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

Savannah River Site L-Basin Spent Nuclear Fuel Program Update

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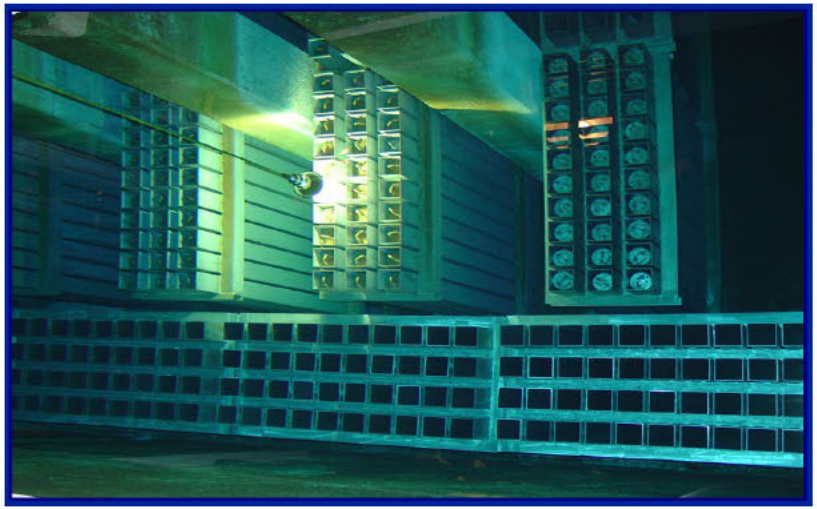
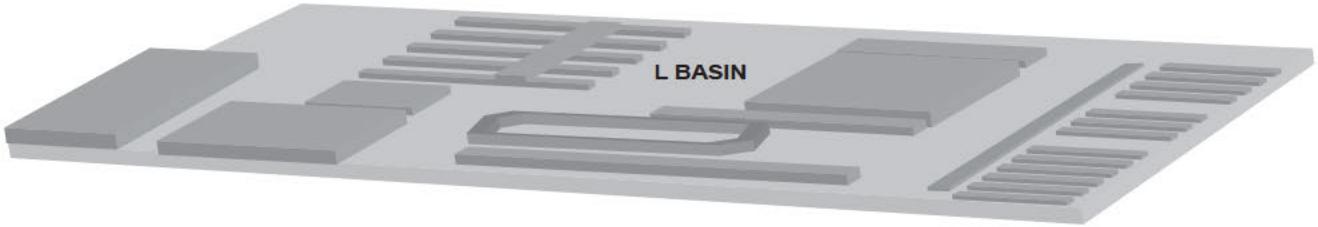
Overview of L-Basin

- L-Basin was expanded from the original reactor basin in the 1990s
  - ~3.4 Million gallons of water
  - Pool Depth 17 to 50 feet
  - Receives typical Foreign Research Reactor/Domestic Research Reactor (FRR/DRR) Material Test Reactor Fuel Assemblies
  - One transfer bay for receipts/shipments



L-Basin Water Purification System



All water passes through sand filters every 32 hours

All water passes through the ion exchange every 13 days

DEIONIZED WATER MAKEUP

L Basin Water Facts

- ~3.4 Million Gallons
- Pool depths of 17 to 50 feet
- Concrete walls 2.5 to 7 feet thick
- A Deionizer Resin Train is used to remove and replace unwanted ions

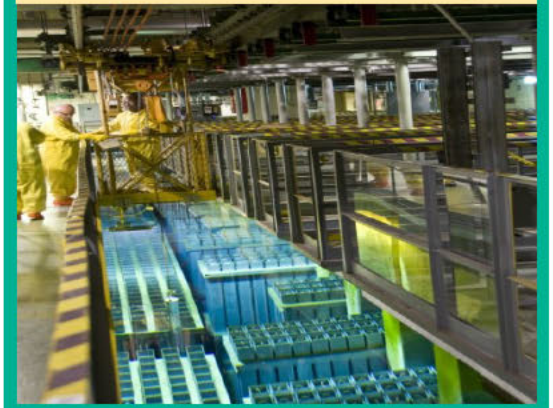
Water Chemistry Control

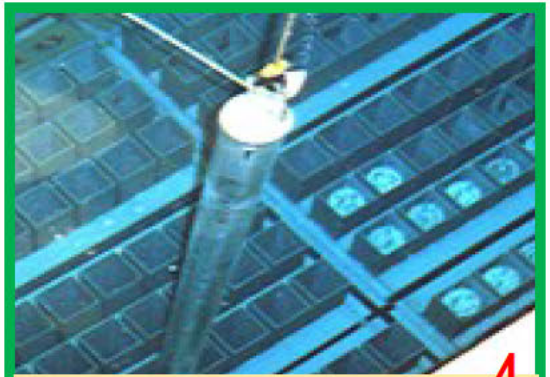
Parameter	Normal Value	Operating Limit
Conductivity	<1.5 mS/cm	10 mS/cm
pH	6.1	5.5 to 8.5
Chloride	<0.05 ppm	0.1 ppm
Mercury	<0.014 ppm	0 014 ppm
Copper	<0.05 ppm	<0.1 ppm

Inventory at Savannah River Site

- Approximately 3,050 bundles of fuel
  - Aluminum Based & Stainless Steel/Zirconium Based Spent Nuclear Fuel (SNF) (~90%)
  - Highly Enriched & Low Enriched Spent Nuclear Fuel (75% vs 25%)
  - Various shapes, sizes, burn-up percentage, degradation
- Safely and Securely Stored in Reinforced Concrete Facility, Underwater Basin (L-Area)
- Continuous Surveillance and Maintenance – 50 additional years of safe storage

Used Nuclear Fuel Storage

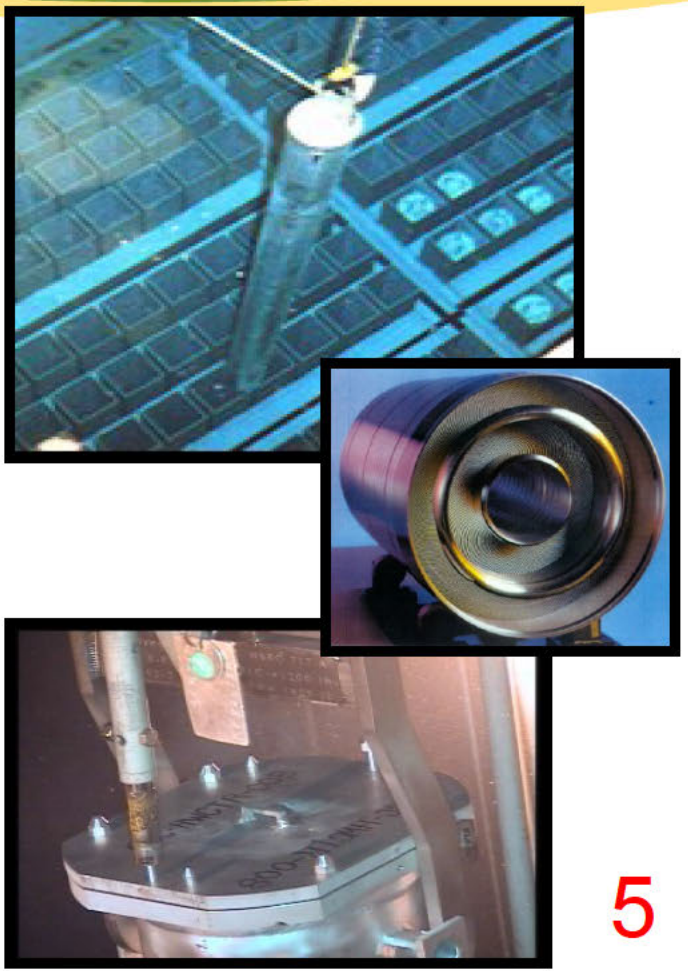




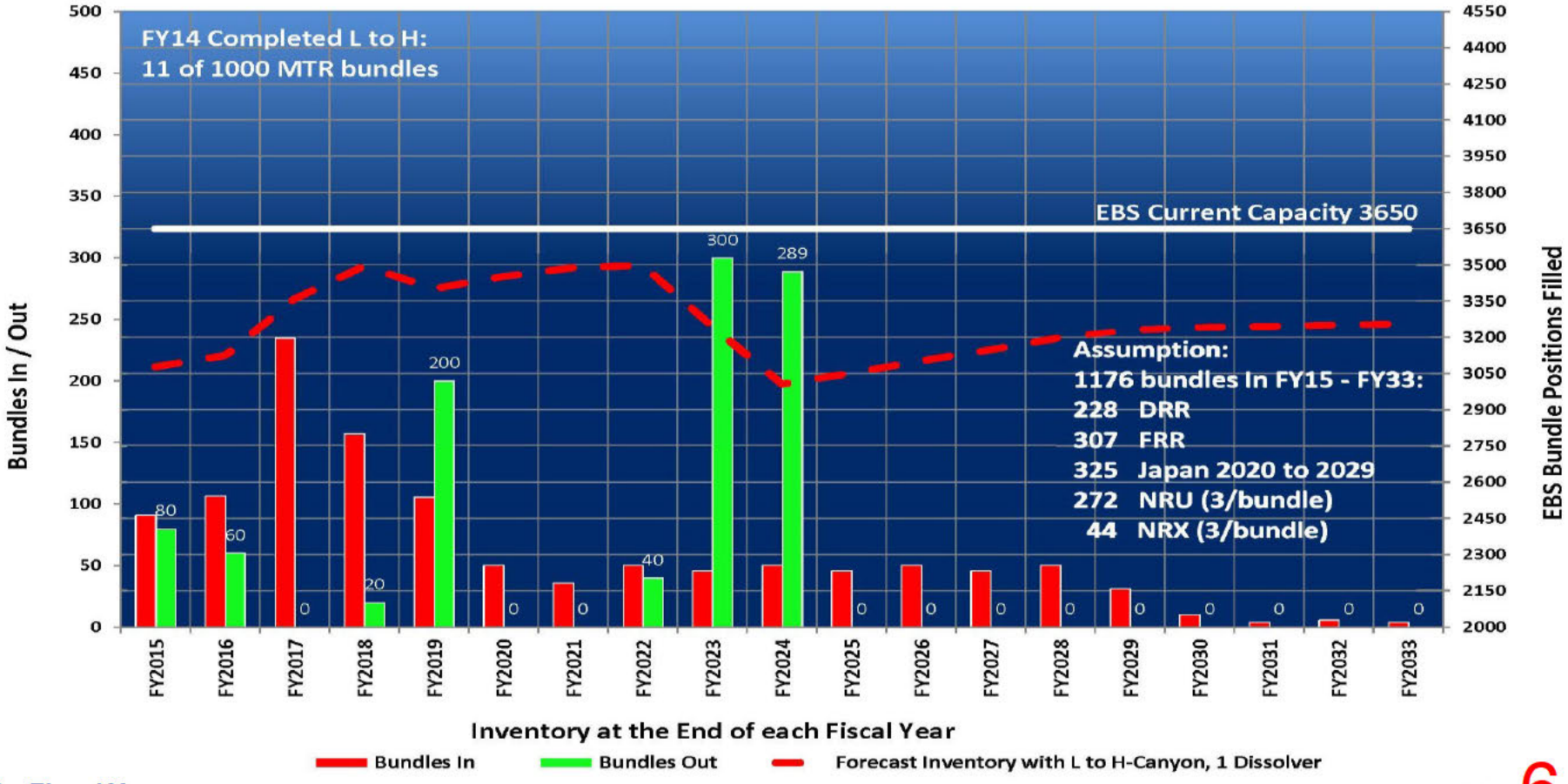
Suspended Fuel Bundle

L-Basin Stored Fuels and Capacities

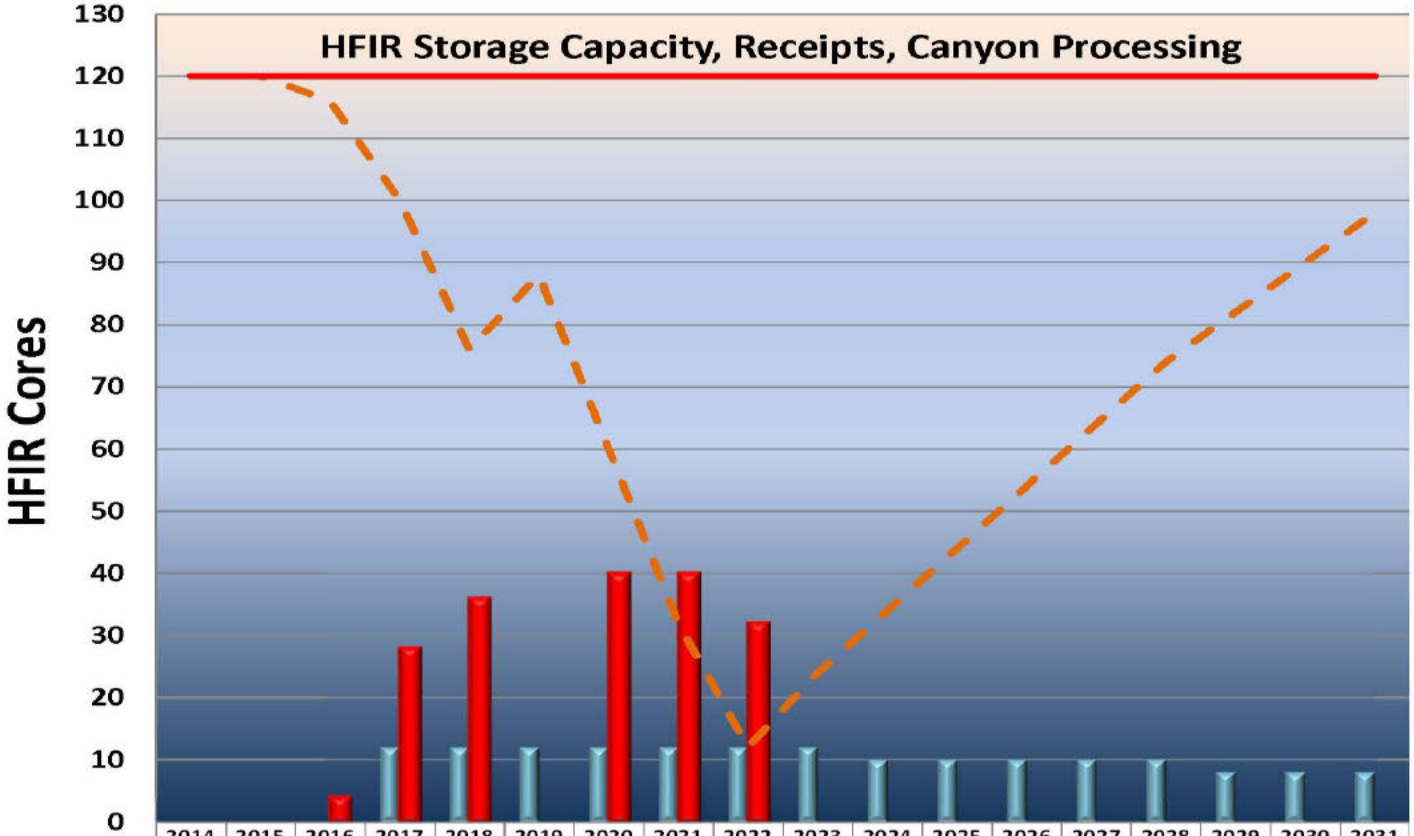
- L-Bundled fuel
  - Typical Foreign Research Reactor/ Domestic Research Reactor (FRR/DRR) Material Test Reactor Fuel Assemblies
  - ~90% full
  - 3045 bundles
  - Amended Record of Decision (AROD) processing decision eliminates need for new racks
- High Flux Isotope Reactor (HFIR) Fuel Racks
  - 100% full
  - 120 Cores
  - Amended Record of Decision (AROD) processing decision eliminates need for new racks
- Isolation Cans
  - Over 400 individual isolation cans stored in 12 oversized cans



Forecast EBS Bundle Positions Filled by FRR/DRR Receipts with H-Canyon Processing



FY – Fiscal Year
EBS – Expanded Basin Storage
NRX – National Research Experimental
DRR – Domestic Research Reactor
FRR – Foreign Research Reactor
MTR – Material Test Reactor
NRU – National Research Universal



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
HFIR HEU Received L Basin	0	0	0	12	12	12	12	12	12	12	10	10	10	10	10	8	8	8
HFIR HEU Canyon Processing	0	0	4	28	36	0	40	40	32	0	0	0	0	0	0	0	0	0
HFIR HEU Inventory L Basin	120	120	116	100	76	88	60	32	12	24	34	44	54	64	74	82	90	98
HFIR HEU Capacity L Basin	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120

HFIR – High Flux Isotope Reactor
HEU – High Enriched Uranium

National Research Universal/ National Research Experimental (NRU/NRX) Basin Modifications

- Canadian Nuclear Laboratories has National Research Universal/National Research Experimental (NRU/NRX) fuel that is longer and heavier than typical Material Test Reactor Fuel
  - Contract signed in 2012 where prepayment of $10 Million made for the modifications to be made for receipt of the fuel in L-basin
- Modifications to the Shielded Transfer System (STS) are required to remove the fuel from the legal weight truck (LWT) cask.
- New unloading station developed to remove the fuel from the basket and load it into bundles for storage in L-basin.
- Fabrication of the Shielded Transfer System (STS) modifications are expected by end of Calendar Year 2014 but now projected by end of February 2015.
- Multi-year shipping campaign
- No other modifications are expected for typical Material Test Reactor Fuels.
- All non-typical Material Test Reactor fuels will be evaluated on a case-by-case basis.

Current Management Approach

- Continue Safe Wet Storage
- Process up to 1000 bundles and 200 High Flux Isotope Cores
- Continue Operations of L-Basin evaluated by Savannah River National Laboratory for safe usage of L-Basin up to an additional 50 years

Processing in H-Canyon

- Successfully completed the Sodium Reactor Experiment Fuel Campaign in August 2014
  - 147 bundles of Sodium Reactor Experiment and High Aluminum Fuels
  - No recovery of Uranium due to U-232
- Amended Record of Decision allows :
  - Processing up to 1000 bundles and 200 High Flux Isotope Cores
  - 40 bundles completed through December 31, 2014
- H-Canyon continued processing of the Aluminum Cladded Fuel in L-Basin is possible but no decision has been made to pursue this at this time
- H-Canyon cannot process the Stainless and Zircaloy cladded fuels stored in L-Basin (~ less than 10% of the inventory)

Dry Storage

- Savannah River Site lifecycle assumes dry storage
  - No decision on processing
  - It is the more costly option for capturing liability costs
- Dry Storage Study was conducted in 2012
  - Included information from both Hanford and Idaho
  - Direction was to include as much "commercially available" options as possible
  - Direction was also to assume the final configuration of the fuel was "road ready" (ready for shipment to a repository)
- Concerns regarding the drying of Aluminum Fuel need to be addressed:
  - How long to dry, how fast to dry to ensure no generation of hydrogen or hydrides

Dry Storage (continued)

- Storage Pad
  - Dry Storage Report envisioned the pad located in L-area
  - Another report is evaluating the use of a multi-use storage pad

- Multi-use storage Pad
  - Very preliminary study
  - Storage of both Vitrified Glass logs in concrete overpacks as well as dry fuel in concrete overpacks
  - Considers a Central location within the site
  - Major driver for multi-use pad is potentially reduced transportation costs and shared storage costs
  - Difficult to determine any cost savings due to the potential need for fuel drying in a different location from L-Area.

Summary

- Fuel is Safely Stored in L-Basin
- Some processing of Fuel is occurring in H-Canyon
- Alternatives to wet storage have been evaluated
- Departmental Decision needed on future direction of fuel storage versus processing