule (LTR), 4 reactor licenses started decommissioning
- Pathfinder: 1971 - 1992
- Shoreham: 1991 - 1995
- Fort Saint Vrain: 1989 – 1997
- Saxton: 1972 - 2005

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Pathfinder

- Spent Fuel to DOE
- Reactor license terminated in 1991
- Part 30 license issued for residual radioactivity
- Part 30 license terminated in 2007 under LTR

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Shoreham

- Licensed to operate to 5% of full power
- Plant shuttered by utility and NY State
- Slightly irradiated fuel transferred to Limerick Station
- Part 50 license terminated 1992

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Fort Saint Vrain

- HTG reactor shutdown in 1989
- Cracks in SGs ring headers
- License terminated in 1997
- DOE took ownership of the spent fuel

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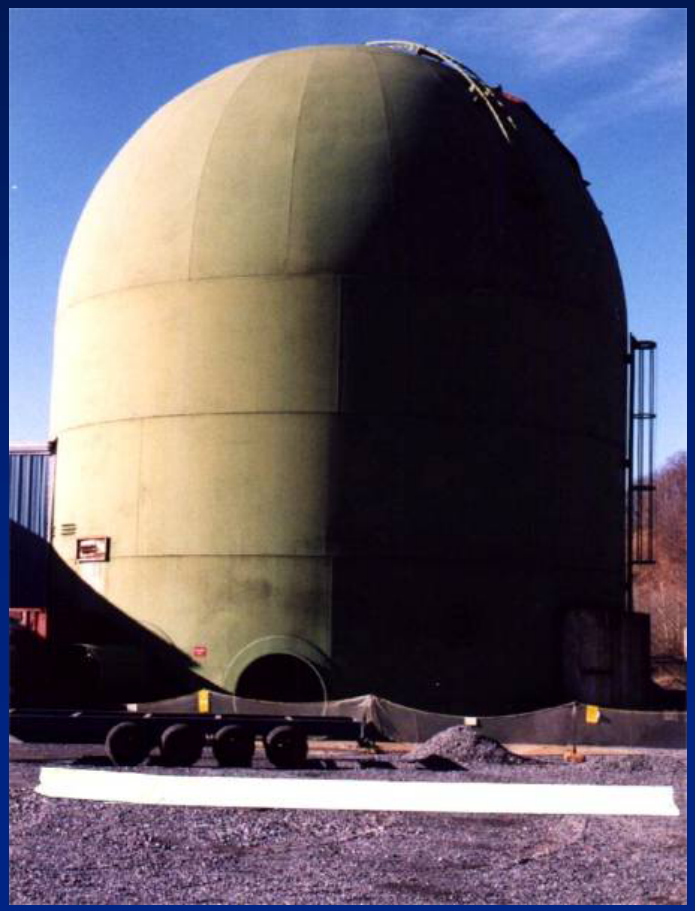
Saxton



- Plant Shutdown -1972
- SAFSTOR until 1986
- 1996 decommissioning Plan became the PSDAR
- License Termination Plan approved in 2003
- License terminated 2005 for unrestricted use

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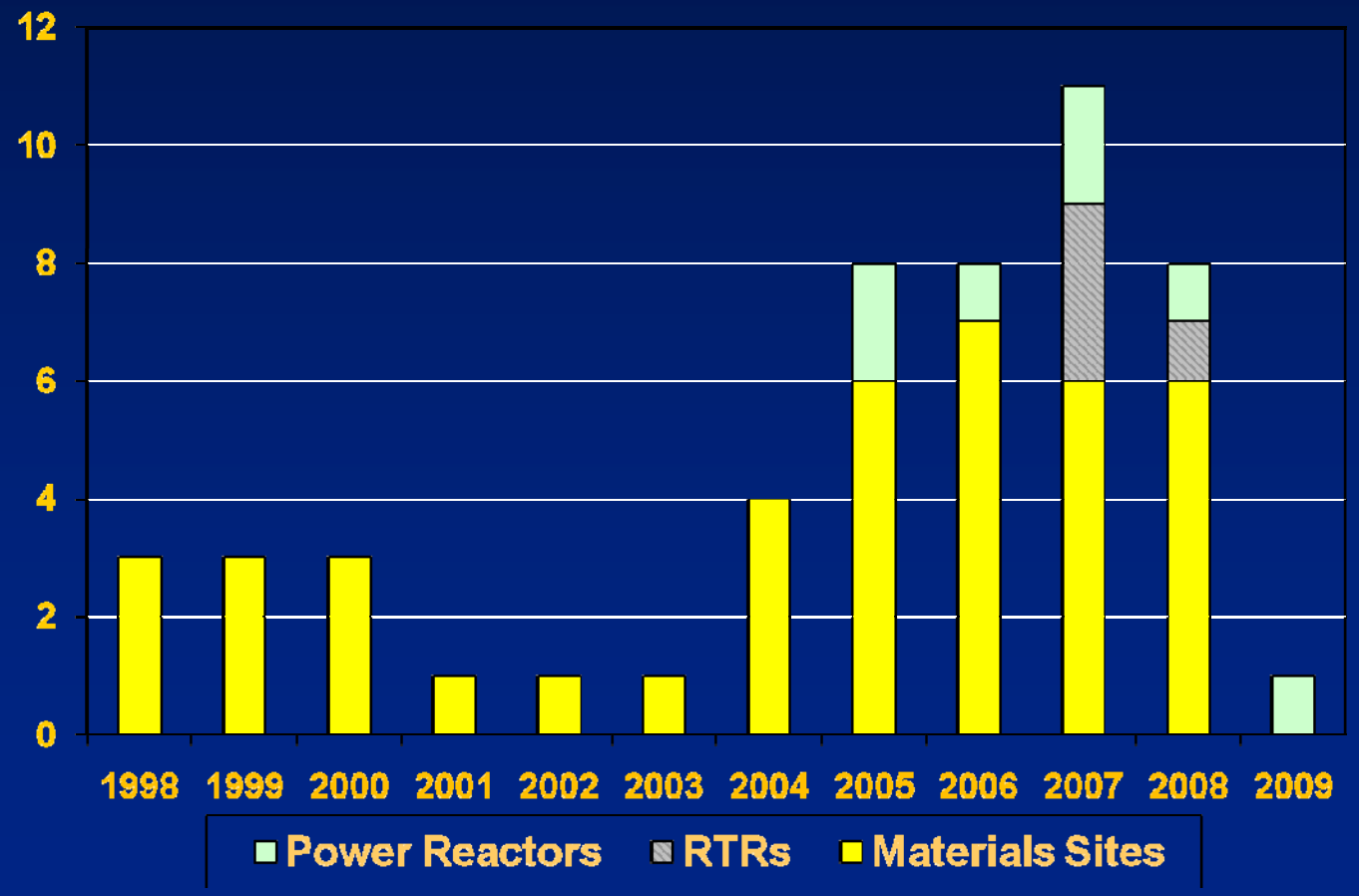
Decommissioning under the LTR



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Power Reactors Decommissioned 2005-2010

- Trojan – May 2005
- Maine Yankee – September 2005
- Big Rock Point – January 2007
- Yankee Rowe – August 2007
- Connecticut Yankee – November 2008
- Rancho Seco - 2009
- San Onofre 1 – Partial Site Release March 2010

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Trojan

- First large power plant to decommission
- Steam Generator and Reactor Vessel disposal
- Decommissioning Plan – Recycling
- Major Structures intact: Containment, Fuel, Auxiliary and Turbine Buildings.
- Part 50 license terminated, Part 72 ISFSI

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Trojan

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Maine Yankee

- State Legislated Limits:
  0.04 mSv/y (4 mrem/y) drinking water
  0.1 mSv/y (10 mrem/y) all sources
  Out-of-state disposal of all decom waste
  Long term monitoring of the site
- Removal of all above ground structures
- Part 50 License amended for ISFSI

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Maine Yankee

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Big Rock Point

- 10 CFR 20.2002 authorization to dispose of 19.16 Million Kg of demolition debris.
- Staff developed 3-D Groundwater Model for placement of wells to monitor for H-3.
- State Historical Preservation Office declared BRP as a “Historic Site” and MOA developed to address concerns.
- Part 50 license amended for ISFSI

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Big Rock Point

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Yankee Rowe

- Reactor and Steam Generators disposed in Barnwell
- State mandated long term monitoring for Tritium in groundwater
- Part 50 License amended for ISFSI

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Yankee Rowe

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Connecticut Yankee

- State Legislated Limits:

  0.04 mSv/y (4 mrem/y) drinking water

  0.15 mSv/y (15 mrem/y) other sources
  0.19 mSv/y (19 mrem/y) all sources
- Out-of-state disposal of all decom waste
- Long term monitoring of the site
- Removal of all above ground structures
- Part 50 License amended for ISFSI

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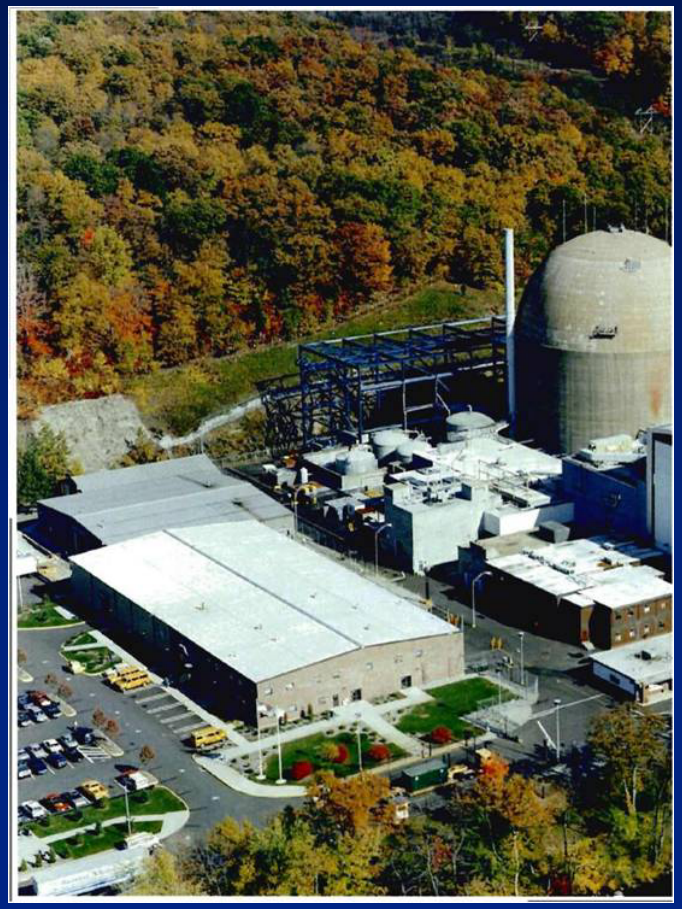
Connecticut Yankee



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San Onofre 1

- Unit 1 Licensed Surface Areas remediated to “Greenfield” under PSDAR, subsurface contamination – TBD.
- Off-shore Cooling Water Pipes released under 10 CFR 50.83(d), release of an area prior to approval of an LTP.
- Reactor Vessel storage on-site until License Termination for all units.

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San Onofre 1

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Rancho Seco

- Containment, Auxiliary, Fuel, Turbine Buildings and Cooing Towers left intact
- Switch yard and Admin Building is the utility Emergency Operations Facility
- Part 50 license retained for B & C waste storage building and ISFSI under Part 72

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Rancho Seco

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Fermi 1

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LaCrosse BWR

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Zion

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Conclusions

- License Termination Regulations are flexible for reactor decommissioning
- License Termination Rule has been implemented for 13 years.
- NRC Guidance continues to evolve as lessons are learned.
- States may require additional restrictions beyond the License Termination Rule

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NRC Decommissioning Universe

- 10 Power & 2 Early Demonstration reactors
- 12 Test, Training, & Research reactors
- 22 Materials sites
- WVDP
- 21 Title I & 11 Title II UMTRCA sites
- 6 Title II sites that have transferred to DOE