

# U.S. Nuclear Regulatory Commission's Decommissioning Program: San Onofre Post Shutdown Activities Report Public Meeting

October 27, 2014  
Carlsbad, California

**Larry W. Camper, CEP, REP, CIPM, Director**

**Division of Decommissioning, Uranium Recovery and Waste Programs  
Office of Nuclear Material Safety and Safeguards**

# Welcome

- September 30, 2013 Public Meeting
- Meeting Agenda
- Meeting Facilitation and Protocol
- NRC Speakers and Experts
- Public Comments, Questions, and Answers
- Meeting Feedback Forms
- Adjourn at 9 PM

# September 30, 2013

## Public Meeting

- Public Outreach (via staff initiated public meeting)
- Government to Government Meeting
- Meeting with Non-Government Organizations (NGOs)
- Responses to Questions from NGOs
- Fuel Management
- Decommissioning Timing

# SONGS PSDAR Meeting Agenda

- Bruce Watson – PSDAR Requirements
- Douglas Broaddus – NRC Review of the PSDAR and Licensing Status
- Ray Kellar – Inspection Programs
- Al Csontos – Spent Fuel Safety
- Thomas Palmisano – SONGS PSDAR
- Chip Cameron – Public Comment Session
- Larry Camper – Summary Remarks and Meeting Closure by 9 PM

# NRC Mission

- The NRC licenses and regulates the nation's civilian use of radioactive materials to protect public health and safety, promote the common defense and security, and protect the environment

# NEPA

- National Environmental Policy Act
- 10 CFR Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions
- Supplemental Environmental Report
- Environmental Assessment conducted during the license termination process

# Decommission (10 CFR 20 Subpart E)

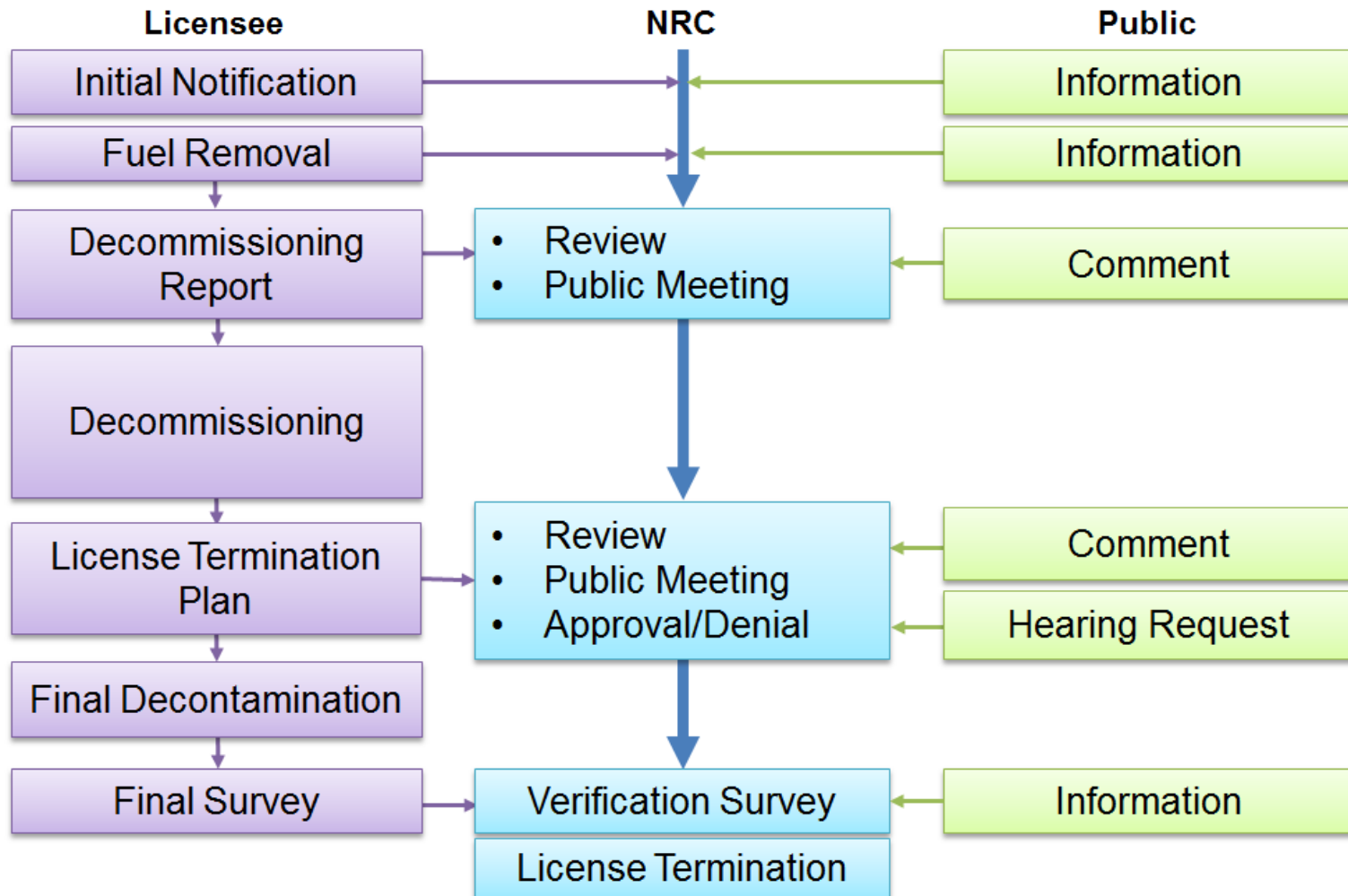
- “To remove (as a facility) safely from service and reduce radioactivity to a level that permits:
- Release of the property for unrestricted use and termination of the license; or
- Release of the property under restricted conditions and termination of the license”

# Release Criteria

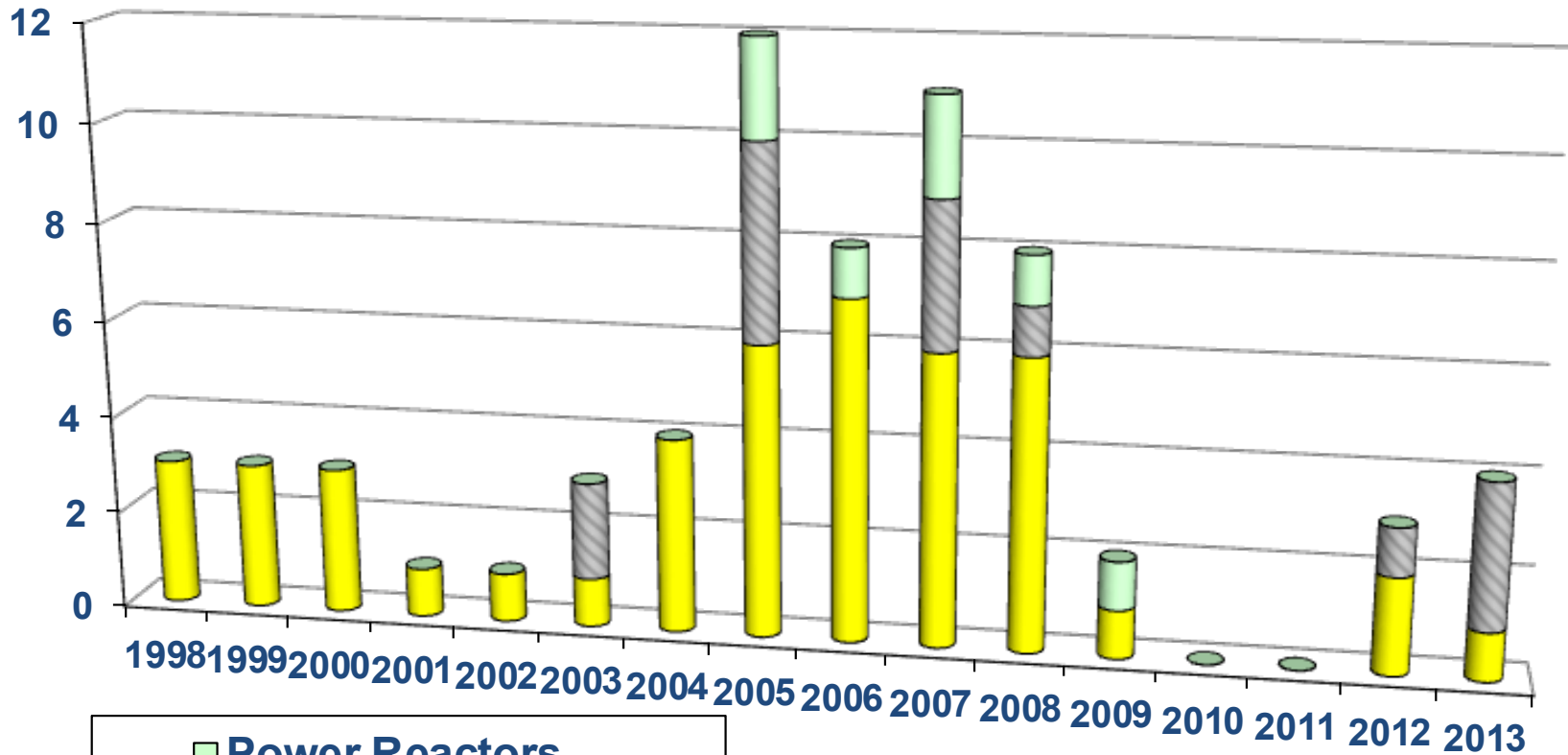
- Unrestricted Release
  - Total Effective Dose Equivalent (TEDE)  $\leq 25$  mrem (0.25 mSv/a) and As Low As is Reasonably Achievable (ALARA)
  - Average member of the critical group
  - All pathways
  - Period of performance - 1000 years
- Restricted release
  - $\leq 25$  mrem (0.25 mSv/a) TEDE and ALARA, with institutional controls in effect
  - Legally enforceable institutional controls
  - If institutional controls fail, doses do not exceed 1 mSv/a, or 5 mSv/a, under specific circumstances
  - Financial assurance - independent third party
  - Licensee and NRC public input / outreach requirements



## Reactor Decommissioning Process



# NRC Decommissioning Experience



# Transition from Operations to Decommissioning

- Office of Nuclear Reactor Regulation continues project management until the Post Shutdown Defueled Technical Specifications are issued
- Transfer of project management responsibilities to the Office of Nuclear Material Safety and Safeguards
- Inspection Program responsibilities are transferred to the Division of Nuclear Materials Safety from the Division of Reactor Projects
- Support continues from the Office of Nuclear Security and Incident Response

# **The NRC Decommissioning Process – San Onofre Post Shutdown Decommissioning Activities Report**

October 27, 2014  
Carlsbad, California

Bruce A. Watson, CHP  
Chief, Reactor Decommissioning Branch  
Office of the Nuclear Material Safety and Safeguards



# NRC Decommissioning Regulations

- 10 CFR Part 20 Subpart E “License Termination”
- 10 CFR Part 50 – Power Reactor License
- 10 CFR Part 72 – Independent Spent Fuel Storage Installation License (ISFSI)
- 17 Years of Implementing Experience

# San Onofre 2 & 3

## Decommissioning Milestones

- June 7, 2013 – SCE certification of permanent cessation of operation for SONGS Units 2 & 3
- June 28, 2013 – Unit 3 defueled certification
- July 22, 2013 – Unit 2 defueled certification
- September 23, 2014 – PSDAR submitted
- NRC issued the public notice for this PSDAR public meeting
- PSDAR is available in ADAMS at **ML14272A121**

# Reactor Decommissioning Options

- **DECON:** Equipment, structures, etc. are promptly removed or decontaminated to a level that permits radiological release
- **SAFSTOR:** Plant placed in a safe, stable condition and maintained in that state until it is subsequently decontaminated to levels that permit radiological release
- **ENTOMB:** Plant is encased in a structurally long-lived substance to allow decay until levels permit unrestricted release (**not currently available**)
- **Radiological Decommissioning** must be completed within 60 years

# Post Shutdown Decommissioning Activities Report Contents (10 CFR 50.82 – Regulatory Guide 1.185)

- A description and schedule for the planned decommissioning activities
- A site-specific decommissioning cost estimate, including the costs of managing irradiated fuel
- 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 – Post Shutdown Decommissioning Activities Report

- NRC regulations require that a public meeting be held in the vicinity of the facility to discuss the PSDAR and its contents, as well as to solicit comments
- NRC shall make the PSDAR available for public comment (ADAMS ML14272A121)
- Licensee may begin major decommissioning activities 90 days after NRC receives the PSDAR

# **The NRC Review Process – San Onofre PSDAR and Irradiated Fuel Management Plan**

October 27, 2014  
Carlsbad, California

Douglas Broaddus, Chief  
LPL IV-2 and Decommissioning Transition Branch  
Office of the Nuclear Reactor Regulation



# NRC's PSDAR Review Process

- Content requirements in 10 CFR 50.82(a)(4)(i)
- Regulatory Guide 1.185 describes the type of information to be included in a PSDAR
- NRR project manager coordinates technical reviews of the PSDAR
- NRC staff may submit Requests for Additional Information (RAIs)

# NRC's PSDAR Review Process: Evaluation Criteria

- Does the PSDAR contain the information required by regulation?
- Can the decommissioning be completed as described, and within 60 years?
- Can the decommissioning be completed for the estimated cost?
- Do the decommissioning activities endanger public health and safety or the environment?

# NRC's PSDAR Review Process: Decommissioning Cost Estimate

- Site-specific Decommissioning Cost Estimate
  - Reasonable assurance funds are available to perform the radiological cleanup
  - If plans are delayed, ensure licensee has a means of adjusting the cost estimate and funding over the storage period
- Decommissioning Cost Estimate (DCE) and funding level are updated annually

# NRC's PSDAR Review Process: Environmental Review / NEPA

- Reasons for concluding that environmental impacts of site-specific decommissioning activities are bounded by previous Environmental Impact Statement(s)
  - NUREG-0586, “Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities”
  - Inspection program

# NRC's PSDAR Review Process

- Review considers public comments
- Staff will notify licensee when no additional information is required
  - NRC does not approve the PSDAR
  - Staff documents NRC review is complete
- Licensee may not begin major decommissioning activities until 90 days after NRC receives the PSDAR, per 10 CFR 50.82(a)(5)

# Review of Irradiated Fuel Management Plan (IFMP)

- Licensees are required to submit IFMP within 2 years of permanent cessation of operations [10 CFR 50.54(bb)]
- Not part of the PSDAR
  - PSDAR / DCE must address the cost of managing irradiated (spent) fuel
  - Not requesting comments on the IFMP
- The IFMP must describe the licensee's program for management and funding of all spent fuel activities until transferred to DOE for ultimate disposal in a repository
- Submitted for NRC's review and preliminary approval
- Must comply with the NRC requirements for possession of spent fuel



# Other Licensing Actions

- SCE has requested other licensing actions that support its decommissioning plan
  - Review of other actions is independent of the PSDAR review
  - PSDAR may or may not depend on approval of the requested licensing actions
- NRC staff is not requesting comments on these other licensing actions at this meeting
- Other actions may offer separate opportunity for public involvement or comment
- Comments received on other licensing actions will be handled through the associated regulatory process, as appropriate

# **NRC Inspection Program for Decommissioning Reactors and Spent Fuel Storage**

October 27, 2014  
Carlsbad, California

Ray Kellar, P.E., Chief  
Fuels Safety and Decommissioning Branch  
Region IV, Division of Nuclear Materials Safety



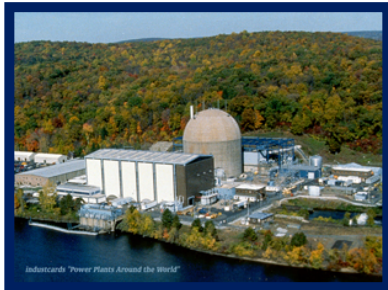
How to safely get from this to

this

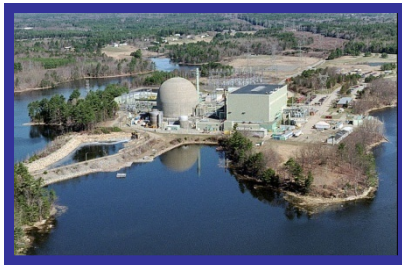


United States Nuclear Regulatory Commission

*Protecting People and the Environment*



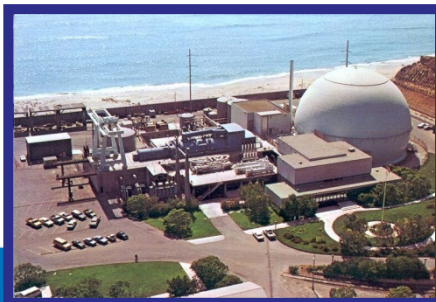
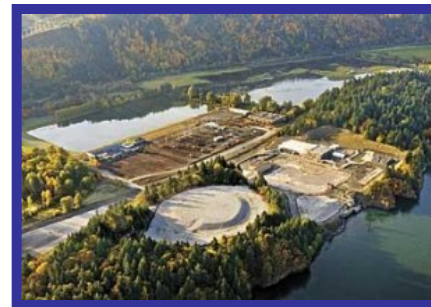
Connecticut Yankee, CT



Maine Yankee, ME



Trojan, OR



San Onofre Unit 1, CA



# How NRC Ensures Safety

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- Establish and ensure compliance with requirements contained in:
  - Regulations
  - License Basis Documents (i.e., License Conditions, Technical Specifications)
  - Guidance Documents
- Perform licensing reviews and safety evaluations
- NRC inspection and enforcement

# Inspection Activities

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- Inspections of spent fuel pool safety
- Inspections of decommissioning activities
  - Generally scheduled during periods of higher risk activities
  - During and after remediation activities, NRC conducts independent radiological measurements to confirm licensee survey methodologies
- Inspections of the Independent Spent Fuel Storage Installation (ISFSI)
- Inspections of physical security

# Objectives of the NRC Inspection Program

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- Objectively verify safe conduct of licensee activities
- Verify adequacy of licensee controls
- Ensure safety problems and violations are promptly identified and corrected, and effective actions are taken to prevent recurrence
- Examine trends in licensee safety performance

# Inspection Planning and Reports

- Routine inspection schedule
  - Planned about a year in advance
  - Coordinated with the program office in NMSS
- Inspection planning and execution
  - Inspections may be announced or unannounced
  - Inspection Plans
  - Inspection Procedures
  - Exit Meetings
- Issue inspection report
  - 30 day goal for normal inspection reports (post exit)
  - 45 day goal for team inspections (post exit)
- NRC Enforcement Policy

<http://pbadupws.nrc.gov/docs/ML0934/ML093480037.pdf>



# Post Inspection Activities

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- Prompt inspection debrief with NRC management
- Determination of any significant findings and enforcement related issues
- Issue inspection report

Most NRC inspection reports are publicly available. To locate reports, go to ADAMS web page (<http://www.nrc.gov/reading-rm/adams.html>), use advanced search feature with docket numbers 05000361, 05000362, and 07200041 for SONGS

- Track and follow up on safety issues



# **NRC Regulation of Spent Nuclear Fuel Storage and Transportation**

October 27, 2014  
Carlsbad, California

Dr. Aladar A. Csontos, Chief  
Renewals and Materials Branch  
Division of Spent Fuel Management  
Office of Nuclear Material Safety and Safeguards

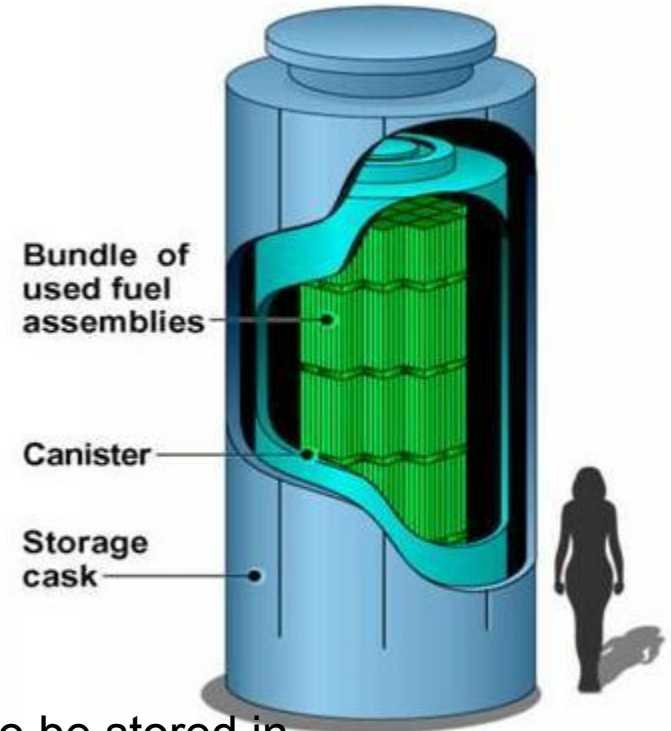
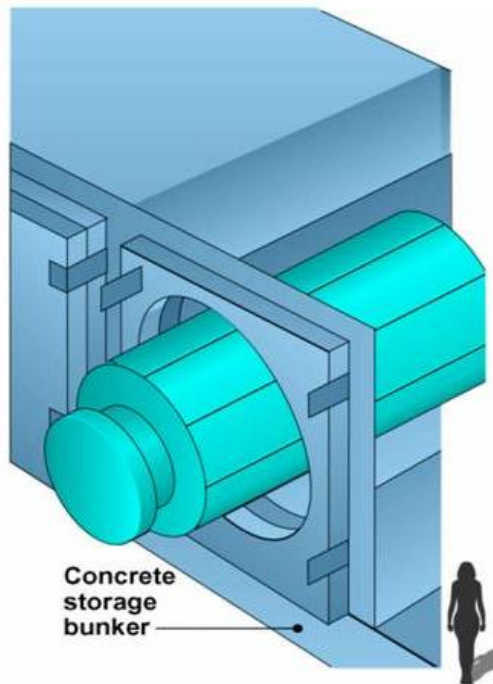


# NMSS / DSFM: Overview

- Licensing, certification and inspection:
  - Spent fuel storage facilities
  - Spent fuel dry cask storage systems
  - Radioactive material transportation packaging
- Coordination with:
  - State and federal agencies (most notably DOT)
  - Foreign and international regulatory agencies
  - Native American tribes
- Applicable regulations:
  - 10 CFR Part 71: Packaging and Transportation of Radioactive Material
  - 10 CFR Part 72: Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste

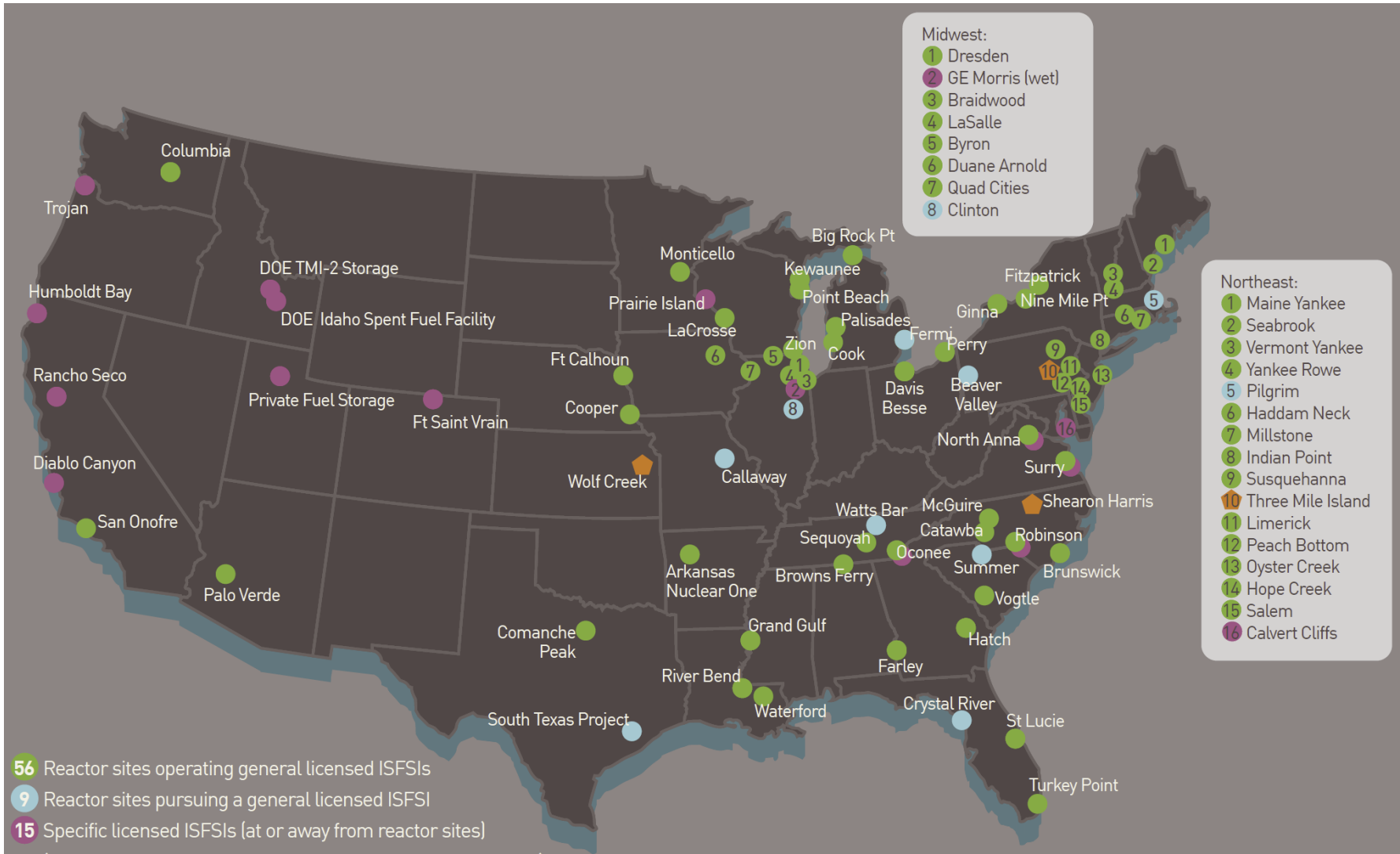
# Spent Fuel Storage Casks

Once the spent fuel has cooled, it is loaded into special canisters which are designed to hold Pressured Water Reactor or Boiling Water Reactor assemblies. Canisters are filled with inert gas, welded, and rigorously tested for leaks. It may then be placed in a “cask” for storage or transportation.



The canisters can also be stored in above-ground bunkers, each of which, is about the size of a one-car garage. Eventually they may be transported elsewhere for storage.

# Status of U.S. ISFSIs



- 56 Reactor sites operating general licensed ISFSIs
- 9 Reactor sites pursuing a general licensed ISFSI
- 15 Specific licensed ISFSIs (at or away from reactor sites)  
(No known sites are pursuing a future specific licensed ISFSI)
- 3 Reactor sites have not announced intentions regarding ISFSI
- 34 States have at least one ISFSI

# 10 CFR Part 72 Regulations

- Review Areas:
  - General Design Criteria:
    - Off-site radiation dose / subcriticality / confinement
  - Quality Assurance
  - Physical Protection
  - Training and Certification of Personnel
  - Siting
  - Reporting
- Technical Review Disciplines:
  - Structural
  - Thermal
  - Criticality
  - Shielding and Radiation Protection
  - Materials
  - Confinement
  - Quality Assurance

# Storage System Design Review

- Normal and Off-Normal Conditions
- Accident Conditions and Natural Phenomena:
  - Tornado winds/tornado missiles
  - Earthquakes
  - Floods and tsunamis
  - Fires and explosions
- Technical Reviews:
  - Structural: Confinement maintained under all conditions
  - Criticality: Fuel subcritical under all conditions
  - Shielding: Meets off-site radiation dose rate requirements
  - Thermal: Cladding protected under normal conditions
  - Materials:
    - Properties appropriately assumed in evaluations
    - Aging effects managed during renewed storage period

# Transportation

- Same set of technical discipline reviews as for storage
  - Ensure that package meets external dose rate limits
  - Ensure fuel remains subcritical
  - Ensure containment is maintained
- Normal and accident conditions differ from storage
  - Normal transport:
    - Vibration
    - Heat and cold
    - Small drops and impacts
  - Postulated Accidents:
    - 30-ft. drop on unyielding surface
    - Fire
    - Puncture
    - Water immersion

# Storage Renewal Guidance Update

- Established NRC Storage Renewal Strategy Team to review existing regulatory framework and aging management guidance
- Updating guidance found in NUREG-1927, Rev. 1 – Standard Review Plan for Dry Cask Storage Systems Renewals
- Updated Storage Renewal Framework:
  - Operations-focused Aging Management
  - Learning, Proactive, and Responsive Aging Management
  - Aging Management Programs that consider and respond to operating experience and results of confirmatory research
- Develop guidance report: “Managing Aging Processes for Storage”
  - Aging Management Programs to include inspection guidance
  - Stakeholder engagement to discuss proposed changes to storage renewal guidance and solicit feedback



# Cladding Integrity & CI Induced Stress Corrosion Cracking

- Over \$9M invested in research and staff efforts
- Cladding Integrity:
  - High burnup fuel is safe for storage and transportation
  - NRC confirmatory research activities
  - DOE Cask Demonstration Surveillance Project
- Chloride Induced Stress Corrosion Cracking (CISCC):
  - Information Notice November 2012, “Potential Chloride-Induced Stress Corrosion, Cracking of Austenitic Stainless Steel and Maintenance of Dry Cask Storage System Canisters”
  - Regulatory Issue Resolution Protocol for CISCC
- NUREG-1927, Rev. 1:
  - Specific aging Management Programs

# Summary

- Regulations in 10 CFR Parts 71 and 72 assure safety for both storing and transporting spent nuclear fuel:
  - Multi-disciplinary technical review
  - Confinement maintained under routine and accident scenarios
- Operations-focused Aging Management
- Learning, Proactive, and Responsive Aging Management
- Storage renewal guidance updates underway
  - Aging Management Programs
- Creating a stable, predictable, and efficient renewal regulatory framework with clear, open, transparent, and reliable regulatory expectations

# Comments and Questions from Members of the Public

**Public comments may be submitted online via the federal government's rulemaking website, [www.regulations.gov](http://www.regulations.gov), using Docket ID NRC-2014-0223.**

**They may also be mailed to Cindy Bladey, Office of Administration, Mail Stop: 3WFN-06-A44M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.**

**Comments will be accepted through Dec. 22, and will be posted on [www.regulations.gov](http://www.regulations.gov).**