Idaho National Laboratory SNF Management: Activities and Plan, Part I

Nicholas Balsmeier – Acting Deputy Manager, Idaho Cleanup Project

Steven Wahnschaffe – Spent Nuclear Fuel Program Manager, INTEC

August 29, 2024

Overview of Idaho Spent Fuel

- The Idaho Site consists of three entities that store spent nuclear fuel
  - Department of Energy, Office of Environmental Management
  - Department of Energy, Office of Nuclear Energy
  - Naval Nuclear Propulsion Program

Naval Reactors Facility

Idaho Nuclear Technology & Engineering Center

Materials and Fuels Complex

INL site SNF Owners and Fuel Types

Organization of the DOE SNF Inventory by Physical Category and MHTM (est. 2055)

	1 Normal	2 Sodium-bonded	3 Epoxied	4 Rubble	5 Intact Commercial	6 Non-Intact Commercial	Other	Total
MTHM	159.2	54.9	0.4	4.2	44.1	23.9	0.7	287.4

Category	Primary SNF types
1	ATR, FSV, Shippingport, Peach Bottom, TRIGA
2	Fermi blanket material, EBR-II driver
3	MTR canal scrap
4	Pieces, scrap, and other damaged parts
5	Big Rock, Turkey Point
6	Turkey Point and Surry disassembled fuels

MTHM = metric tons heavy metal
ATR = Advanced Test Reactor
FSV = Fort Saint Vrain
EBR = Experimental Breeder Reactor
MTR = Materials Test Reactor

Left- ATR, Middle-FSV, Right-TRIGA

Note: Inventory does not include 41 MT of Naval Nuclear Propulsion Program SNF currently stored at the Idaho Site or future Naval Nuclear Propulsion Program SNF receipts which have a known RRDS path.

Number of DOESC to Package DOE SNF

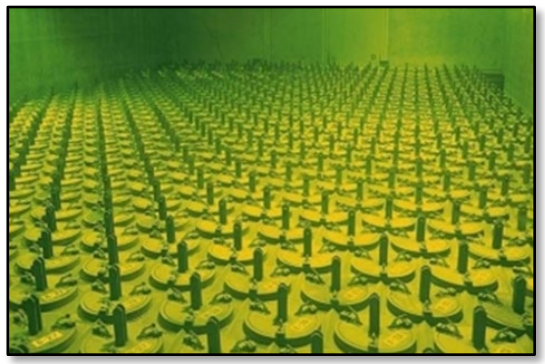
DOESC	1 Normal	2 Sodium-bonded	3 Epoxied	4 Rubble	5 Intact Commercial	6 Not Intact Commercial	Other	Total
18x10	550	144	13	29	44	13	6	799
18x15	1026	0	2	37	82	29	0	1176
24x10	0	0	0	0	0	0	0	0
24x15	27	0	0	0	0	0	0	27
Total	1387	124	15	66	124	42	6	2002

EM Idaho Managed SNF Facilities

- CPP-603 (SNF handling and dry-storage in hot cell-type facility)
- CPP-2707 (outside dry storage of shielded casks on pad)
- CPP-749 (underground dry storage)
- CPP-666 (wet and dry storage)
  - All fuel removed from CPP-666 in 2023 and transferred to dry storage
- Fort St. Vrain, Colorado (above ground dry storage)
- CPP-1774 – (dry storage of TMI-2 core debris in NUHOMS-based ISFSI)

Fort Saint Vrain-Independent Spent Fuel Storage Facility

CPP-2707 Cask Pad



CPP-603 dry storage array

CPP-749 Underground Dry Storage

TMI-2 Independent Spent Fuel Storage Facility

DOE-NE Materials and Fuels Complex

- MFC-771 Radioactive Scrap and Waste Facility (RSWF) - underground dry storage
- MFC-785 Hot Fuel Examination Facility (HFEF)- temporary staging in hot cell-type facility for research purposes
- MFC-765 Fuel Conditioning Facility (FCF) Pyroprocessing of sodium bonded SNF

Radioactive Scrap and Waste Facility

Hot Fuel Examination Facility

Fuel Conditioning Facility

Naval Nuclear Propulsion Program
Naval Reactors Facility

- Expended Core Facility – Wet processing and examination of Naval SNF
- Spent Fuel Packaging Facility – Canister loading, drying, and closure welding for road ready dry storage
- Overpack Storage Building – Fabrication of concrete overpacks and dry storage of Naval SNF canisters in shielded overpacks
- Cask Shipping and Receiving Facility – Future loading of Naval SNF canisters into a cask for transport to a geologic repository or interim storage site

Note – The Naval Nuclear Propulsion Program has packaged approximately 33 MTHM of Naval SNF into road-ready dry storage at the Naval Reactors Facility

DOE SNF Staging Facility Project

Idaho Integrated Spent Fuel Management Plan

- Serves as initial assessment of the framework/roadmap for spent nuclear fuel (SNF) management at the Idaho National Laboratory (INL) Site
- Cohesive strategy to establish a road-ready, dry storage packaging configuration capability
- Integrates expertise of federal and contractor personnel from three distinct SNF programs at the INL site
- Optimizes effective use of existing resources and facilities
- Reflects technical and regulatory considerations to be addressed
- Outlines recommended path forward actions for implementation

Assumptions, Constraints and Bounding Conditions

- Geologic repository not anticipated to be available for multiple decades
- Road Ready Packaging strategy is being established
- SNF can be packaged in DOESCs and over-canisters using a variety of basket designs
- DOE SNF shipments (to repository) are assumed to not begin until around 2055
- Revision to DOE Order 435.1 allow DOE to manage approximately 53 MTHM as non-SNF
- A small percentage of the Idaho SNF inventory will require conditioning (i.e., beyond drying)
- TMI-2 SNF is safely stored in the NUHOMS®-based ISFSI and will not require repackaging

DOESC = DOE Standard Canister
TMI-2 = Three Mile Island Unit 2
ISFSI = Independent Spent Fuel Storage Facility

Proposed Path Forward

- Identify potential funding needs and sources
- Identify facility and infrastructure upgrades/modifications needed to support the SNF packaging demonstration effort (ongoing)
- Further assess integration opportunities among the three programs
- Define “road ready” (ongoing)
- Develop proposed regulatory compliance framework (ongoing)
- Create disposition strategies for non-SNF material
- Evaluate staging facility to progress toward CD-1 for DOE owned fuel (ongoing, anticipate CD-1 by end of FY24)

Ongoing SNF Management Activities

- Routine maintenance, surveillance and management of SNF facilities at INTEC and FSV in Colorado
- Continue ATR receipts and Peach Bottom transfers
- Naval Nuclear Propulsion Program continues to package and store Naval SNF in RRDS at Naval Reactors Facility awaiting a National repository.
- DOE-EM and-NE are collaborating on a road ready demonstration project (RRDP) to demonstrate the ability to begin packaging DOE SNF in a RRDS configuration
- Facility upgrades to CPP-603 to support RRDP and future SNF Packaging Operations
- EM has approved a capital project to construct a SNF staging facility to store road ready SNF following completion of the demonstration project. This project is currently at CD-0

Road-Ready Dry Storage Packaging Capability

- Incremental resources will be needed to support DOE fuel packaging
  - Purchase of DOE Standard Canisters, cask and canister overpack handling equipment
  - CPP-603 Dry Storage Facility upgrades
  - FSV fuel stored in CPP-603 will be the first fuel packaged for the Road Ready Demonstration Project
    - Following RRDP, FSV Fuel can provide approximately 10 years of packaging operation
- Collaboration within integrated project group on approaches/ strategies
  - Fuel loading, fuel baskets, and equipment
  - Remote welding development for canisters
  - Fuel conditioning to support interim storage

Questions?