

Industry Readiness to Transport Commercial Spent Fuel on a Large Scale

National Transportation
Stakeholders Forum
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Background

NEI 20-02 was developed by the NEI Spent Fuel Transportation and Consolidated Interim Storage Task Force

The objective was to provide a comprehensive overview of a transportation campaign

This document was a collaborative effort involving the following individuals and organizations:

- Mark Richter, NEI
- Rod McCullum, NEI
- Association of American Railroads
- Jack Edlow, Edlow International
- Jeff England, NAC International
- Pam Gorman-Prochaska, Xcel Energy
- Brian Gutherman, Gutherman Technical Services
- Kelly Horn, Illinois Emergency Management Agency
- Kim Manzione, Holtec International
- Franchone Oshinowo, Edlow International
- Jay Thomas, Orano
- Heather Westra, Prairie Island Indian Community

Spent Fuel Transportation Planning and Implementation

Prepared by the Nuclear Energy Institute
December 2021

NEI 20-02 Scope

- Analyzes a private commercial spent fuel or GTCC shipment via rail
 - Considers highway via heavy-haul truck to rail head for inter-modal transfer
 - No federal government involvement in transportation
 - NWPA and DOE Standard Contract requirements are not applicable
- Chapters
 - 1. Introduction
 - 2. Roles and responsibilities
 - 3. Project timeline
 - 4. Regulations and guidance
 - 5. Rail transportation
 - 6. Contingency planning
 - 7. Additional resources
 - 8. References

NEI 20-02 Scope (cont'd)

- Roles and responsibilities
 - Regulatory framework
 - ◆ SNF possession, title, governing licenses
 - ◆ Shipper regulatory responsibilities
 - ◆ Part 71 CoCs
 - ◆ Canister inspections
 - ◆ Canister documentation packages
 - Physical protection
 - NRC route approval
 - ◆ Pre-planning and coordination
 - ◆ Movement control center
 - ◆ Local law enforcement arrangements
 - ◆ Armed escorts
 - ◆ Advanced notification to states and tribes
 - ◆ Training, procedures
 - ◆ Permits, registrations, fees, escorts, and inspections

NEI 20-02 Scope (cont'd)

- Roles and responsibilities (cont'd)
 - Other federal agencies
 - State, county, and local stakeholders
 - Nation non-governmental organizations
 - Federally recognized tribes
- Regulations and guidance
 - NRC Regulations
 - DOT Regulations (invoked by NRC regs)
 - Other important documents
 - ◆ 1979 NRC-DOT memorandum of understanding
 - ◆ Physical protection of SNF shipments (NUREG-0561)
 - ◆ 2008 DOT hazardous materials shipment guidance summary from Pipeline and Hazardous Materials Safety Administration
 - ◆ San Onofre relocation of SNF offsite strategic, conceptual transportation, and action plans

NEI 20-02 Scope (cont'd)

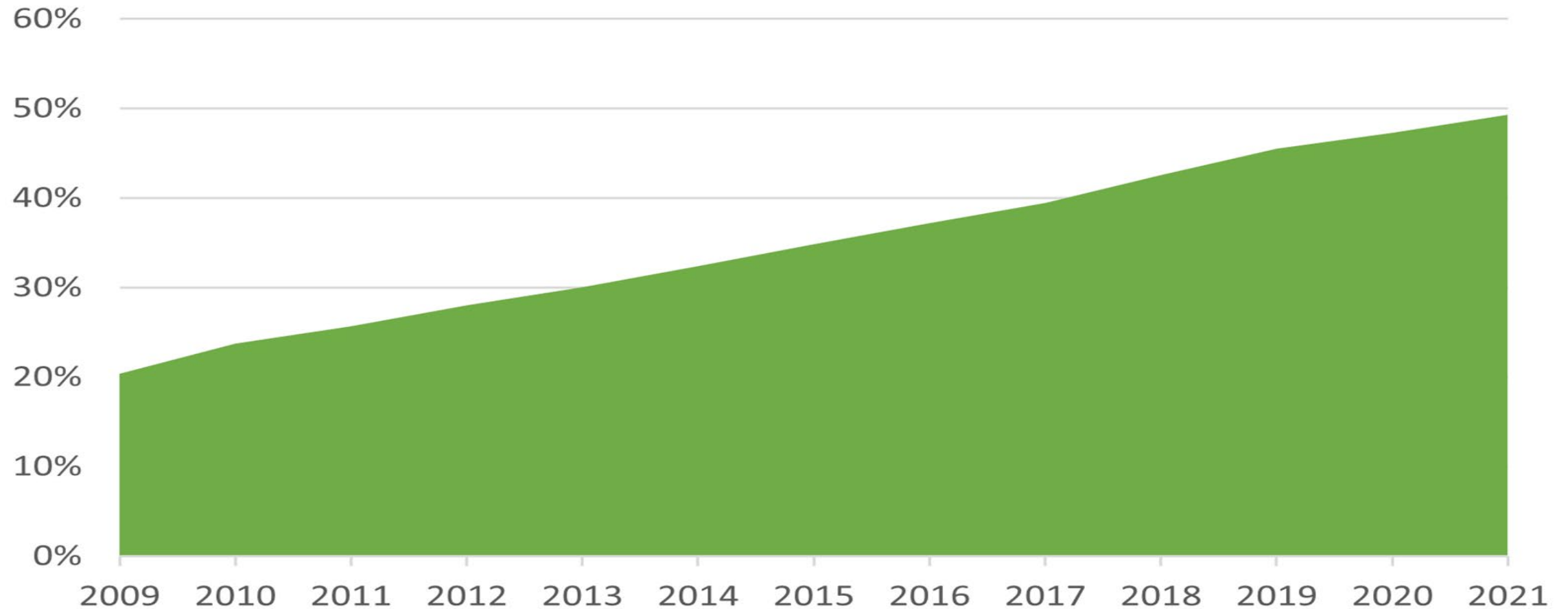
- Rail transportation
- Contingency planning
 - Rail
 - Highway
- Additional resources

Also:

- 2021 NRC transportation regulatory readiness report

Commercial Spent Fuel in Storage

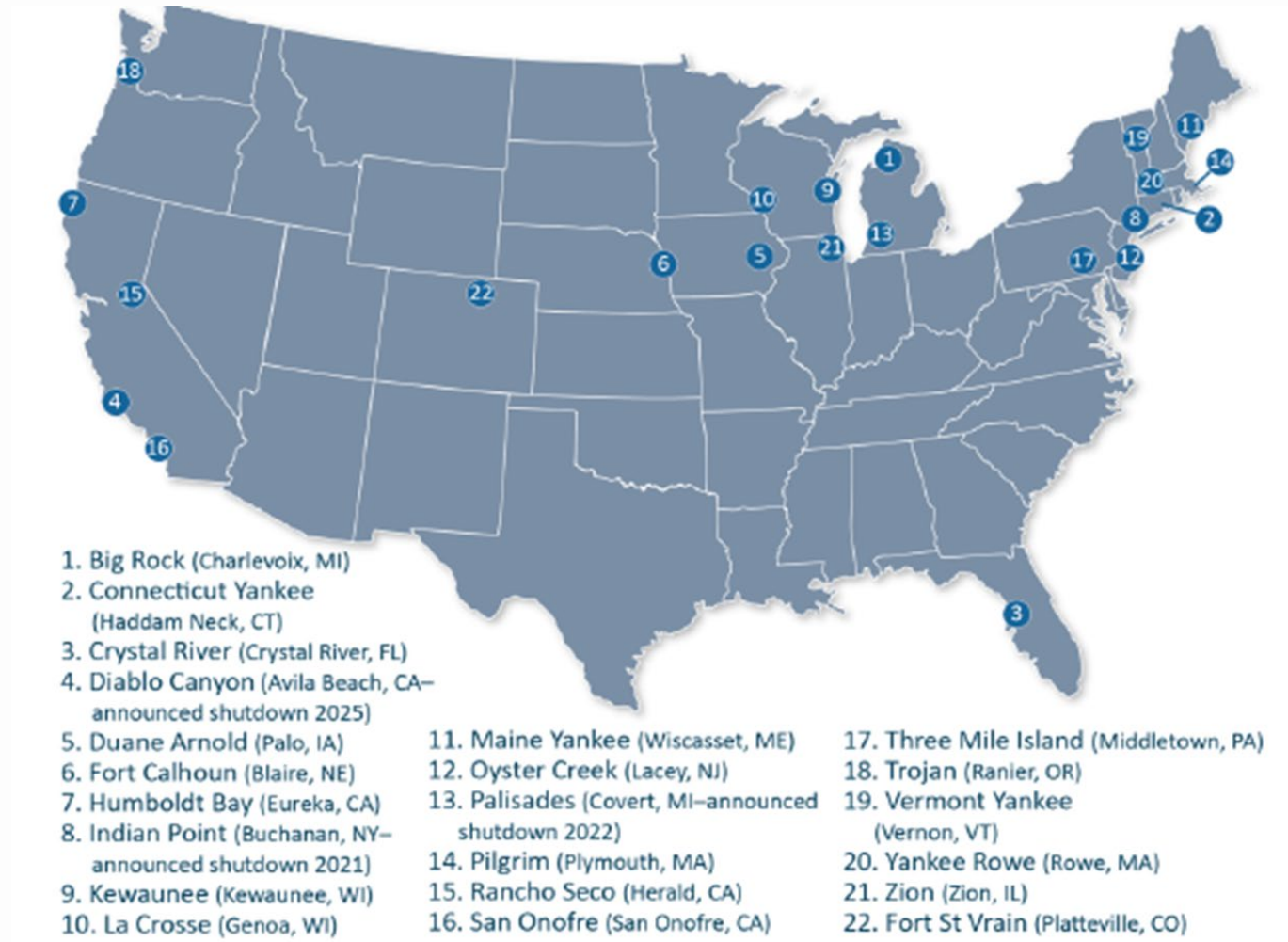
Fraction of U.S. Discharged SNF in ISFSI Storage



Prior Focus to Date on Storage

- Cask design evolution
 - Increased heat loads
 - Increased capacity
 - Increased enrichment to 5%
- These evolutions were critical to efficient SNF management from wet to dry
- Transportation certification must catch up
 - Longer cooling times to reduce heat and dose rate
 - Increased packaging weights
 - Transport of aged canisters
- What is needed for consolidated interim storage?
- Impacts on SNF disposal are unclear
 - Can dual-purpose canister be directly disposed or is re-packaging necessary?

Projected Shutdown Reactors Sites by 2025



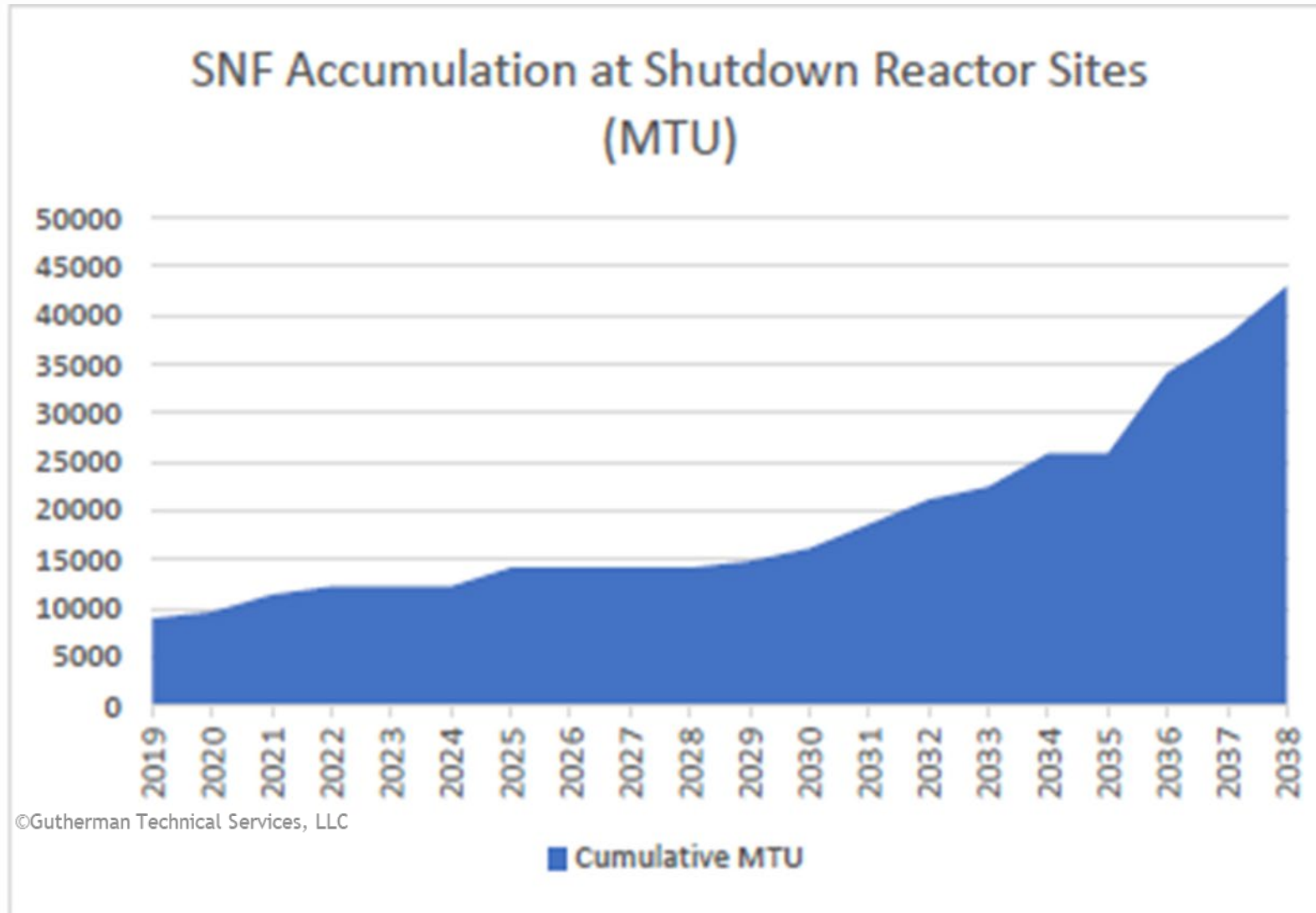
Source: “Strategic Plan for Relocation of SONGS Spent Nuclear Fuel to an Offsite Storage Facility or a Repository,” Northwind, Inc., 2021

Shut Down Sites

- **By 2025:** 22 sites with spent fuel from 28 reactors and no operating reactor; The ISFSIs will have:
 - 1,110 spent fuel casks in service
 - 67 GTCC casks in service
 - 44,000 fuel assemblies stored
 - 14,000 MTU stored
- **By 2030:** 24 sites representing 30 reactors
- **By 2040:** 35 sites representing 51 reactors



SNF Accumulation at Projected Shutdown Reactor Sites



The Challenge



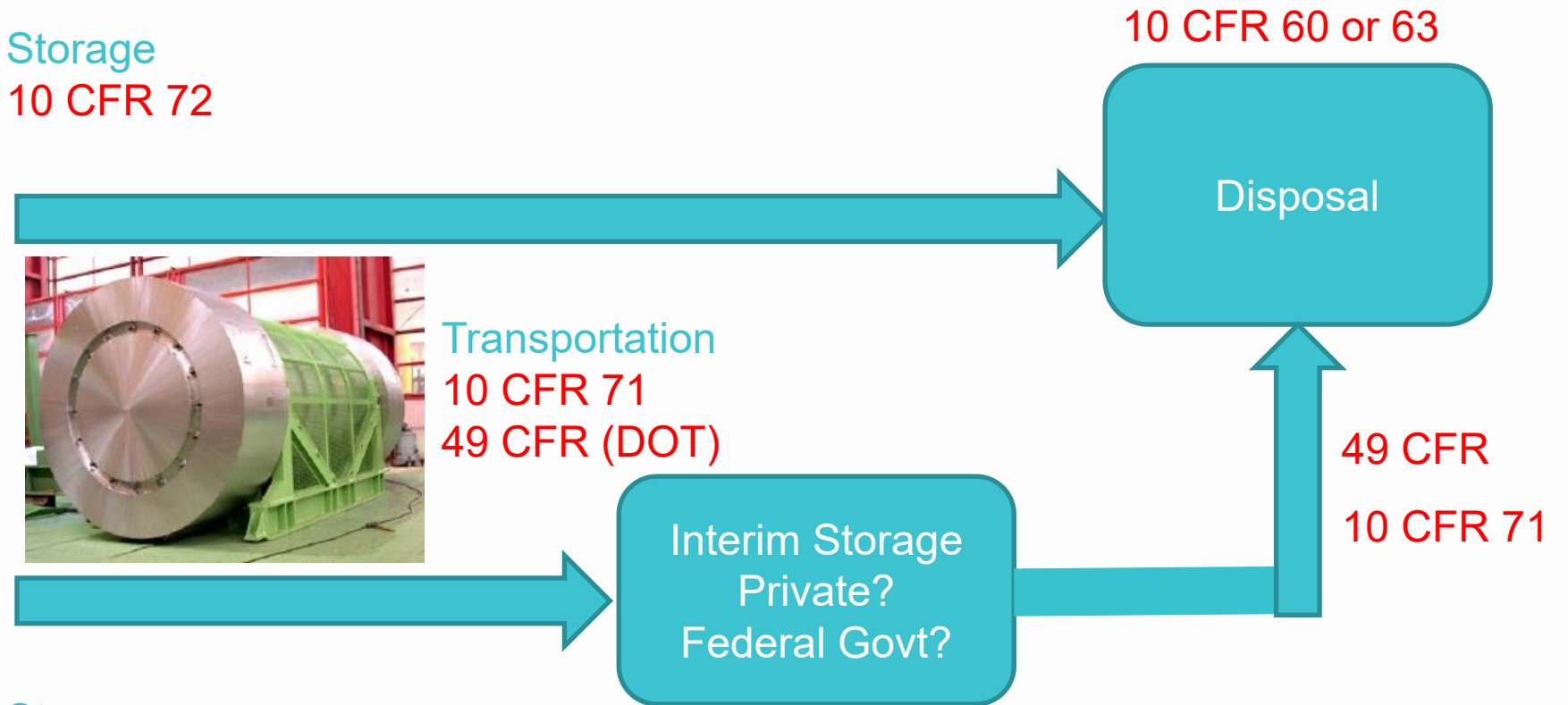
Storage
10 CFR 72



Transportation
10 CFR 71
49 CFR (DOT)



Storage
10 CFR 72

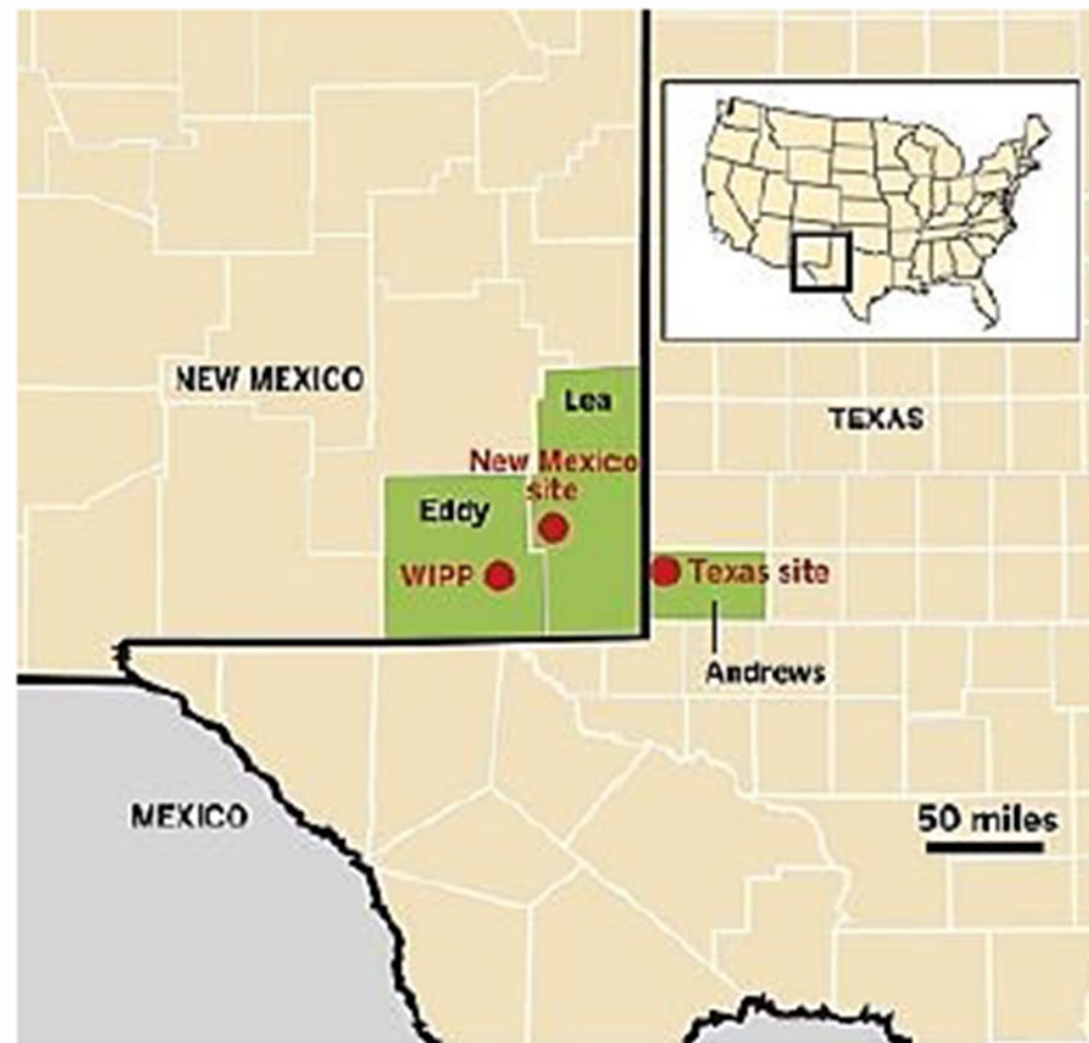


Readiness to Ship?

- Canister condition meets Part 71 CoC
 - 72.48 changes
 - Fabrication deviations
 - Aging management findings
- Canister contents covered by Part 71 CoC
 - Fuel type, burnup, cooling time, enrichment
 - Foreign material
- All of the above assembled in canister-specific record packages
- Shipping casks and balance of packaging (e.g., impact limiters) ordered
- Site infrastructure needed to reach railhead
 - Barge? Heavy haul truck? Site rail?
- Transportation plan, staffing, training
- Engage transportation experts, stakeholders and regulators

Where is Spent Fuel and GTCC Going?

- Federal CISF or repository subject to consent-based site
- Two private CISFs soon to be available
 - Interim Storage Partners (ISP) CISF (license issued 2021)
 - Holtec International HI-STORE CISF (license expected 2022)
- Start clean/stay clean canister-based storage technologies – no re-packaging individual SNF assemblies, no spent fuel pool
- Canister aging management requirements apply as the canisters pass 20 years of total time in service



Key Private CISF Parameters vs. Nuclear Waste Policy Act

Condition/Limit	ISP	HI-STORE	NWPA
Customer keeps title to SNF?	Yes	Yes	No
Customer arranges and pays for transportation?	Yes	Yes	No**
Shared liability agreement?	Yes	Yes	No
Initial licensed capacity	5,000 MTU	8,680 MTU	40,000 MTU
Ultimate licensed capacity	40,000 MTU*	100,000 MTU*	40,000 MTU
GTCC included in initial license?	Yes*	No*	Yes
Use “native” storage module?	Yes	Some	No

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Additional Resources

- NRC Spent Fuel Transportation Regulatory Readiness Plan (October 2021)
 - [US NRC ADAMS Common Web Interface \(ADAMS Accession ML21298A164\)](#)
- SONGS Conceptual Transportation Plan (March 2021)
 - [Spent Nuclear Fuel Solutions – A Fresh Approach | SONGS \(songscommunity.com\)](#)
- DOE [Nuclear Power Plant Infrastructure Evaluations for Removal of Spent Nuclear Fuel \(April 2021\)](#)
 - [Nuclear Power Plant Infrastructure Evaluations for Removal of Spent Nuclear Fuel | Department of Energy](#)

Questions?
Request a Copy
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