

# High Burnup Research Cask Transport Updates

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U.S. DEPARTMENT  
of **ENERGY**

Office of  
Nuclear Energy

*Spent Fuel and High-Level Waste Disposition*

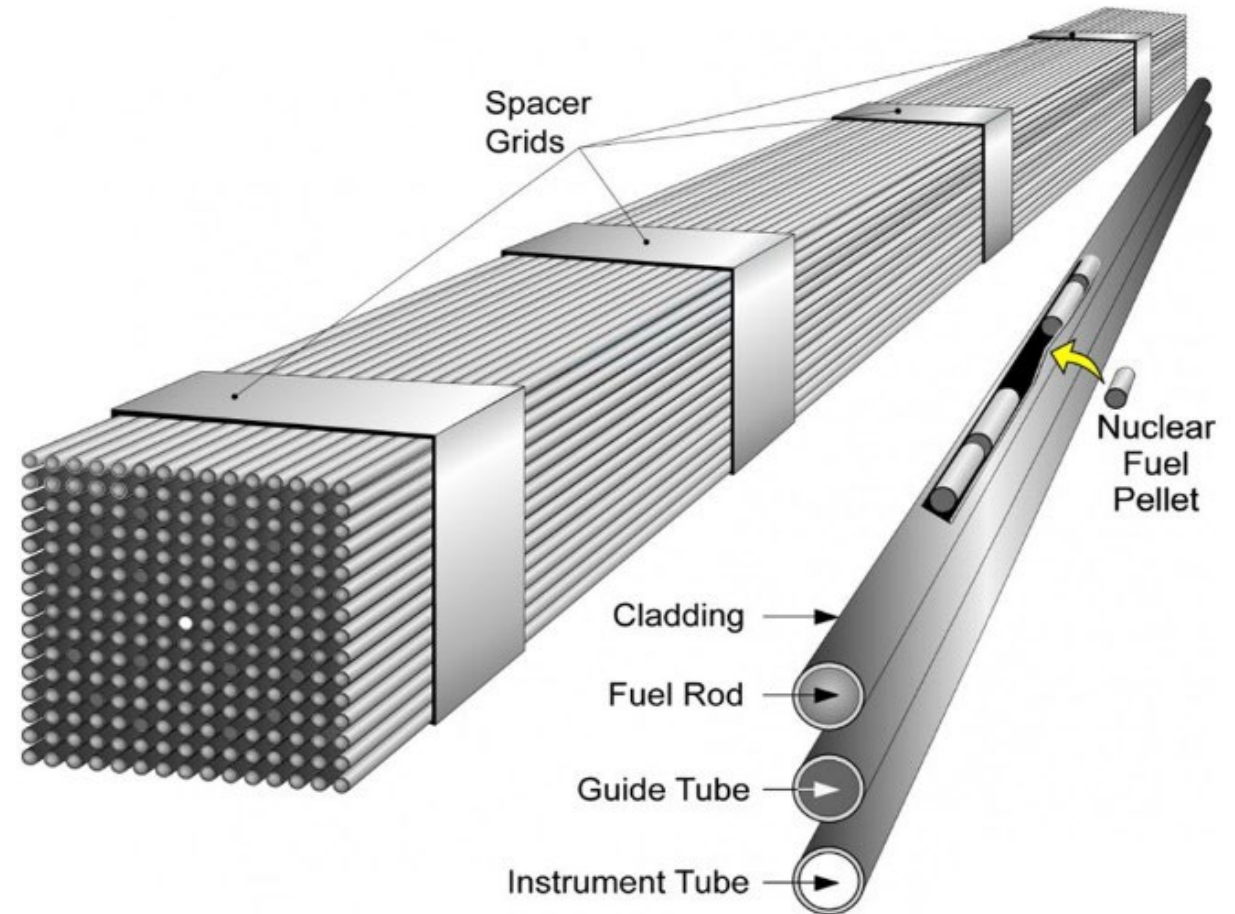
# What is DOE's High Burnup Research Cask (HBURC) Project?



- Research project started in 2013 as a collaboration between the US Department of Energy (DOE) and the Electric Power Research Institute (EPRI)
- High burnup spent nuclear fuel (SNF) stays in reactors longer to produce electricity
- Monitoring characteristics of high burnup SNF in a typical dry cask at the North Anna Power Station near Mineral, Virginia
- Project will provide data to support safe storage of SNF for DOE's future Federal consolidated storage facility(s), and for the majority of currently operating U.S. nuclear power plants

# Spent Nuclear Fuel Characteristics

- 32 pressurized water reactor high burnup SNF assemblies
- SNF assemblies in the cask have four different cladding types
  - Zircaloy-4, low-tin Zircaloy-4, Zirlo®, M5®
- At the time of shipment, the SNF will have been in dry storage, collecting data for about 10 years



# Cask Characteristics

- The cask is a TN-32B model cask licensed for storage and certified for transportation by the U.S. Nuclear Regulatory Commission (NRC).
- Made of steel and lead and provides containment and shielding to protect the public.
- Specialized lid allows temperature measurements with thermocouples.
- TN-32B and hardware for shipment (its “shipping weight”) is 361,855 pounds (181 tons).





# Transporting the High Burnup Research Cask

## Why?

- SNF will remain in dry storage systems in the U.S. for many decades before final disposal.
- DOE will continue to collect data on SNF inside the HBURC, including opening the cask to remove fuel rods for examination.
- Specialized science facilities are needed to open the cask and examine fuel rods; nuclear power plants do not have these specialized facilities. Idaho National Laboratory, the lead lab for DOE SNF research, does.



## Benefits?

- First commercial shipment of SNF in nearly 2 decades.
- Demonstrating ability to safely ship SNF
- Building public trust and confidence
- Demonstrating the safety and security of the new Atlas rail consist
- Providing valuable data needed for licensing activities for current and future storage of commercial SNF
- Opportunity to build capacity for future DOE shipments of SNF

# Announcement of Destination Site (April 2025)



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/ 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.*



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

# Transporting the High Burnup Research Cask

## How?

- The size and weight of the cask – more than 180 tons – means that freight rail is the best mode to transport the cask from Virginia to INL in Southeastern Idaho
- DOE has designed, tested, and obtained approval for specialty railcars (Atlas) for transporting SNF by rail
- Armed escorts will travel on the train in a rail escort vehicle (REV)

## When

- Spring 2027 – “Dry-run” rail shipments with an empty TN-32B cask from Virginia to INL and back to test procedures, conduct public outreach, and inform emergency responders (provide opportunities to view train consist)
- Fall 2027 – SNF shipment



DOE's Atlas railcar



Rail Escort Vehicle



# Major Shipment Preparation Activities for 2024 - 2027



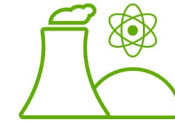
Logistics planning and equipment fabrication



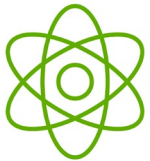
National Environmental Policy Act (NEPA) evaluation



Consultation and coordination (Tribal, State, Federal, local)



Site evaluations at origin and destination sites



Procedures and preparation for couriers



Dry run with empty cask



Emergency responder training



Outreach and engagement



# What's Next?

- Fabricate impact limiters, a transport cradle, and end stops
- Develop plans and environmental information to support the proposed shipment
  - Since the shipment of the HBURC and the subsequent research at INL are federal actions, analysis of the impacts of these actions is required under the National Environmental Policy Act
  - A detailed transportation plan will cover topics such as analysis for expected modes of transportation, handling operations, regulatory expectations for compliance, radiation protection, emergency response, and communications.

# What's Next?



Photo credit: Keith Waldrop

- Coordinate with other federal agencies
- Contract for transportation services - rail carriers determine rail transport route
  - Maintain engagement with security staff at the origin and destination sites and coordinate with local law enforcement agencies in the vicinities of the origin and destination sites and along the transportation route in preparation for the shipment
- Prior to the actual shipment, a dry run will be conducted
  - This operation will involve loading an empty TN-32B onto the Atlas railcar, transporting it to the destination site, and practicing the unloading operations at the destination site

# What's Next?

- Coordinate technical assistance, public information, and training needs with State and Tribal jurisdictions along the transport route
- Work with EPRI and Dominion Energy to coordinate cask loading and shipment logistics at the North Anna origin site
- Continually engage with Tribal and State partners through existing cooperative agreements and DOE's National Transportation Stakeholders Forum (NTSF)



Picture Credit: Jeff Galan, NNSA



# What's Next?



- Plan and release outreach and informational events in advance of the shipment
  - Engagement efforts may include conversations with stakeholders in Tribes and States along the route and facilitated discussions on the safety and security of SNF transport.
  - Once the dry run is complete, the Atlas railcar and ancillary equipment for the HBURC will need to return to North Anna.

# *We want your input!*

- DOE Order 460.2B requires:
  - “as appropriate, Departmental elements must consider input from States and Tribes on holidays or special events that may impact shipping schedules or where emergency response assets may be otherwise engaged”
- We will be requesting this input this winter via the NTSF HBURC Shipment ad hoc working group

## **Likely Rail Route for the U.S. Department of Energy’s High Burnup Research Cask Spent Nuclear Fuel Shipment**



# Learn More about the HBURC Shipment Project



Visit our webpage at:

<https://curie.pnnl.gov/HBURC-Transport>

- Background information
- Updates on the project
- Contact information
- Sign-up [link](#) for email updates



# Questions?

## You can contact our team leads at:



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