High Burnup Research Cask Shipment Updates

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National Transportation Stakeholders Forum

Las Vegas, Nevada

May 20-21, 2025

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

Spent Fuel and High-Level Waste Disposition

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What is DOE's High Burnup Research Cask Project?

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

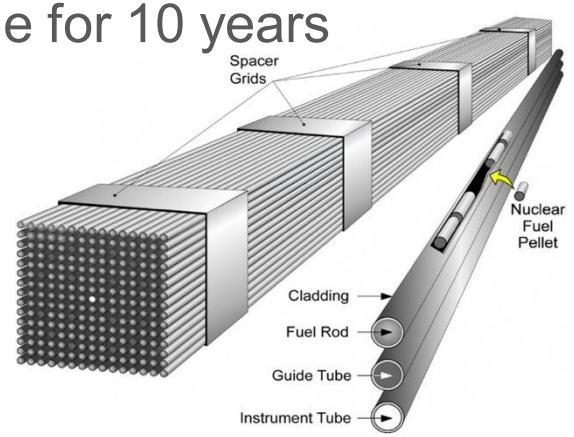
Cask and Spent Nuclear Fuel Contents

Cask

- TN-32B is a cask certified by the U.S. Nuclear Regulatory Commission (NRC) for storage and transportation of SNF
- It is made of steel and lead and provides containment and shielding to protect the public.
- TN-32B and hardware for shipment (its “shipping weight”) is 361,855 pounds.

Spent Nuclear Fuel

- (32) pressurized water reactor high burnup SNF assemblies
- SNF assemblies 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 for 10 years



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 high burnup research cask (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. DOE's national laboratories do.
- State of Idaho and DOE announced a targeted waiver decision on April 29, 2025 that allows the HBURC to be received and studied at Idaho National Laboratory (INL).

Benefits?

- Building public trust and confidence
- Demonstrating ability to safely ship SNF
- Providing valuable data needed for future licensing activities for storage of commercial SNF
- Demonstrating the safety and security of the new Atlas rail consist
- Opportunity to build capacity for future DOE shipments to a Federal CISF or repository, when available

Transporting the High Burnup Research Cask

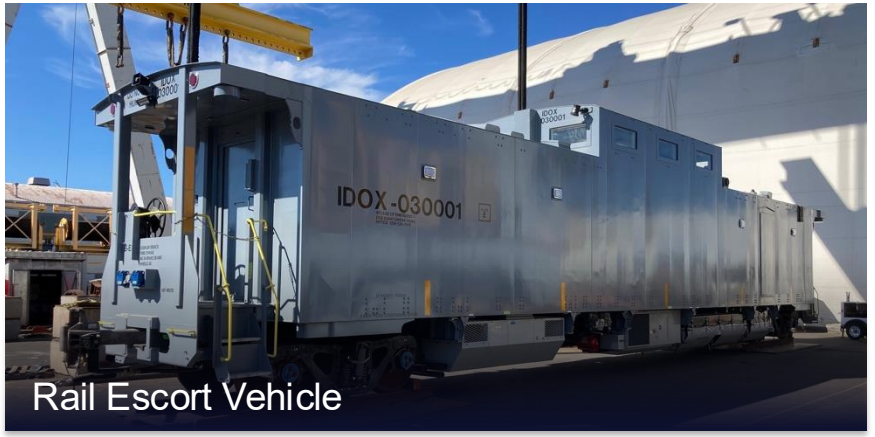
How?

- 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, the destination site
- DOE has designed, tested, and obtained approval for specialty railcars for transporting SNF by rail
- Armed escorts travel on the train in a rail escort vehicle

DOE's Atlas railcar

When?

- 2026 – 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



Rail Escort Vehicle

What's Next?

- Fabricate impact limiters, a transport cradle, and end stops
- Develop plans and environmental information to support the proposed shipment
  - Because 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?

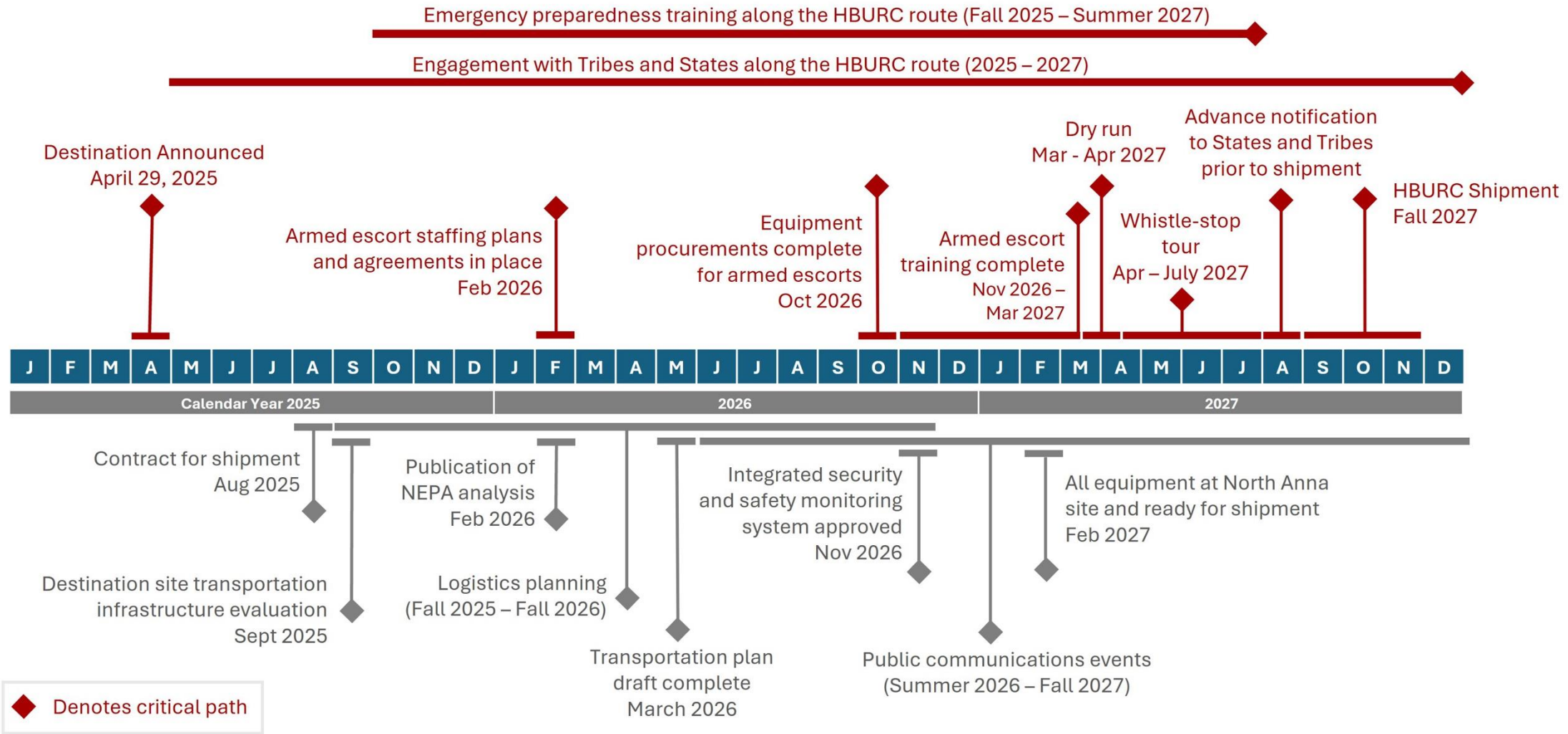
- Coordinate technical assistance, public information, and training needs with State and Tribal jurisdictions along the transport route
- Work with EPRI and Dominion Energy to coordinate cask loading and shipment logistics at the North Anna origin site
- Continually engage with Tribal and State partners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

Picture Credit: Jeff Galan, NNSA

What's Next?

- Plan and release public outreach and informational events in advance of the shipment
  - Public engagement efforts may range from conversations with stakeholders in Tribes and States along the route to a potential cross-country mobile exhibit 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. This return trip may provide an opportunity for public engagements in which stakeholders, emergency responders, and members of the public would be invited to come see the train.

Planned Schedule: HBURC Shipment Timeline



Map of Potential Rail Routes

Time for Questions and Discussion