Overview of DOE-NE Recent Activities and Future Plans

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Director, Office of Storage & Transportation

NTSF Annual Meeting

May 20-22, 2025

U.S. DEPARTMENT of ENERGY | Office of Nuclear Energy

Spent Fuel and High-Level Waste Disposition

U.S. DEPARTMENT of ENERGY | Office of Nuclear Energy

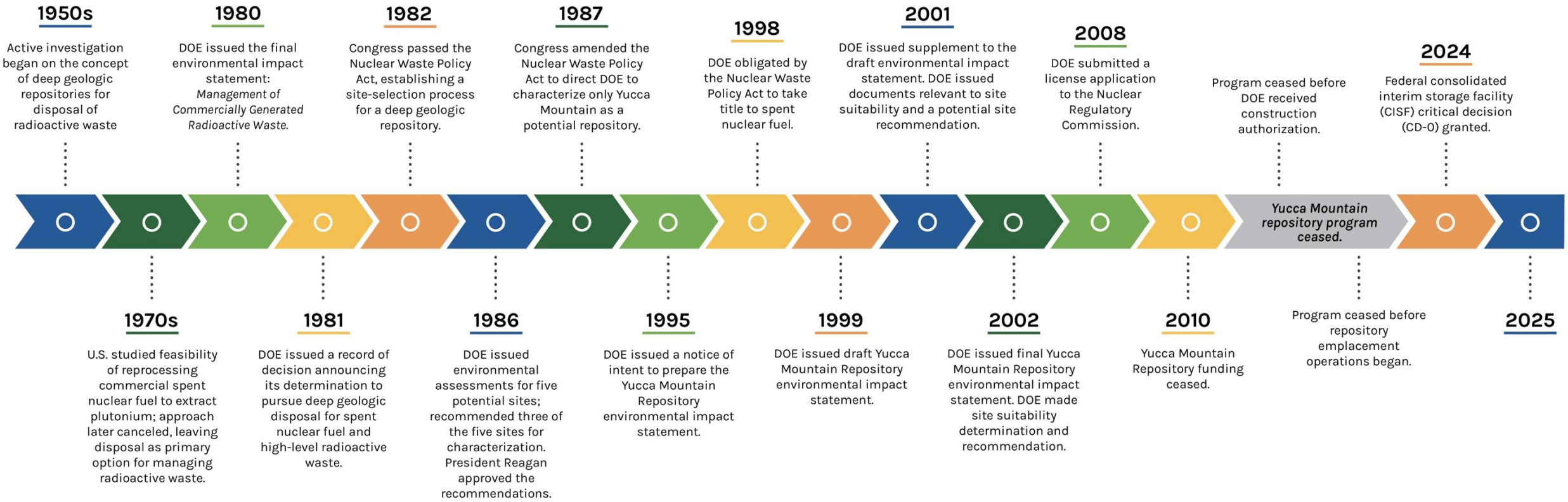
DISCLAIMER

This is a technical presentation that does not take into account contractual limitations or obligations under the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract) (10 CFR Part 961)

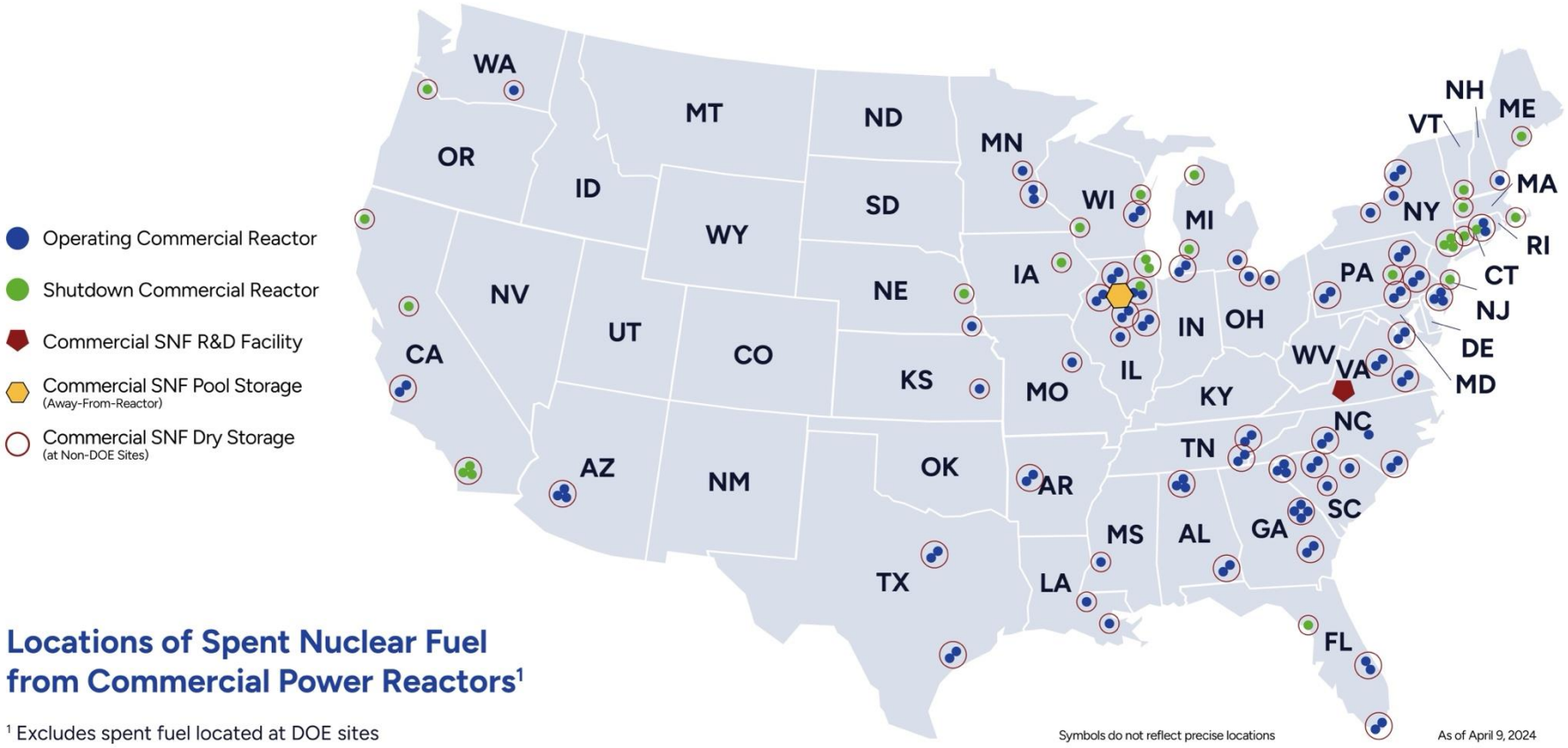
To the extent discussions or recommendations in this presentation conflict with the provisions of the Standard Contract, the Standard Contract governs the obligations of the parties, and this presentation in no manner supersedes, overrides, or amends the Standard Contract.

This presentation reflects technical work which could support future decision making by the U.S. Department of Energy (DOE or Department). No inferences should be drawn from this presentation regarding future actions by DOE, which are limited both by the terms of the Standard Contract and Congressional appropriations for the Department to fulfill its obligations under the Nuclear Waste Policy Act including licensing and constructing of a spent nuclear fuel repository.

Timeline History of Deep Geologic Repository Program



U.S. Spent Nuclear Fuel (SNF) in Context



Locations of Spent Nuclear Fuel from Commercial Power Reactors[1]

[1] Excludes spent fuel located at DOE sites

1958

United States began using commercial nuclear power

2025

94 operating commercial reactors at 54 nuclear power plants in 28 states

- 20 nuclear power plants have shut down
- ~95,000 metric tons of SNF

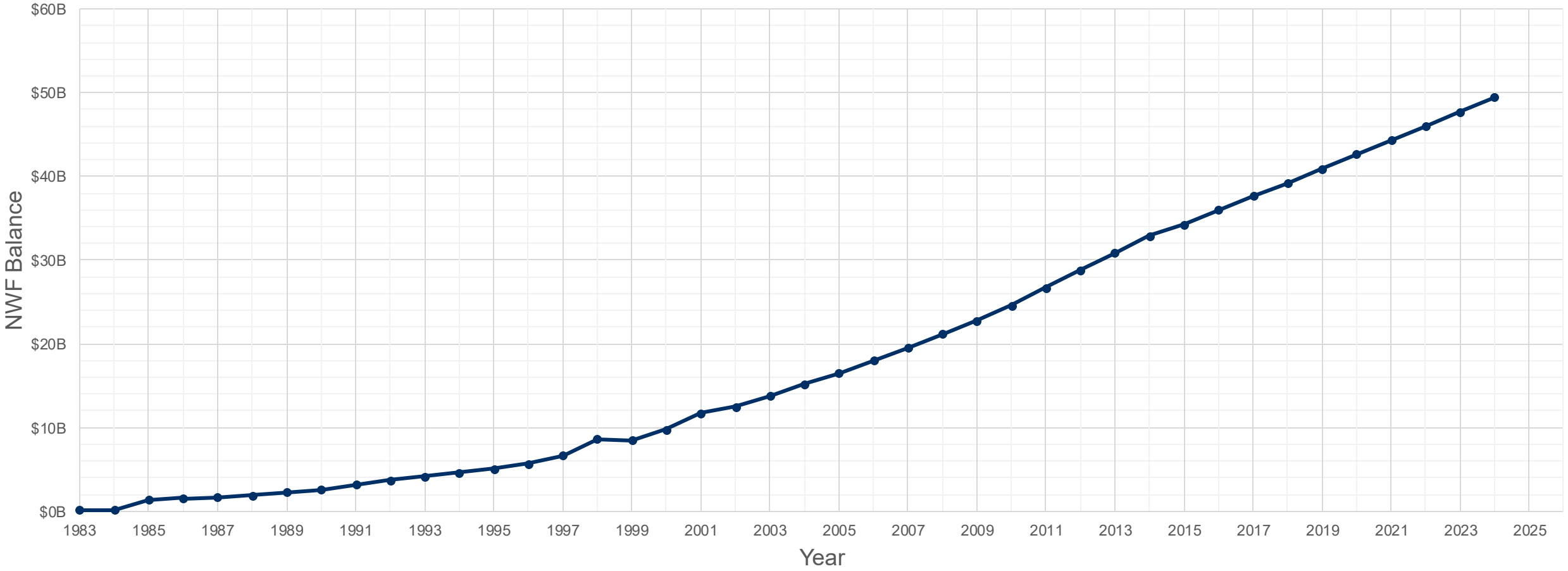
End of Current Fleet

United States estimated to have up to approximately 180,000 metric tons of commercial SNF

Taxpayer Liability for SNF

*Source: DOE Nuclear Waste Fund Annual Financial Statement Audit Reports.
**DOE's cumulative Spent Fuel Program Appropriations includes funding from the Integrated Waste Management System, Used Nuclear Fuel Disposition, and the Nuclear Waste Fund Oversight Programs.

Nuclear Waste Fund (NWF) Balance



Data through Fiscal Year 2024. The NWF balances reflect past fees and interest collected from owners and generators of nuclear waste and investment earnings. Source: US Department of Energy's Nuclear Waste Fund Annual Financial Statement Audit Report

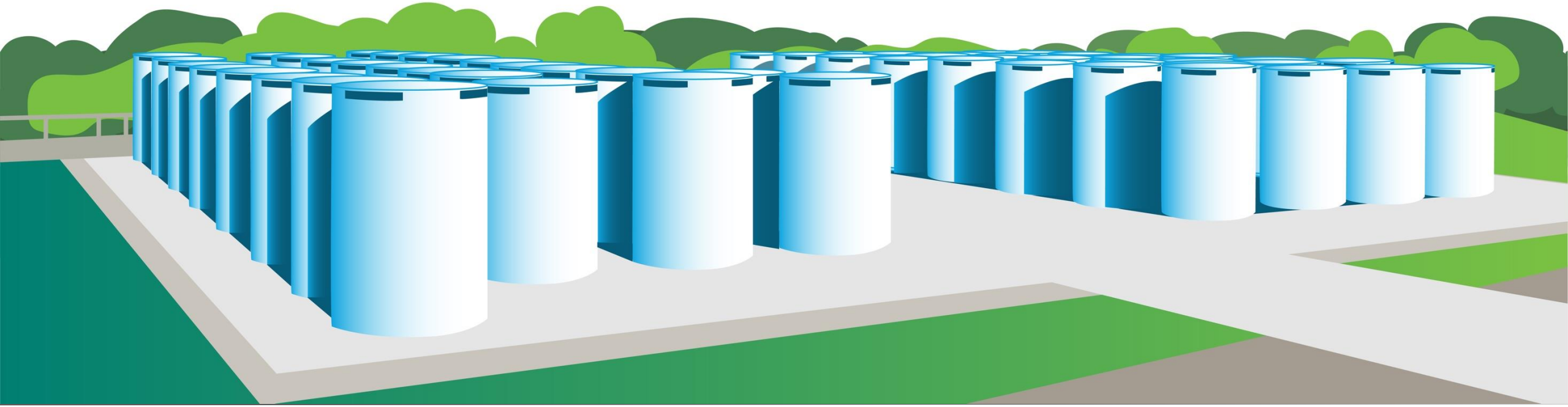
NWF Contributions by State

Total Contributions to the Nuclear Waste Fund by State*					
Alabama	$948.9 million	Louisiana	$407.4 million	New York	$1,011.8 million
Arizona	$686.6 million	Maine	$251.9 million	North Carolina	$1,034.6 million
Arkansas	$367.1 million	Maryland	$426.4 million	Ohio	$381.5 million
California	$953.9 million	Massachusetts	$188.4 million	Oregon	$75.5 million
Colorado	$0.2 million	Michigan	$829.0 million	Pennsylvania	$1,947.3 million
Connecticut	$931.4 million	Minnesota	$449.2 million	South Carolina	$1,498.7 million
Florida	$887.0 million	Mississippi	$250.4 million	Tennessee	$596.9 million
Georgia	$846.1 million	Missouri	$243.1 million	Texas	$812.3 million
Illinois	$2,261.2 million	Nebraska	$300.2 million	Vermont	$272.3 million
Iowa	$137.1 million	New Hampshire	$201.2 million	Virginia	$837.0 million
Kansas	$225.3 million	New Jersey	$769.6 million	Washington	$198.9 million
				Wisconsin	$416.4 million

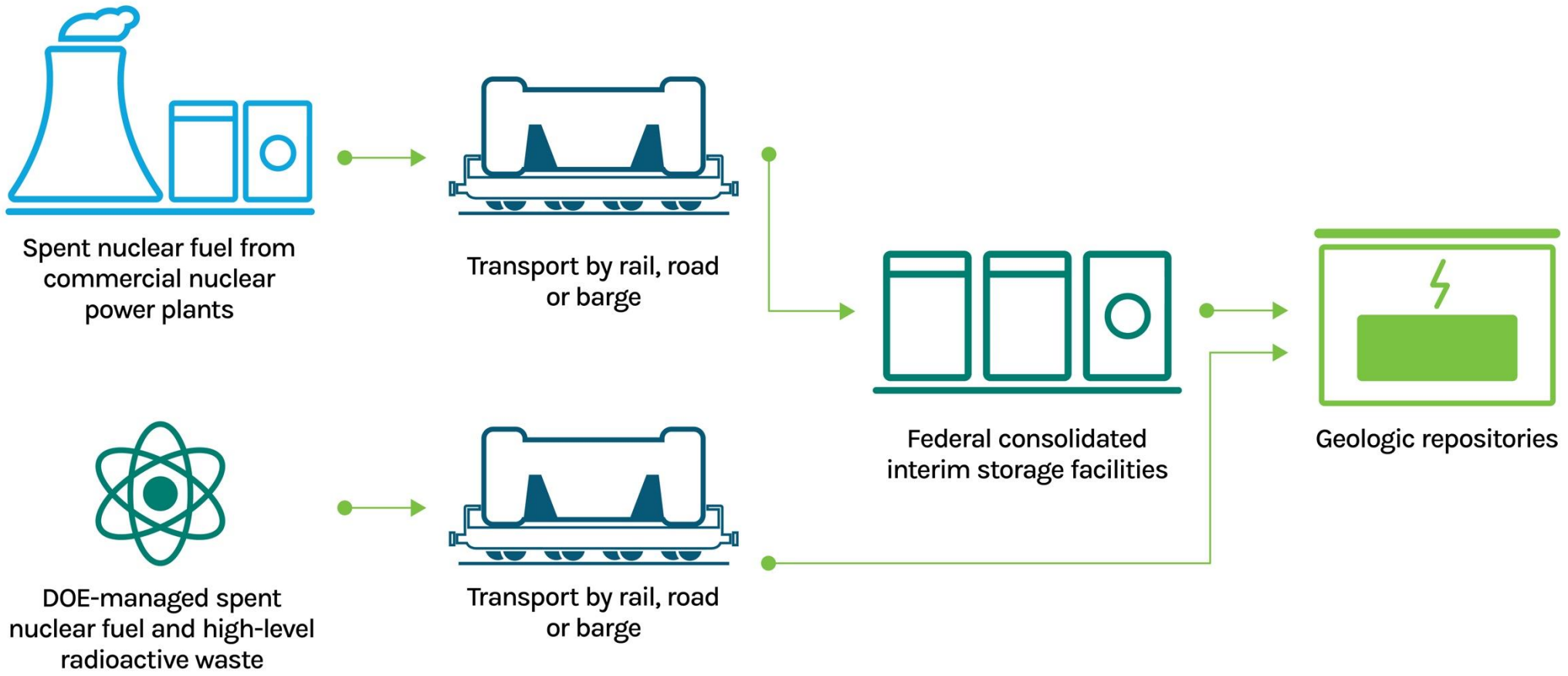
*Data through December 2024.
Source: U.S. Department of Energy Office of Standard Contract Management
https://www.energy.gov/sites/default/files/2025-04/NWF%20Net%20Payments%20%26%20Balances%20by%20State_2024.1231.pdf

Office of Spent Fuel and High-Level Waste Disposition

Develop and implement a plan for the safe and secure long-term management of the Nation's spent nuclear fuel and high-level radioactive waste.



Integrated Waste Management System for SNF and HLW



Office of Spent Fuel and High-Level Waste Disposition

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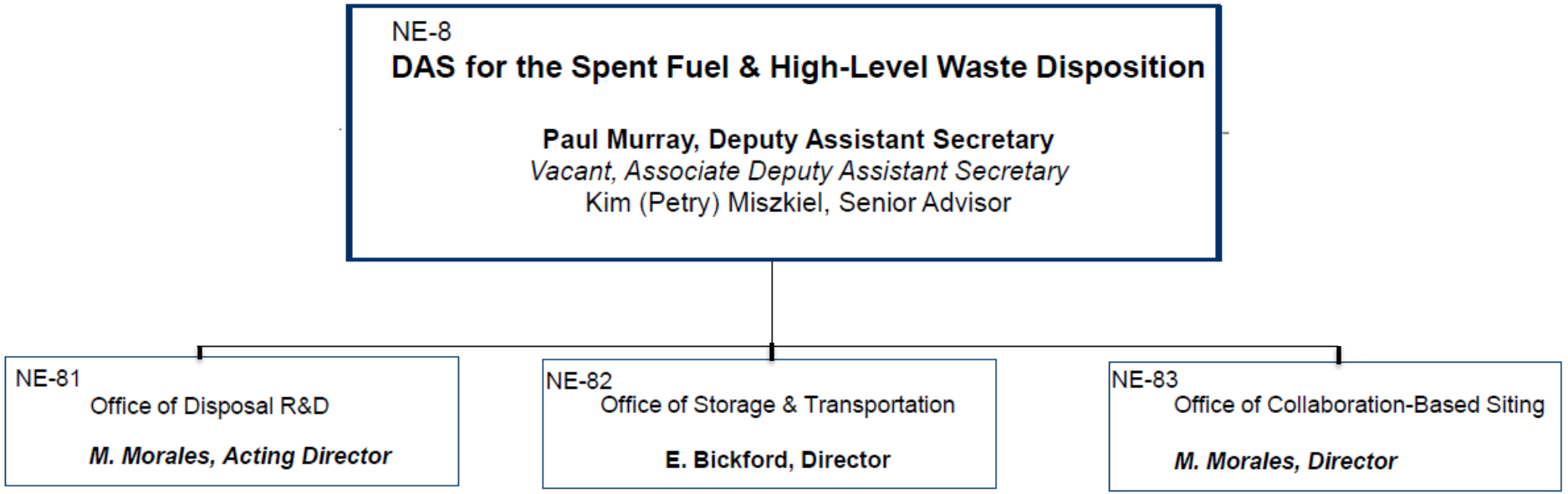
NE Organizational Charts
Current Onboard Staffing

May 2025

Deputy Assistant Secretary Spent Fuel & High-Level Waste Disposition, NE-8



Office of Spent Fuel and High-Level Waste Disposition

NE Organizational Charts
Current Onboard Staffing

May 2025

Deputy Assistant Secretary Spent Fuel & High-Level Waste Disposition, NE-8

NE-8
DAS for the Spent Fuel & High-Level Waste Disposition

Paul Murray, Deputy Assistant Secretary
Vacant, Associate Deputy Assistant Secretary
Kim (Petry) Miszkiel, Senior Advisor

NE-81
Office of Disposal R&D
M. Morales, Acting Director

NE-82
Office of Storage & Transportation
E. Bickford, Director

NE-83
Office of Collaboration-Based Siting
M. Morales, Director

Office of Siting & Disposal
Marla Morales

Office of Storage & Transportation
Erica Bickford

Spent Fuel & High-Level Waste Disposition Current Program Priorities

2025

Collaboration-Based Siting & Public Outreach

2025 Issue an Expression of Interest

Design of Federal Consolidated Interim Storage Facility (CISF)

2025 - 2038 Federal CISF engineering design, licensing, construction & operation

2026 Establish the Spent Nuclear Fuel International Center of Applied Research in Storage and Transportation

Transportation of Spent Nuclear Fuel

2027 Move High Burnup Research Cask to DOE Facility
2028 - 2031 Conduct Package Performance Project (PPP)*
2034 Build out transportation infrastructure for SNF
2038 - 2040 Begin transporting SNF to federal CISF

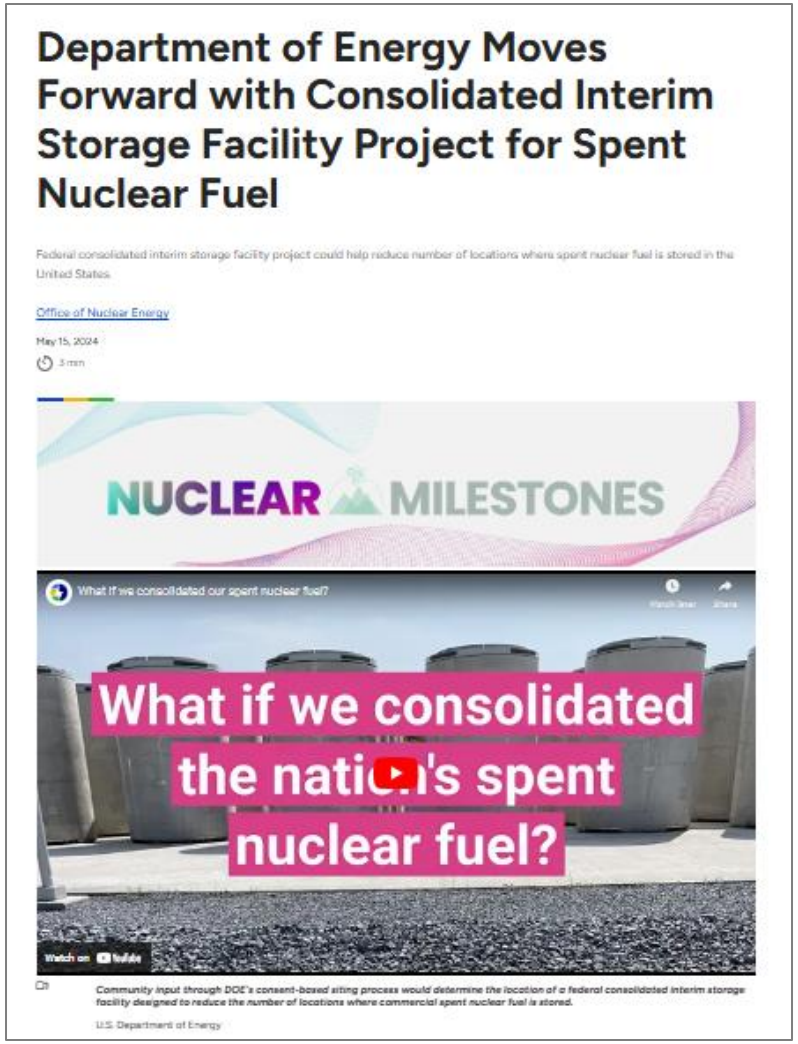
2040

*Forecasted PPP completion is dependent on the results of the Request for Information. The earliest target date is 2028 but it is likely to be extended.

Recent Accomplishments

Federal Consolidated Interim Storage Facility (CISF) Project Mission Need approved by US Department of Energy's Energy System Acquisition Advisory Board (ESAAB), May 2024

- First stage in a multi-step approval process
- Project schedule estimates Federal CISF to begin operations in 2038
- Exploring options to build facility sooner

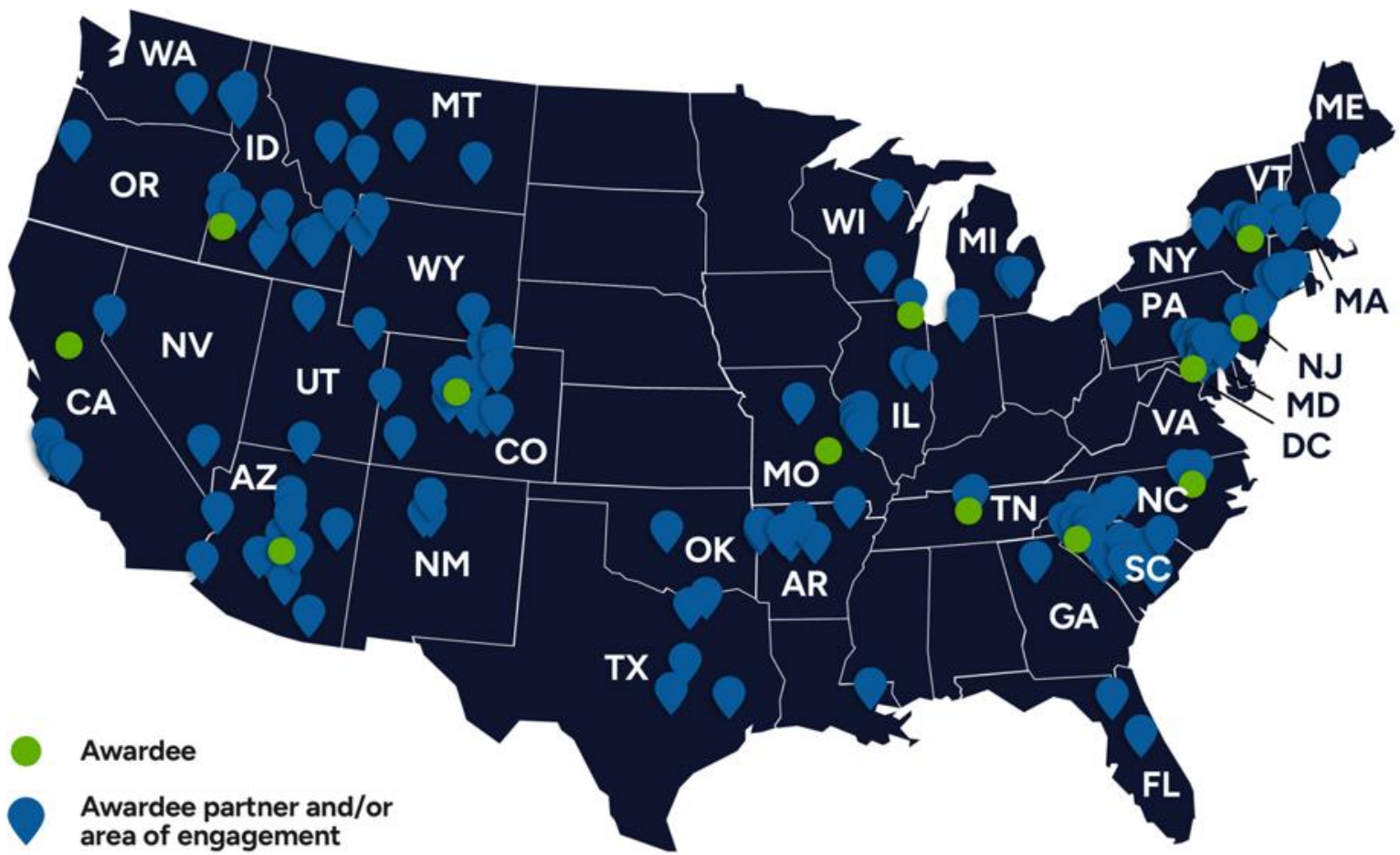


Federal CISF

- **DOE's reference concept for a Federal CISF:**
  - Initially licensed for 15,000 metric tons uranium (MTU) SNF
  - Options to expand to 70,000 MTU of SNF
  - Licensed by the Nuclear Regulatory Commission (NRC) under 10 CFR Part 72
  - Start operations at 500 MTU/year receipt rate, ramp up to 3,000 MTU/year, possibly 4,500 MTU/year
- **Transportation System Needs:**
  - Acquisition of railcars and Type B transport casks
  - Armed courier program to escort shipments by rail
  - Standard operating procedures and training requirements
  - Training and technical assistance program for public safety officials in Tribal and State jurisdictions along transport routes
  - Site-specific transportation plans
  - Potential infrastructure upgrades near origin sites, etc.

Collaboration-Based Siting

- Participatory approach to increase social acceptance
- Include community input into facility governance and design
- Conduct meaningful public engagement to develop relationships and trust
- June 2023, DOE awarded $24 million to 12 consortia to:
  - innovate and test public engagement approaches
  - build capacity for future siting discussions
  - develop best practices



CONSORTIA PROGRESS UPDATE: MARCH 2025

The U.S. Department of Energy (DOE) is currently using a collaborative process to site spent nuclear fuel facilities. The Consortia support DOE's efforts by facilitating public engagement, eliciting regional perspectives, and providing subgrants to community-level entities wishing to learn more. The Consortia consist of twelve project teams – drawn from academia, nonprofits, industry, and beyond – funded to spend two years removing barriers to participation in DOE's collaborative siting process.

286 Consortia Public Engagements

19 Tribal Engagements

61 Government Engagements (Local, State, and Federal)

20 Community Grants Awarded

25 Information Resource Projects

Progress: Siting Process General Timeline

Progress: Consortia Timeline

Updates reflect activities from September 2023 up to March 2025.

Recent Accomplishments

Atlas railcar consist, including a 12-axle cask-carrying railcar, two buffer railcars, and rail escort vehicle certified by the Association of American Railroads for use in North America, June 2024

- Provides a capability for DOE to transport SNF and HLW by rail
- First shipment of SNF planned for 2027

Fortis Railcar Project Status

Fabrication Starts for High-Tech Fortis Railcar

Fabrication process starts for U.S. Department of Energy Fortis railcar project

Office of Nuclear Energy

March 18, 2024

3 min

NUCLEAR MILESTONES

- 8-axle SNF cask-carrying railcar
- Design approved by Association of American Railroads (AAR)
- Prototype Fortis railcar being fabricated
  - Delays with component purchasing
  - Fabrication to now finish summer 2026
- Testing – AAR review after each phase
  - Single-car testing
  - Multiple-car testing
  - Demonstration run on US rail network

Package Performance Project

What is a Package Performance Project (PPP)?

- Physical demonstrations of a rail-sized spent nuclear fuel transportation cask
- Previously referred to as a “package performance study” or “package performance demonstration”

Why is DOE planning a PPP?

- Build trust and confidence in the safety of SNF transportation casks and SNF transportation
- Gather technical data to further support computer models
- Record high-resolution video to use in DOE communication products and public outreach
- Explore additional opportunities to strengthen relationships

Photo credits: CEGB public demonstration test. Images from, “Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States,” The National Academies Press, Washington, D.C. (2006); A. MUSOLFF et al., “Drop Test Results of the Full-Scale CONSTOR® V/TC Prototype,” Proc. 15th Int. Symp. on the Packaging and Transportation of Radioactive Materials (PATRAM 2007), Miami, Florida, October 21–26, 2007 (2007).

High Burnup Research Cask Project

- High Burnup Research Cask (HBURC) is an R&D project started in 2013 as a collaboration between DOE and the Electric Power Research Institute (EPRI)
- Most new SNF is now high burnup
- Monitoring temperature of high burnup fuel in dry cask storage
- DOE plans to ship this cask to a DOE National Lab for further R&D in 2027
- Future R&D includes opening the cask to examine fuel

HBURC Shipment

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Home / Press Releases / Idaho and Trump Administration sign agreement to support U.S. nuclear energy future

Idaho and Trump Administration sign agreement to support U.S. nuclear energy future

Tuesday April 29, 2025

(IDAHO FALLS, Idaho) — The State of Idaho and the U.S. Department of Energy have agreed to a targeted waiver of the 1995 Settlement Agreement. The agreement established milestones to remove legacy waste at the Idaho National Laboratory site while allowing nuclear energy research and development at the lab.

The waiver will enable critical research on a high burnup nuclear fuel cask from a commercial nuclear power plant. This research will provide data to support licensing for the extended storage of spent fuel at 54 nuclear power plants in 28 states.

> *"The collaborative effort between the State of Idaho, the U.S. Department of Energy, and the Idaho National Laboratory showcases our commitment to advancing nuclear energy research while upholding the goals of the 1995 Settlement Agreement. We are proud to support innovation in nuclear energy that will support national security and energy independence into the future,"* **Governor Brad Little** said.

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5h ago

Hanford completes 2,000-gallon TBI waste shipment
7h ago

U.S. nuclear capacity factors: Stability and energy dominance
Fri, May 2, 2025, 3:57PM

A message from Goodway Technologies

Ensuring Safety and Cleanliness: The Crucial Role of Industrial Vacuums in Nuclear Power Facilities

National awards to be presented at ANS Annual Conference
Fri, May 2, 2025, 1:12PM

Ted Garrish faces Senate committee for DOE nuclear post
Fri, May 2, 2025, 10:30AM

Sellafield waste vault yields 1960s-era finds
Fri, May 2, 2025, 8:01AM

A message from Goodway Technologies

Optimizing Maintenance Strategies in Power Generation: Embracing Predictive and Preventive Approaches
Learn More

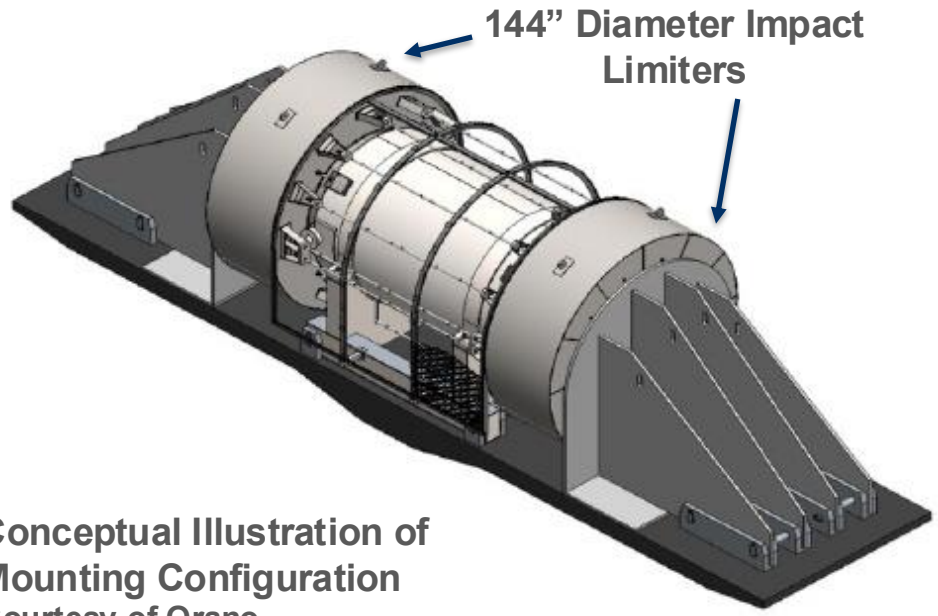
WASTE MANAGEMENT

Idaho agrees to INL spent fuel waiver

Thu, May 1, 2025, 10:29AM | Radwaste Solutions

INL's Hot Fuel Examination Facility. (Photo: INL)

Potential HBURC Shipment Rail Routes



Conceptual Illustration of Mounting Configuration
Courtesy of Orano

Coordination with Tribal, State, and Federal Partners

CSG ERC

Western Interstate Energy Board

CSG MIDWEST

SOUTHERN STATES ENERGY BOARD
Transcending Boundaries

TRMTC

NAVAL REACTORS

FRA

PHMSA

UNITED STATES COAST GUARD 1790

CYBERSECURITY & INFRASTRUCTURE SECURITY AGENCY CISA

FEDERAL BUREAU OF INVESTIGATION WEAPONS OF MASS DESTRUCTION DIRECTORATE

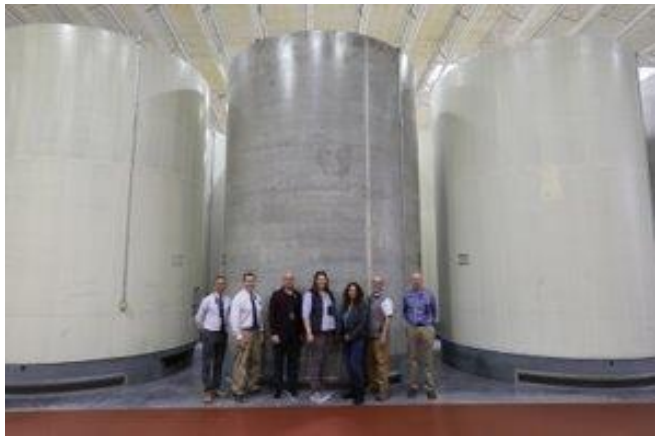
DEPARTMENT OF ENERGY UNITED STATES OF AMERICA

UNITED STATES NUCLEAR REGULATORY COMMISSION

Collaboration with Naval Reactors

DOE Rail Escort Vehicle

NNPP Rail Escort Vehicle (under construction)



- Navy has been shipping their SNF safely since 1957
- Have shipped 924 naval SNF containers over 1.7 million miles
- DOE continues to collaborate with Naval Reactors on development of railcars for SNF transport
- Discussing additional collaborations on SNF storage design and transport operations

Spent Nuclear Fuel International Center of Applied Research in Storage and Transportation

Up to approximately 180,000 tons of SNF from the current light-water reactor fleet equates to up to 94 million fuel rods. Many variables. Different cladding types, different enrichments, different burnups.

Need statistically significant data to be able to make informed technical decisions related to SNF and HLW management

Exploring collaborations with Germany, Belgium, United Kingdom, Switzerland, and Japan

- Countries with similar waste forms

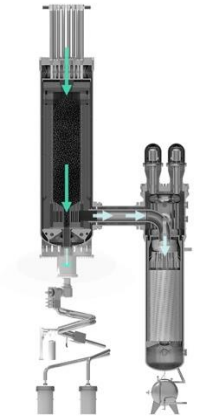
Consolidate all Research & Development into one location

- Coordinated technical expertise, assets, and a global support network

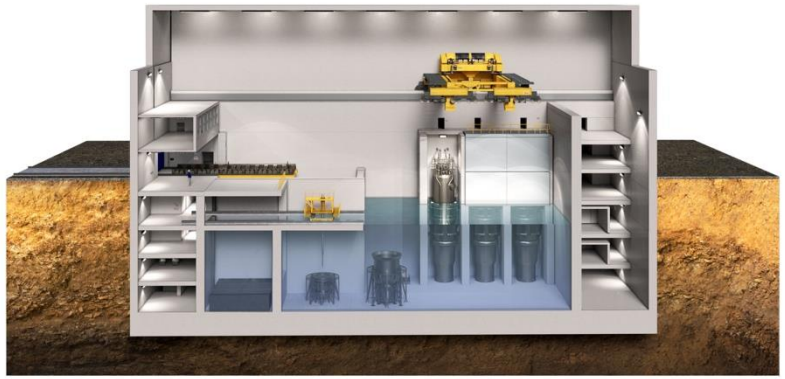
Location will follow the HBURC and move to the Federal CISF

Considering Waste Management for Advanced Reactors

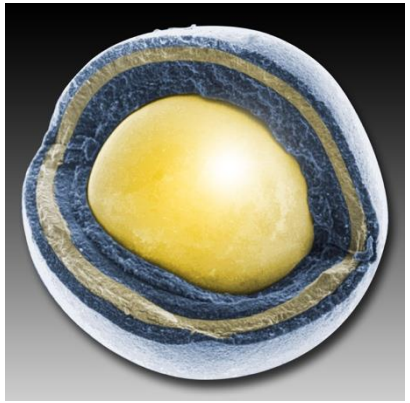
Natrium Small Modular Reactor (SMR) - TerraPower



Xenergy SMR



NuScale SMR facility



Tri-Structural Isotropic Fuel (TRISO) nuclear fuel pellet.

- DOE is required to sign an amended standard contract with reactor operators that provides confidence the SNF can be disposed in a deep geologic repository
- Working to mitigate risk to deployment of advanced reactors
- DOE's integrated project team conducted technical assessment of storage, transportation, and disposal
- Interested in discussing molten salt reactor disposal concerns

Generic Repository Program

- Consider all options for the program in line with the Nuclear Waste Policy Act
- Program needs to rebalance to conduct engineering evaluations as well as research & development (R&D)
- Continue to support international R&D related to generic repository studies for shale and granite
- Support the development of the generic repository standard with U.S. Environmental Protection Agency (EPA)

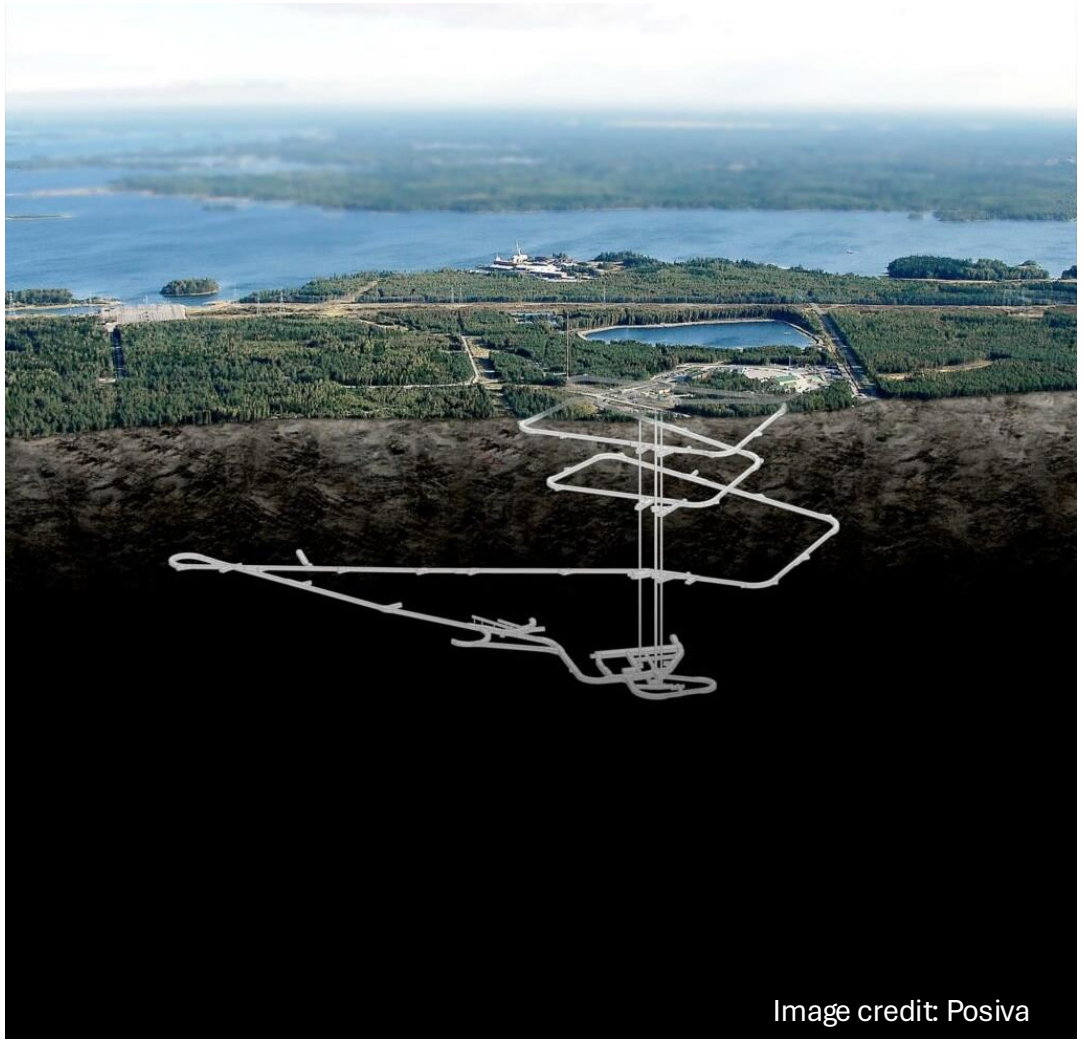


Image credit: Posiva


Q&A

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