U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

Overview of DOE Spent Nuclear Fuel Management

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Mission & Functions

MISSION

Office of Nuclear Materials Disposition performs analyses, develops and recommends program strategies for management and disposition of EM's nuclear materials, spent nuclear fuel, and other surplus nuclear materials.

FUNCTIONS

- Perform and conduct strategic and program planning activities including cross-cutting analyses to indentify cost-effective strategies and plans for management and disposition of surplus nuclear materials and SNF
- Coordinates management and disposition of EM's surplus plutonium, highly enriched uranium (HEU), and other nuclear material activities with internal and external entities
- Support DOE /NNSA non-proliferation program; represents EM in negotiations with foreign governments and in planning and acceptance for future receipts of the Foreign Research Reactor SNF, Gap Materials, and other nuclear materials at EM facilities

Sources of Spent Nuclear Fuel (SNF) in DOE Inventory

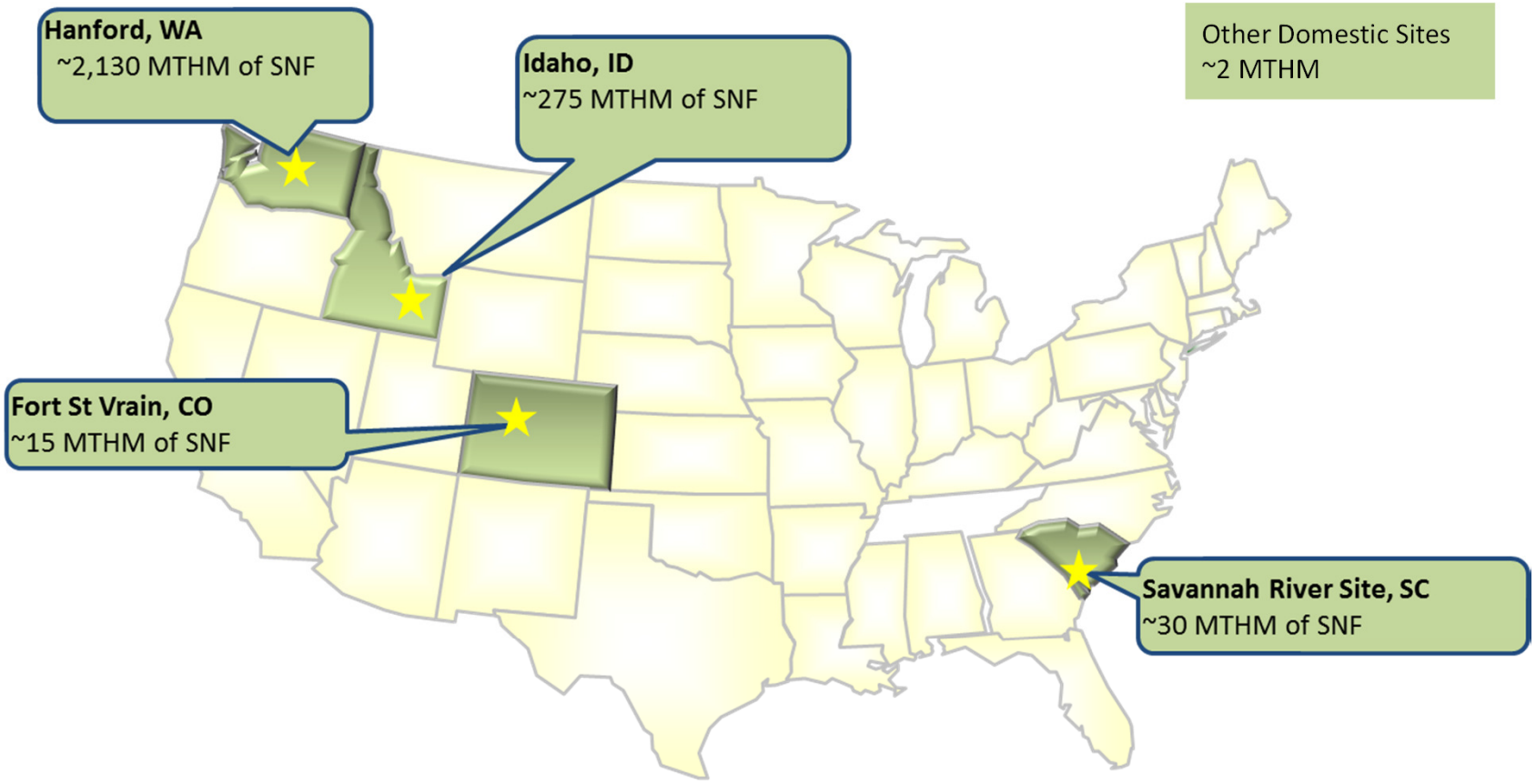
- DOE production reactors (majority)
- Core debris from the Three-Mile Island Reactor
- Commercial power demonstration projects
  - **Shippingport Atomic Power Station,** *Shippingport, Pennsylvania*
  - **Peach Bottom Atomic Power Station,** *Peach Bottom Township, Pennsylvania*
  - **Fort Saint Vrain Generating Station,** *Platteville, Colorado*
- Domestic Research Reactors (DRR)
- Foreign Research Reactor(FRR,FRR SNF Acceptance Program)

SNF Management

- 2,400 metric tons of SNF stored at three primary DOE sites
  - **Hanford Site**, *Washington*
  - **Idaho National Laboratory (INL),** *Idaho*
  - **Savannah River Site (SRS),** *South Carolina*

- 250 different fuel types
  - different enrichment
  - fissile materials
  - cladding
  - geometry

U.S. DOE SNF Inventory in 2014



TOTAL	
MTHM of SNF	~2,450

MTHM – Metric Tons Heavy Metal

Hanford, Washington

- All SNF has been moved from wet to dry storage
- SNF is safely stored in ~400 multi-canister overpacks and other dry casks
- Safely stored awaiting disposition

Dry Cask Storage

Canister Storage Building

Idaho National Laboratory, Idaho

- Diverse inventory of SNF
- Idaho Settlement Agreement
  - SNF in dry storage by 2023
  - All of EM-owned fuel is in dry storage
  - Some non-EM fuel still in wet storage
  - SNF out of Idaho by January 1, 2035
  - $60,000/day fine

Idaho Cleanup Project Spent Nuclear Fuel

Facilities

CPP-2707 – Cask dry storage

NRC-Licensed Facilities

TMI – Horizontal modular dry storage

FSV-Vertical modular vault dry storage (Colorado)

CPP-603 – Shielded cave rack dry storage

CPP-749 Underground dry storage

CPP-666 – Basin water storage

CH2M•WG IDAHO, LLC

G11-2640-03b

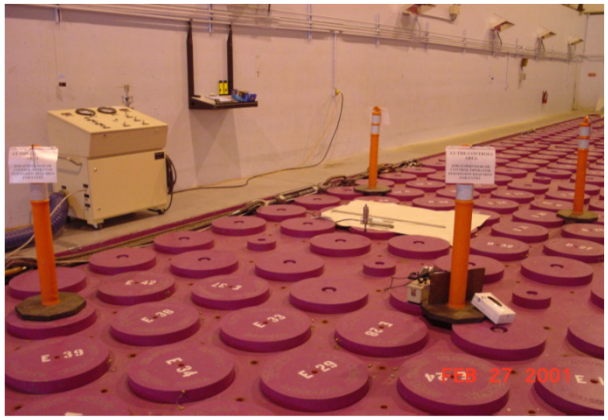
Idaho National Laboratory, Idaho (cont)

- Treating small amount of sodium-bonded fuel using Electrometallurgical Treatment Process (NE)
- Continue to receive FRR (until 2019) and DRR
  - Non-aluminum clad fuel (primarily TRIGA)
  - Currently, SNF shipments into Idaho are suspended until treatment of remaining liquid tank, sodium-bearing waste is completed

Cask Pad

Ft. St. Vrain, Colorado

- Only commercial scale high temperature gas-cooled reactor plant in the United States
- Dry storage facility managed by DOE, licensed by Nuclear Regulatory Commission (NRC)
  - 20-year NRC license extension granted on July 2011
- Colorado Agreement
  - All fuel out of State by January 1, 2035
  - $15,000/day fine



Vertical modular vault dry storage

Independent Spent Fuel Storage Installation

Savannah River Site, South Carolina

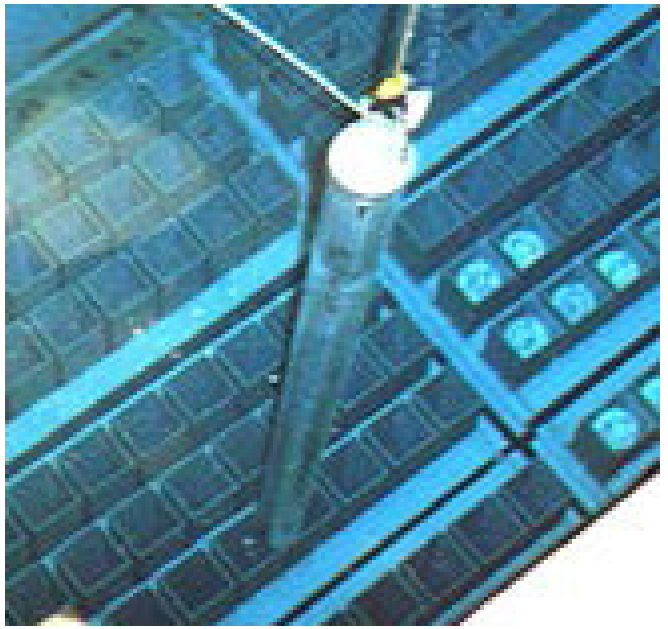
- All SNF in wet storage (L-Basin)
  - safely stored for additional 50 yrs
  - Implementing Augmented Monitoring & Condition Assessment Program in addition to existing maintenance activities
- Continue to receive FRR (until 2019) and DRR
  - Aluminum-clad SNF only
  - Includes High Flux Isotope Reactor (HFIR) Fuel – temporarily suspended due to storage capacity

Wet storage at L- Basin

HFIR Fuel (Office of Science)

Savannah River Site, South Carolina (cont)

- Processing SNF vulnerable to continued long term wet storage (Sodium Reactor Experiment SNF) in H-Canyon – complete in summer 2014
- In March 2013, DOE decided to process limited quantity of aluminum-clad fuel (including HFIR) & target residues
  - Generates extra storage capacity (especially for HFIR fuel)
  - Economic benefits (converts separated HEU to LEU for commercial use with proceeds back to Federal Government)
  - Non-proliferation benefits



Typical Material Test Reactor (MTR) Fuel Bundle

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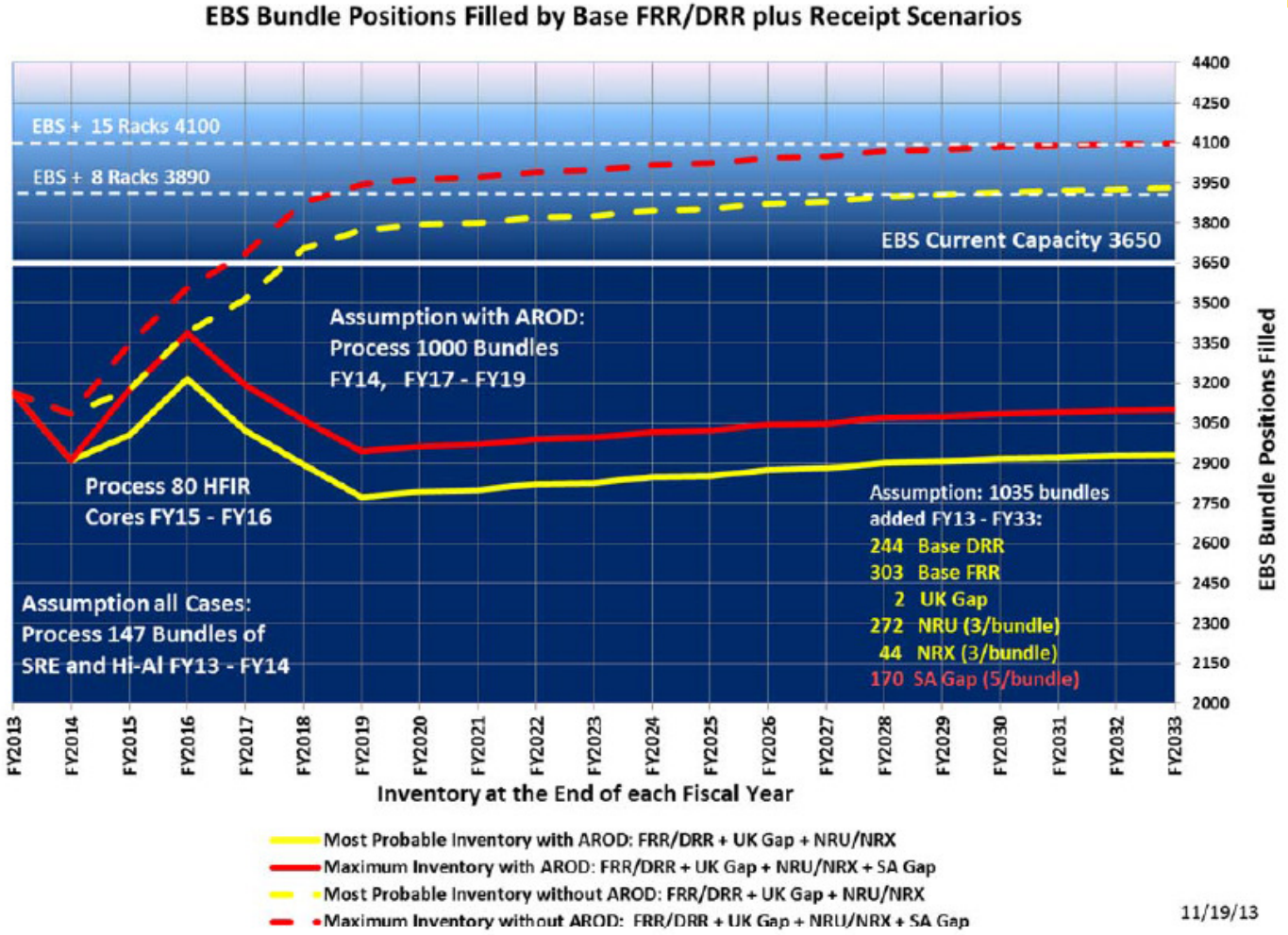
FRR - SNF Acceptance Program

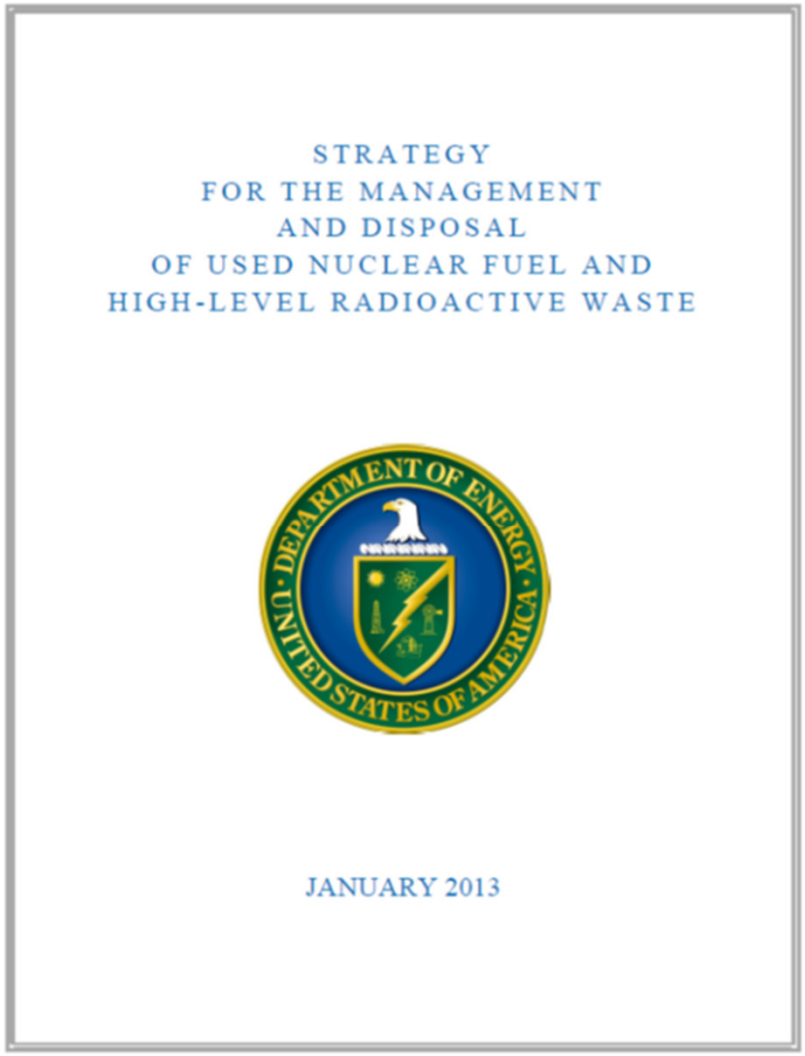
- EM supports the U.S. non-proliferation policy under the Global Threat Reduction Initiative (GTRI) to secure and consolidate SNF
- EM continues to receive, store, safely and securely manage SNF via the Foreign Research Reactor Spent Nuclear Fuel Acceptance Program from research reactors within 41 participating countries
- All fuel received is consolidated at SRS and Idaho
  - Aluminum clad fuel is stored in SRS
  - Non-aluminum clad fuel is stored in Idaho
- EM also continues to support the management of SNF received from DOE/Government and University domestic research reactors (DRR)
- Program ends in 2019

L-Basin *Expanded Basin Storage (EBS)* Capacity



The EBS capacity chart shows the "maximum" and most probable" predicted inventory with and without processing of the 1000 bundles stated in the AROD.

Future of SNF Management



- On January 2013, DOE issued *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste*
- Establishing EM Spent Nuclear Fuel Corporate Board
  - Partnership includes participation from Office of Nuclear Energy, Office of Science and National Nuclear Security Administration
- Continue Safe Storage of SNF in Interim
- Continue with acceptance of FRR (under GTRI) and DRR

http://www.energy.gov/downloads/strategy-management-and-disposal-used-nuclear-fuel-and-high-level-radioactive-waste

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