High Burnup Research Cask Shipment Planning: Project Risk Evaluation

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tents

- verview of U.S. Department of Energy (DOE) gh Burnup Research Cask (HBURC) Project
  - Project Background
  - Transporting the Cask
  - Project Schedule
- oject Risk Register, with focus on risks to -time completion of shipment
  - dentifying risks
  - Evaluating risks

Photo courtesy of Dominion Energy

at is DOE's High Burnup Research Cask (HBURC) ject?

"used nuclear fuel" is intended to be synonymous with the term "spent nuclear fuel" as defined in the Nuclear Waste Policy Act of 1982, as amended, and the Standard Contract posal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR Part 961).

- Research project started in 2013 as a collaboration between DOE and the E Power Research Institute (EPRI)
- High burnup used nuclear fuel (UNF)[1] in reactors longer to produce electricit
- Monitoring characteristics of high burn UNF in one dry cask at the North Anna Power Station near Mineral, Virginia
- Project will provide data to support saf storage of UNF for DOE's future Fede staging facilities (FSFs) for UNF, and f majority of currently operating U.S. nu power plants

k Characteristics

e cask is a TN-32B model cask certified the U.S. Nuclear Regulatory Commission RC) for storage and transportation of UNF.

de of steel and provides containment and elding to protect the public.

ecialized lid allows temperature asurements with thermocouples.

-32B and hardware for shipment (its ipping weight") is 361,855 pounds 1 tons).

nsporting the HBURC

?

e size and weight of the cask – more than 180 tons – means t freight rail is the best mode to transport the cask from ginia to INL

E has designed, tested, and obtained approval for specialty cars (Atlas) for transporting UNF by rail

ned escorts will travel on the train in a rail escort vehicle EV)

DOE's Atlas railcar

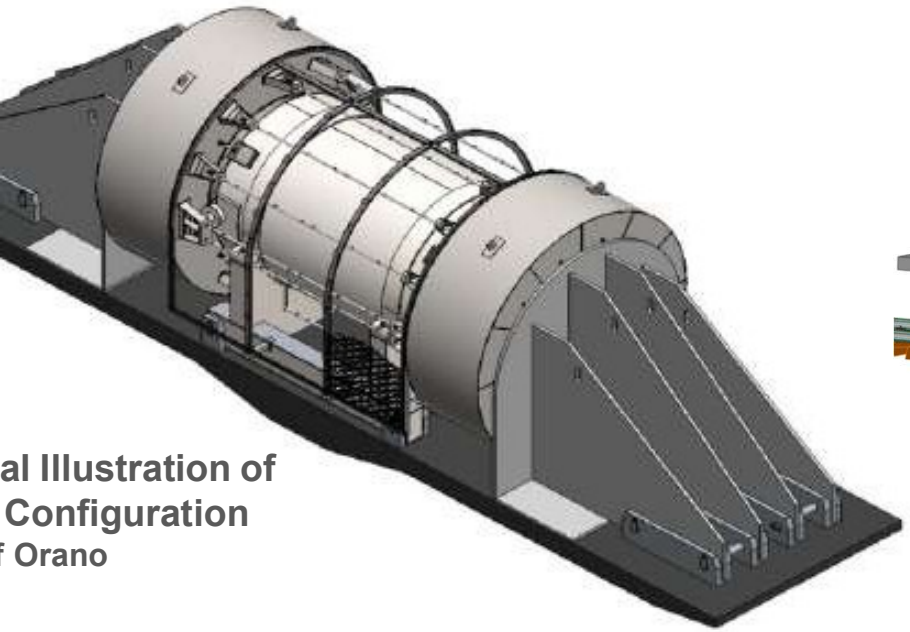
n?

ing 2027 – "Dry-run" rail shipments with an empty TN- cask from Virginia to INL and back to test procedures inform emergency responders (provide opportunities to w train consist)

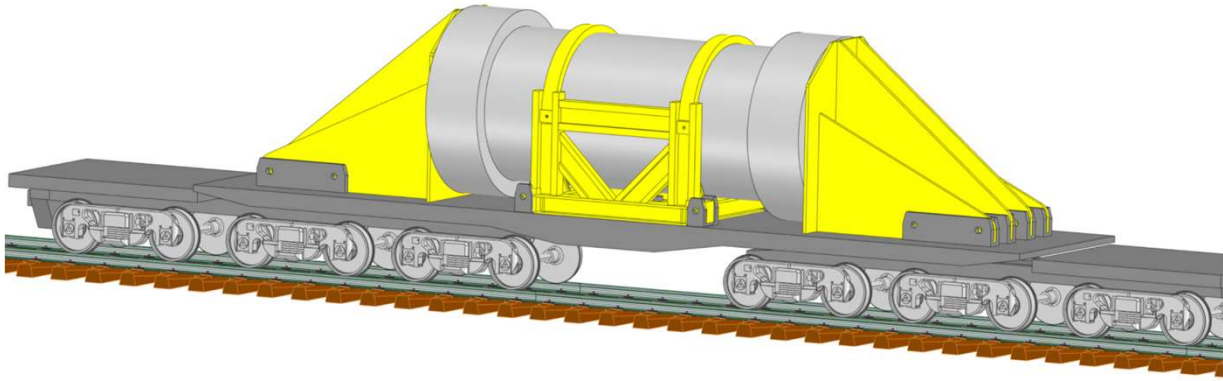
2027 – UNF shipment

Rail Escort Vehicle

pment Basics: What Will the Train Look Like?



al Illustration of
Configuration
f Orano



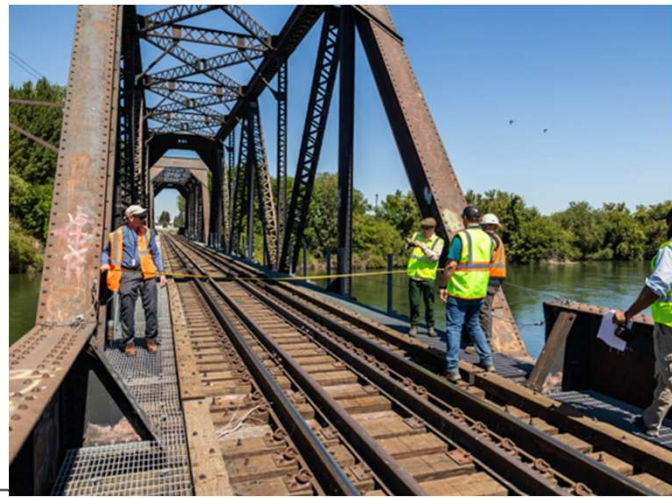
Conceptual Illustration of a Cask on Atlas Railcar

otives Buffer Car Atlas Railcar Buffer Car Rail Escort V

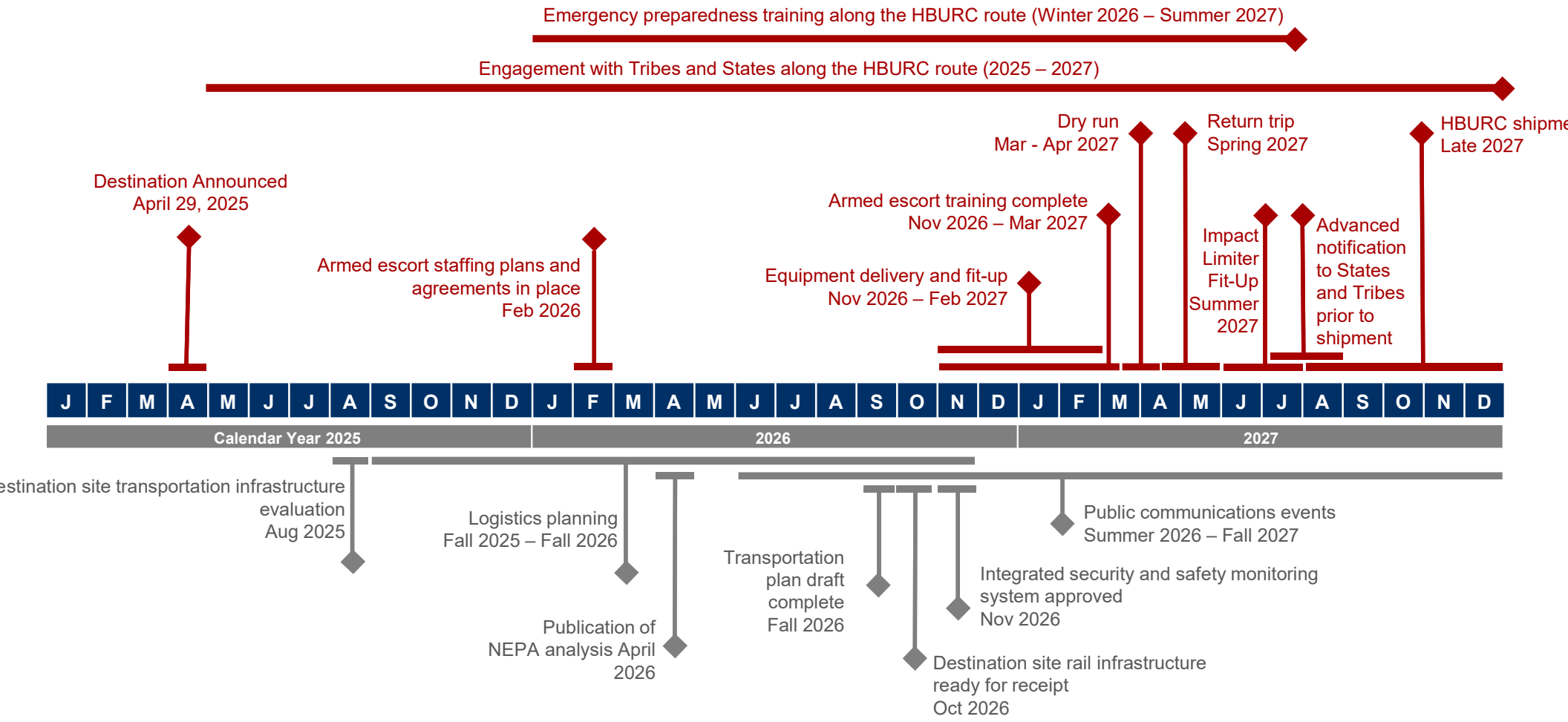
Conceptual Illustration of Atlas Rail Consist

URC Shipment Accomplishments

- ducted infrastructure assessments at Origin: North Anna and tination: Idaho National Laboratory (INL)
- Rail infrastructure at both sites
- Held local leaders' meetings at both sites
- Met with Shoshone-Bannock Fort Hall Business Council
- od-up DOE/contractor teams to plan origin site loading preparations, ment operations, destination site receipt
- E identified a one-time armed escort option for the shipment.
- king with FBI and DOE-NNSA on CURRIE security-focused training etop in September 2026
- od-up Tribal, State, and Federal ad hoc working group
- E-EM supporting the HBURC shipment by making Transportation ergency Preparedness Program (TEPP) training available along the y route
- mpleted the NEPA Supplement Analysis



URC Shipment Schedule



◆ Denotes critical path

...oment of the HBURC requires coordination across ...y activities and project teams

...Site Planning

...astructure evaluation, refurbishment, gas sampling

...ation Site Planning

...astructure evaluation, refurbishment, availability, receipt operations

...ent Planning

...e shipment, dry run, engagement with elected officials and first responders, ...ipment shipments

...istics, coordination with rail carriers

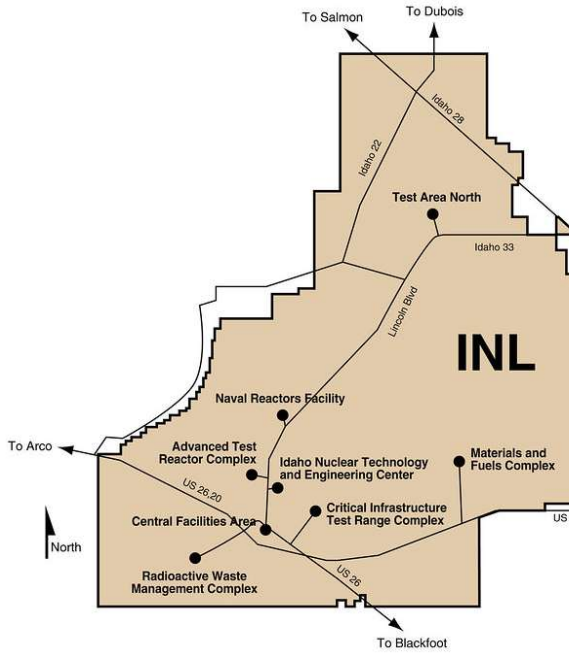
...ding at North Anna; unloading at INTEC

...ency Preparedness

...nsportation Emergency Preparedness Program (TEPP) training for Tribes and States ...g route

...State, and Federal Engagement

...te Regional Groups (SRGs), Tribal Radioactive Materials Transportation Committee ...MTC), National Transportation Stakeholders Forum (NTSF), ad hoc working group, ...tiple federal agencies



...oment of the HBURC requires coordination across many ...vities and project teams

- Shipment Scheduling
  - 240-day notice to Governor of Idaho, scheduling opera... at power plants and receipt site, weather
- Armed Escort Program
  - Confirming legal authority, finalizing procedures
  - Identifying and training personnel
- National Environmental Policy Act compliance
  - Supplement Analysis
- Equipment
  - HBURC, Atlas rail consist, spare TN-32B cask, cradles, impact limiters, end stops, personnel barrier, mock imp... limiters, additional cradles and ancillary equipment, cra... heavy haul equipment, thermocouples and gas samplin... equipment
  - Equipment fit-up operations

he start of planning, a project risk register was eloped

st step of planning project: develop plans

cond step: consider project risks, with focus on schedule and budget impac

- Develop plans to prevent hypothetical undesired events
- Develop plans for mitigating effects of hypothetical undesired events

e risk register documents the risks identified by the team and attempts to ra quantify them based on likelihood of occurring and consequence to schedu dget

- A team was first convened in the summer of 2024 to identify risks
- Periodic updates to the project risk register have taken place since
- DOE leads are engaged in report outs and mitigation strategy development

bling assumptions

me risks, if realized, would make it impossible to complete the shipment on
ne

rreparable damage to impact limiters or Atlas railcar prior to shipment; unavailability of pla
or receipt facility, for example

These risks are unlikely and outside of the control of planning team

- DOE is aware of these risks and has taken steps to prevent them from being realized – for examp
  real impact limiters will not be sent on the Dry-Run Shipment
- Therefore, the team assumes they will not take place

likely “what-if” scenarios are, in essence, out of scope

Focus is on risks of at least somewhat quantifiable probability that can be planned for

ny risks were identified, most were not severe

- e majority of risks identified by the team were considered negligible
- me risks have been removed from the project risk register
  - Once the destination site was confirmed in April 2025, risks related to not knowing the destination site were taken off the risk register
  - Now that the Supplement Analysis has been published, risks related to NEPA requirements being removed from the risk register
- am continuously updates the risk register and distributes it internally at peri ervals
  - The risk register is not intended to be a public-facing document

rn 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

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