U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Presentation to the NWTRB: Management of Spent Nuclear Fuel at the Idaho National Laboratory – Office of Environmental Management

Barbara Beller
Federal Project Director
August 6, 2014

Regulatory Drivers

Compliance

- Spent fuel is regulated under two distinct systems
  - Department of Energy- applicable federal laws e.g. (10 CFR 835) and DOE Orders
  - Nuclear Regulatory Commission – applicable laws e.g. (10 CFR Part 72)
    - Some DOE requirements apply to NRC regulated facilities such as 10 CFR 851
- Idaho Nuclear Technology Center, Fuel Storage Area, CPP-666 operates in compliance with a State of Idaho Air Permit (includes NESHAPS)

U.S. DEPARTMENT OF ENERGY
Environmental Management

Key State Drivers

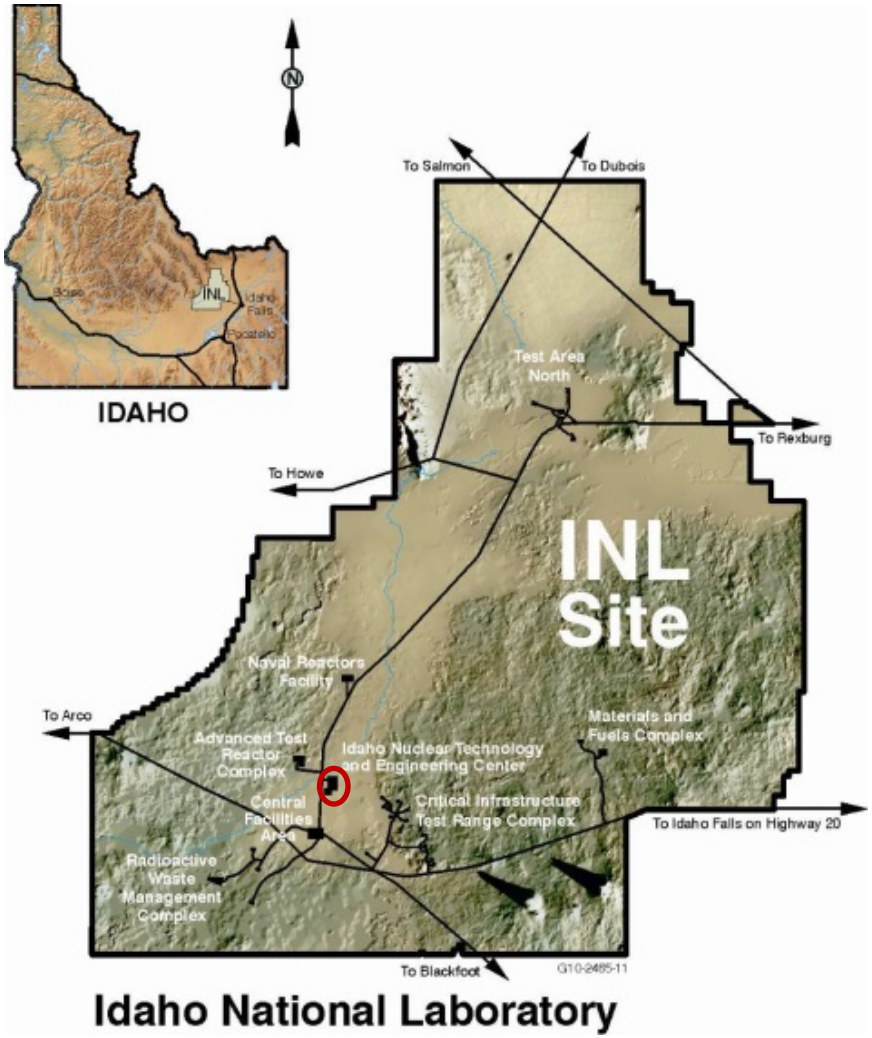
- 1995 Programmatic Spent Nuclear Fuel Management and INEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (DOE/EIS-0203) and RODs
- **1995 Settlement Agreement**
  - E.8., "DOE shall complete the transfer all spent fuel from wet storage facilities at INEL by December 31, 2023."
  - C.1., "DOE shall remove all spent fuel including naval spent fuel and Three Mile Island spent fuel from Idaho by January 1, 2035."
- Protection of the Snake River Plain Aquifer, designated a sole source aquifer.
- Agreement to remove all Fort Saint Vrain (FSV) fuel from the State of Colorado by 1/1/2035.
  - Idaho Settlement Agreement does not allow transfer of Fort Saint Vrain fuel to Idaho unless a repository or interim storage facility is opened outside of Idaho and has accepted spent nuclear fuel from the Idaho national Laboratory.

U.S. DEPARTMENT OF ENERGY
Environmental Management

Spent Fuel Facilities

SNF is stored in 6 configurations:

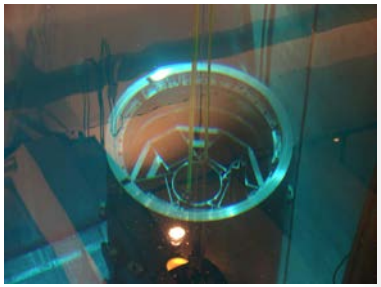
- CPP-2707 –Cask Storage Pad
- CPP-749 – Outdoor Fuel Storage Facility
- CPP-603 –Irradiated Fuel Storage Facility
- CPP-666 –Fuel Storage Area (Basin)
- CPP-1774 –TMI-2 Independent Spent fuel Storage Installation (NRC licensed)
- Ft. St. Vrain, Independent Spent fuel Storage Installation (NRC licensed), Colorado


IDAHO
Boise
INL
Idaho Falls
Pocatello
N
To Salmon
To Dubois
Test Area North
To Rexburg
To Howe
INL Site
Naval Reactors Facility
To Arco
Advanced Test Reactor Complex
Idaho Nuclear Technology and Engineering Center
Materials and Fuels Complex
Central Facilities Area
Critical Infrastructure Test Range Complex
To Idaho Falls on Highway 20
Radioactive Waste Management Complex
To Blackfoot
G10-2485-11
Idaho National Laboratory

U.S. DEPARTMENT OF ENERGY
Environmental Management

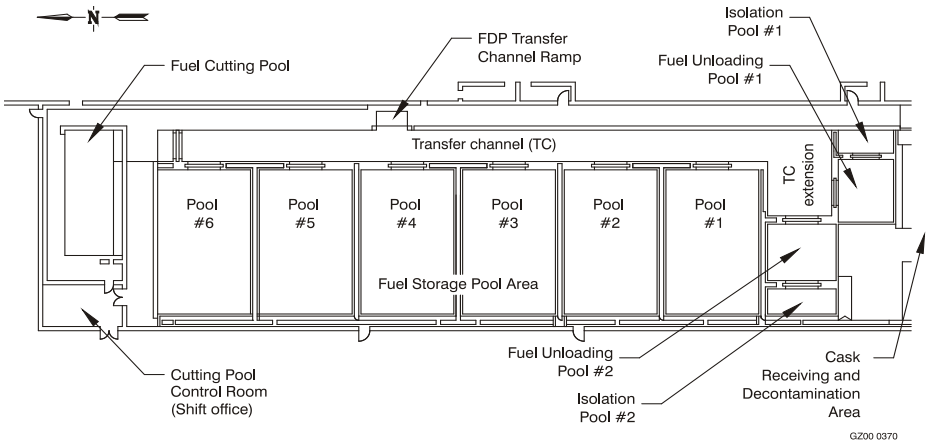
CPP-666 Fuel Storage Area (FSA)

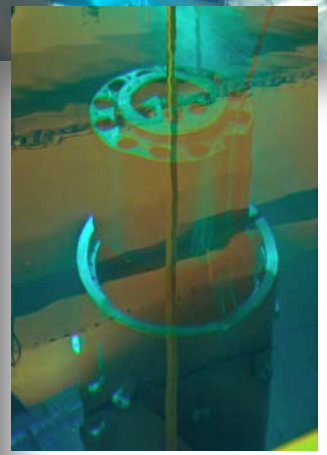
- First fuel received 1984
- Fuel storage to support processing through 1992
- Fuel storage mission since 1992
- Current Inventory, based on storage positions
  - 30% filled, 70% empty positions
  - Of the positions filled, Navy 60%, ATR 10%, EBR-II 30%
  - 2 spent fuel casks store 208 cans of miscellaneous fuel



Loading a basket in a dry storage cask

South





Loading a basket in a dry storage cask

U.S. DEPARTMENT OF ENERGY
Environmental Management

CPP-666 Scope

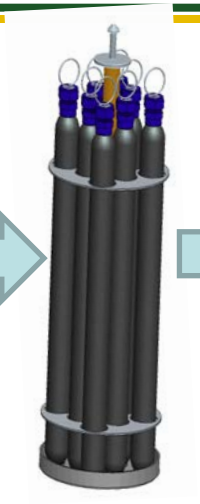
- **Routine Surveillance & Maintenance**
- **Experimental Breeder Reactor (EBR II) wet to dry storage**
  - 217 shipments remaining
  - Settlement Agreement Milestone 2/31/2023.
- **Advanced Test Reactor (ATR) Fuel Receipt**
  - Receive and unload 15 shipments of ATR fuel each year through 2020.
    - 8 elements per shipment for interim storage
- Return fuel to Naval Reactors Facility for dry storage. Tool design and fabrication, cask receipt, fuel preparation and cask loading.

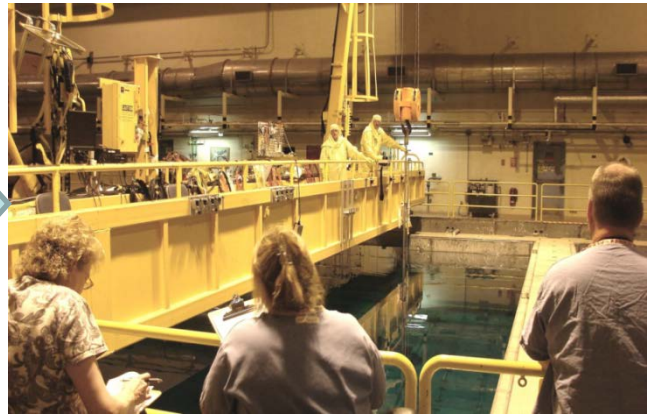
U.S. DEPARTMENT OF ENERGY

Environmental Management

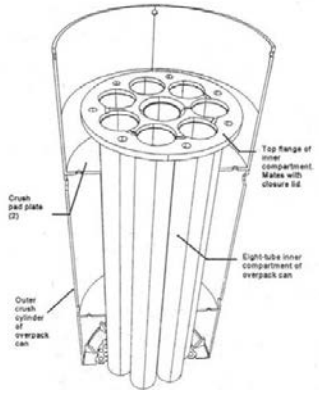
CPP-666 EBR II Transfer Process Wet Storage to MFC for Processing

EBR II Fuel packaged in stainless steel bottles at MFC and sent to INTEC in 1997 and 1988, stored 8 bottles per basket

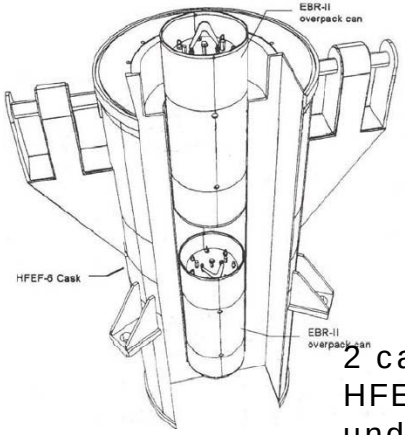




8 bottles removed from basket and loaded in shipping can (underwater @ 30')



2 cans loaded in HFEF 6 cask, underwater



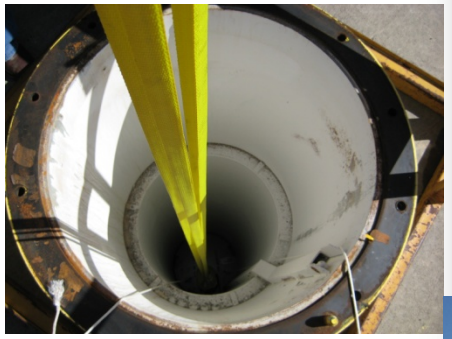
16 bottles per shipment INTEC to MFC

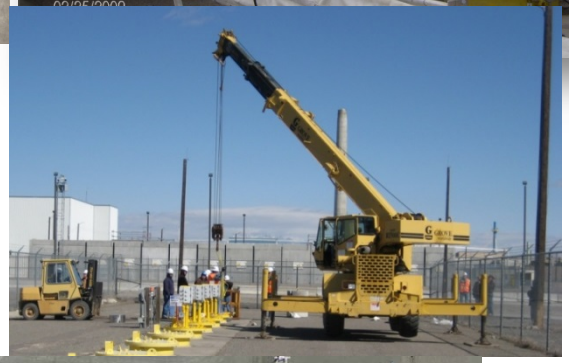
U.S. DEPARTMENT OF ENERGY

Environmental Management

Background CPP-749 Outdoor Fuel Storage Facility

- Storage vaults, variety of diameters
  - First Generation Vaults
    - Commissioned 1970
    - 54 of 61 vaults loaded (88%)
  - Second Generation
    - Commissioned 1984
    - 74 of 157 vaults loaded (45%)
- 5 fuel types stored
- Routine surveillance & maintenance





U.S. DEPARTMENT OF ENERGY
Environmental Management

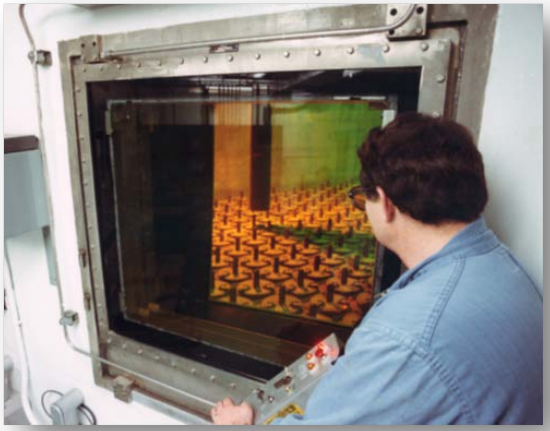
CPP-2707 Dry Cask Storage

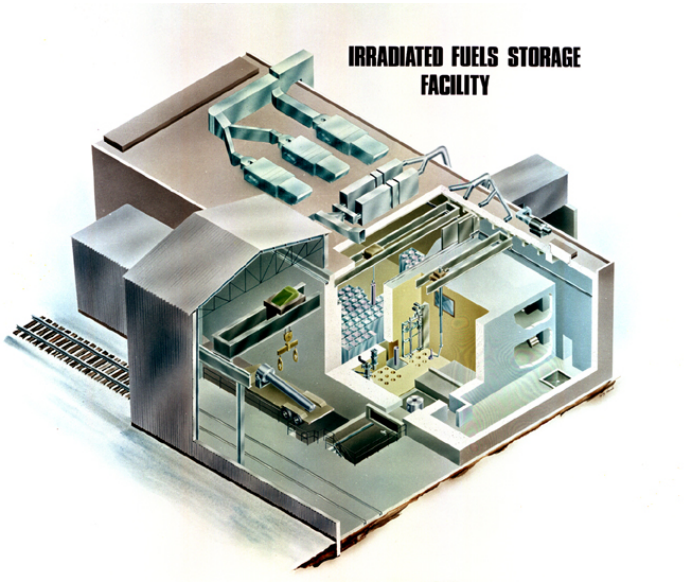
- Pad commissioned Oct. 2004
- Experiments conducted for Electric Power Research Institute to support NRC technical basis for dry storage license period. (10 CFR part 72)
- 10 types of “commercial” fuel SNF
- Bolted lid cask
- West Valley rail cars

U.S. DEPARTMENT OF ENERGY
Environmental Management

CPP-603, Irradiated Fuel Storage Facility

- Commissioned 1974
  - Initially for Fort St Vrain graphite fuel
  - Shielded dry storage area
  - Shielded Cave for maintenance
  - Conditioning Station to dry fuel (repairs required)





- Current Inventory
  - 91% capacity
  - ~ 20 types of SNF/ fissile material
  - Opportunity for optimization of storage array through analysis, fuel consolidation and investment in equipment modification

73-3459

U.S. DEPARTMENT OF ENERGY
Environmental Management

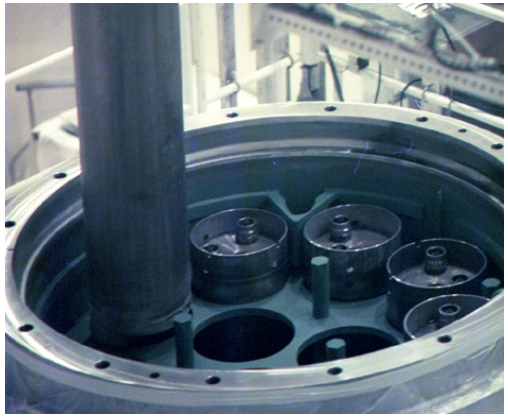
Elements of Scope CPP-603

- Routine surveillance and maintenance
- Domestic Research Reactor/Foreign RR (DRR/FRR) Receipts
- May require facility upgrades to support fuel transfer out of state. Planned retrieval beginning in 2025 (assuming 100% fuel repackaging is required) to meet the 1/1/2035 settlement agreement milestone, all SNF out of Idaho.
- Although not in the current Environmental Liability Baseline, the 1995 DOE NEPA Record of Decision documents a fuel exchange with Savanna River Site (SRS). Aluminum clad fuel compatible with H-canyon process from Idaho for SRS fuel that cannot be processed.

U.S. DEPARTMENT OF ENERGY
Environmental Management

Three Mile Island Unit 2 (TMI-2)

- NRC License SNM-2508 for the Independent Spent Fuel Storage Installation (ISFSI) was issued March 19, 1999
- Current Inventory
  - 29 of 30 concrete Horizontal Storage Modules loaded
  - Carbon steel Dry Shielded Canisters
  - 342 TMI-2 fuel, filter and knock-out canisters
- Transportation cask was leased.



U.S. DEPARTMENT OF ENERGY
Environmental Management

Fort Saint Vrain NRC

- NRC licensed Fort St. Vrain Independent Spent Fuel Storage Installation (ISFSI) is located in Platteville, CO
- License SNM-2504
- Constructed in 1989 by public Services of Colorado
- Licensed in 1991
- License transferred to DOE in 1999
- 20-year license renewal granted through 2031
- Stores graphite high temperature gas cooled reactor elements in 244 fuel storage canisters.

14

U.S. DEPARTMENT OF ENERGY
Environmental Management

Elements of Scope NRC Licensed Facilities

- **Maintain compliance with 3 NRC licenses granted under 10 CFR Part 72 for Independent Spent Fuel Storage Installations (ISFSIs):**
  - SNM-2504 Fort Saint Vrain (FSV), expires 2031
  - SNM-2508 Three Mile Island (TMI) expires 2019
  - SNM-2512 Idaho Spent Fuel Facility (ISFF, not constructed) expires 2024
- Aging management program for TMI and FSV
  - Technology development
- **TMI ISFSI and Fort Saint Vrain**
  - Routine surveillance & maintenance
  - TMI license renewal application (LRA) by March 2017; 20-year renewal

U.S. DEPARTMENT OF ENERGY
Environmental Management

Elements of Scope for The Capability to Transfer SNF from Idaho by 1/1/2035

- **"Project Schedule"**
  - Support CD-0/1 – 2017 through 2019
    - Develop and evaluate alternatives including alternate fuel disposition recommendations and reuse of existing facilities
    - Conceptual design report including a cost estimate and schedule
  - Design to support project baseline approval
  - Project approved for Construction CD-3 2023
- **Mission Need Document**
  - Receipt of SNF from on-site facilities
  - Fuel characterization (NDE), stabilization
  - Packaging in DOE standardized canister
  - Standardized canister storage (limited to approximately 300 positions)
  - Load-out capability for both rail and truck transportation casks (casks provided by NE)