DOE Spent Nuclear Fuel Storage & Transportation Program

Dr. Erica Bickford

Director, Office of Storage & Transportation

RadWaste Summit

June 10, 2025





Spent Fuel and High-Level Waste Disposition

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 CISF to begin operations in 2038
- Exploring options to build facility sooner

Department of Energy Moves Forward with Consolidated Interim Storage Facility Project for Spent Nuclear Fuel





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.





DOE Federal CISF Design Overview





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 spent nuclear fuel (SNF) and high-level radioactive waste (HLW) by rail
- First shipment of SNF planned for 2027

New Railcar Designed to Transport Spent Nuclear Fuel Cleared for Operation





High Burnup Research Cask Project

- High Burnup Research Cask (HBURC) is an R&D project started in 2014 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





Preparing to Transport the HBURC



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.



DOE's Atlas railcar, designed and tested to transport spent nuclear fuel.



Potential HBURC Shipment Rail Routes





Coordination with Tribal, State, and Federal Partners





Collaboration with Naval Reactors



TYPICAL NAVAL SPENT FUEL SHIPPING ROUTES

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 CISF design and transport operations



Considering Waste Management for Advanced Reactors



Natrium Small Modular Reactor (SMR) - TerraPower





NuScale SMR facility



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

Xenergy SMR

- DOE is expected to sign amended standard contracts 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 ulletconducted technical assessment of storage, transportation, and disposal
- Interested in discussing molten salt reactor disposal concerns



Spent Nuclear Fuel Center for Applied Research



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 EPRI, Germany, Belgium, United Kingdom, Switzerland, Spain, 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





National Transportation Stakeholders Forum Webinar Announcement

Wednesday, 18 June 2025

2:00pm CDT



The National Transportation Stakeholders Forum (NTSF) Planning Committee is pleased to present:

Ready to Move:

DOE Prepares to ship a rail-sized research cask of spent nuclear fuel

Wednesday, 18 June 2025

