A Presentation to the
SRS CAB Nuclear Materials Committee
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Enriched Uranium Disposition Project as it Affects Spent Nuclear Fuel and Plutonium Disposition

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DOE-SR

EM Environmental Management
safety ❖ performance ❖ cleanup ❖ closure

SRS

Acronyms

Al – Aluminum
ATR – Advanced Test Reactor
DOE – Department of Energy
DRR – Domestic Research Reactor
EM – DOE Office of Environmental Management
EUD – Enriched Uranium Disposition
FRR – Foreign Research Reactor
FY – Fiscal Year
HEU – Highly Enriched Uranium
HFIR – High Flux Isotope Reactor
INL – Idaho National Laboratory
IPT – Integrated Project Team
LAC – L Area Complex
LANL – Los Alamos National Laboratory
LEU – Low Enriched Uranium
LLNL – Lawrence Livermore National Laboratory
LWT – Legal Weight Truck
MOX – Mixed Oxide
MTHM – Metric Tons Heavy Metal
MTR - Material Test Reactor
NE – DOE Office of Nuclear Energy
NNSA – National Nuclear Security Administration
NPDES - National Pollutant Discharge Elimination System
ORNL – Oak Ridge National Laboratory
PDCF – Pit Disassembly and Conversion Facility
SC – DOE Office of Science
SNF – Spent Nuclear Fuel
SRNS –Savannah River Nuclear Solutions
SRS – Savannah River Site

Nuclear Materials Mission

Safely, securely, and efficiently store and process excess nuclear material to improve our security posture, protect public health and the environment, and to allow either beneficial reuse or disposal of these materials thereby supporting transformation of the Savannah River Site for the future and supporting other national priorities.

Savannah River Site Capabilities

- **New and updated EM and NNSA capabilities would allow SRS to consolidate, securely store, process, and disposition excess nuclear materials.**
  - **L-Basin: wet storage of spent nuclear fuel**
  - **K-Area Complex: secure storage of HEU and Pu**
  - **H-Canyon / HB-Line converts HEU to LEU or dissolve and send to DWPF**

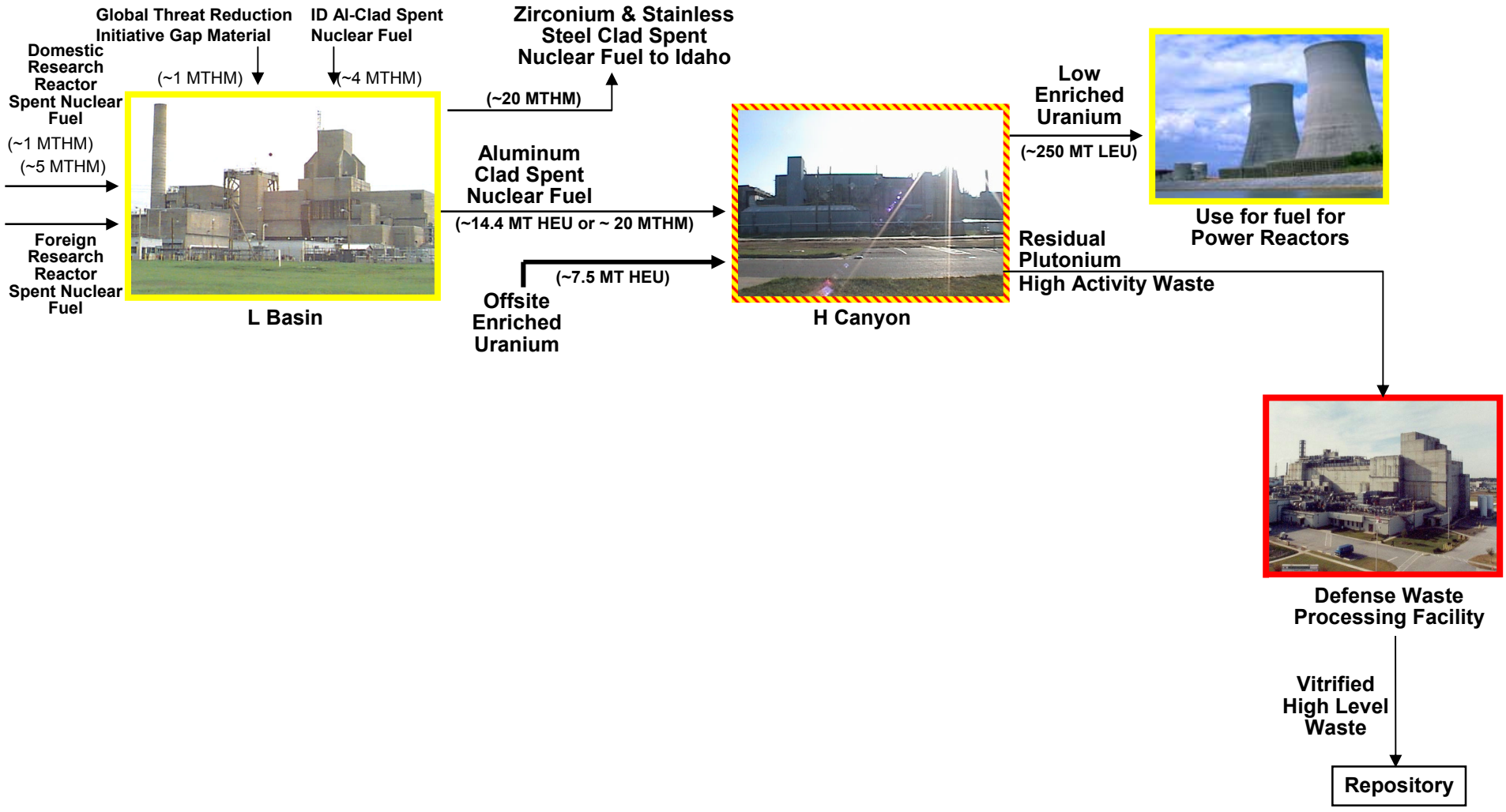
Cost Avoidance and Nonproliferation

- Consolidating nuclear material from other sites into existing SRS facilities to allow these sites to de-inventory

- Significant cost avoidance can be realized by consolidating surplus nuclear materials at a single location
  - Eliminates multiple (existing) storage vaults across the DOE complex
  - Eliminates multiple security projects across the DOE complex
  - Allow other DOE sites to close facilities reducing the DOE national nuclear footprint (and avoid operating costs)

- Support nonproliferation and improve Homeland Security
  - Secure materials from foreign and domestic research reactors
  - Reduce the number of facilities to protect
  - Blend HEU to a non-weapon grade form

Highly Enriched Uranium Disposition Strategy



Enriched Uranium Disposition Project

- Enriched Uranium Disposition (EUD) Project
  - August 2006, approved mission need

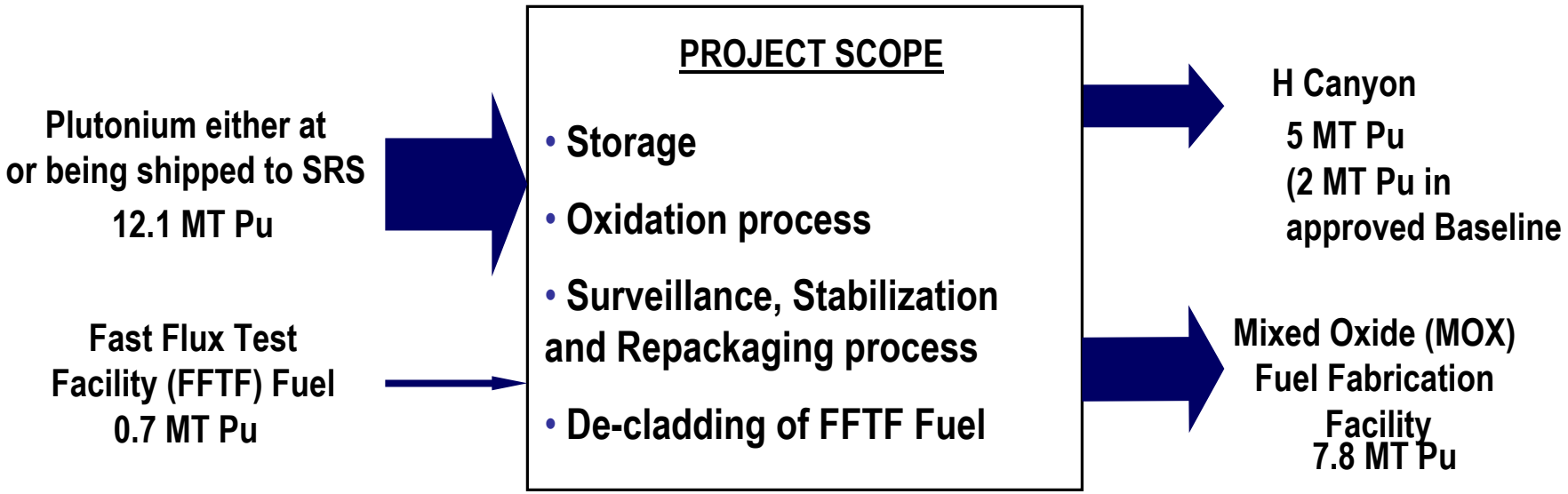
- Disposition ~21 MT of surplus HEU by processing in H-Canyon facilities as part of the EU Disposition Project
  - ~ 7.5 MT of HEU (dissolution will be completed by FY 2011)
  - ~ 13.5 MT of HEU in the form of aluminum-clad spent nuclear fuel (processing scheduled to start in FY 2011 and estimated to be completed in FY 2019)

- HEU will be blended down to low enriched uranium (LEU) and provided to an end user (such as TVA) for use in fabricating fuel for commercial nuclear reactors

- The EUD project is split between PBS 11C and 12 and has an estimated life-cycle cost range of $4.3B - $4.6B.

Note: NNSA has responsibility for DOE's overall surplus HEU disposition program

Proposed Plutonium Disposition – EUD Scope



Proposed Plutonium Disposition - EUD Interface

H Canyon

Residual Plutonium
High Activity Waste

(3 MT Pu)

Non-Pit Plutonium*

Non Moxable Plutonium

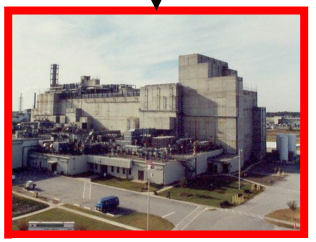
(2 MT Pu)

K Area

(6.7 MT Pu)

New SRS Capabilities

Pu Disp. (Preparation) And CSSC Scope



Defense Waste Processing Facility

Plutonium Consolidation

(12.8 MT Pu)

Moxable Pu

(4.1 MT Pu)

Oxides

(3.7 MT Pu)

Vitrified High Level Waste

Plutonium Pits and Clean Metal

Interim Storage at Pantex

Pits and Clean Metal

New SRS Facility

Pit Disassembly & Conversion Facility

New SRS Facility

MOX Fuel Fabrication

MOX Fuel

Burn in Existing, Domestic Commercial Reactors

Spent Nuclear Fuel

Repository

Project Status

Processing accomplishments

- Completed LLNL / LANL HEU Oxides Campaign
  - December 2008
- Completed Neptunium campaign
  - March 2009, Savannah River Site Completed Shipment of Neptunium Oxide to the Idaho National Laboratory and Oak Ridge National Laboratory.
- Complete Super Kukla campaign
  - April 2009, Savannah River Site completed the last dissolution of Highly Enriched Uranium from Y-12. The campaign, which lasted over a year, consisted of dissolving 4.5 Metric Tons of uranium material
- Started the HEU Molybdenum campaign
  - May 2009

Project Status

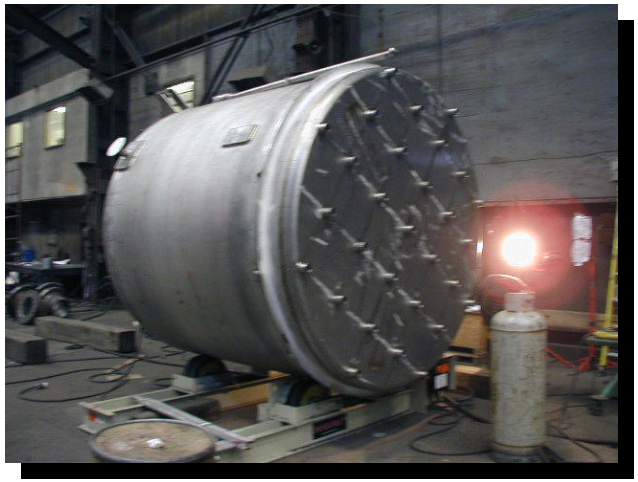
- **H-12 NPDES Outfall Corrective Action Project**
  - Scope: This project designed and constructed a humic acid chemical addition system to reduce the toxicity of the copper at the outfall and thus allow the copper limit to remain with SCDHEC waste water limits.
  - Operations started June 2009
  - Compliance date is July 2009

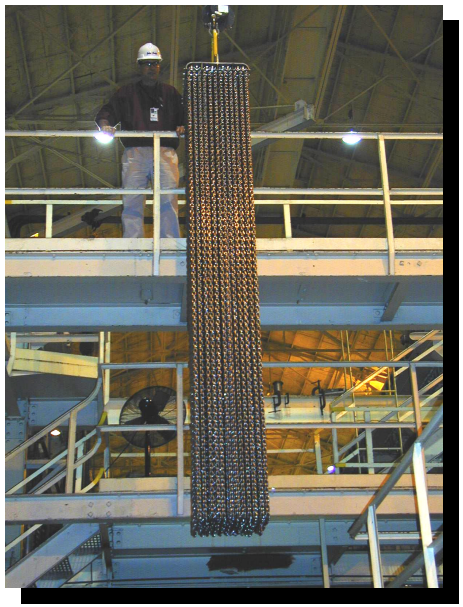
- **HB-Line Chiller replacement**
  - Scope : Replaced the existing 110 ton water cooled chiller with a new air cooled unit.
  - Operations started June 2009

Project Status

- **Spare Process Tank**
  - Scope: Procure (one) Spare 8' dia. X 8' Cell Tank & Perform Mockup

- **Sump Inserts**
  - Scope: This project will insert stainless steel chain inside the H-Canyon sumps as a criticality control and waste reduction method.





Spent Fuel Project Status

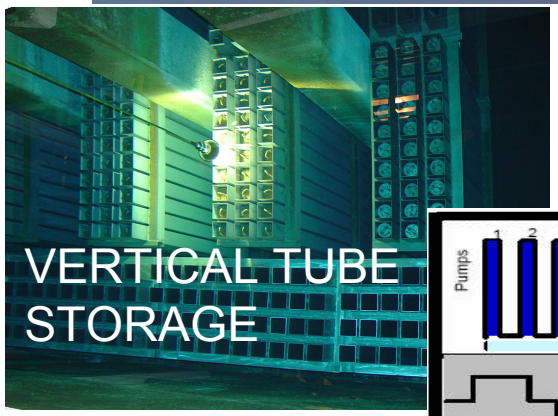
Dawn Gillas, Program Manager

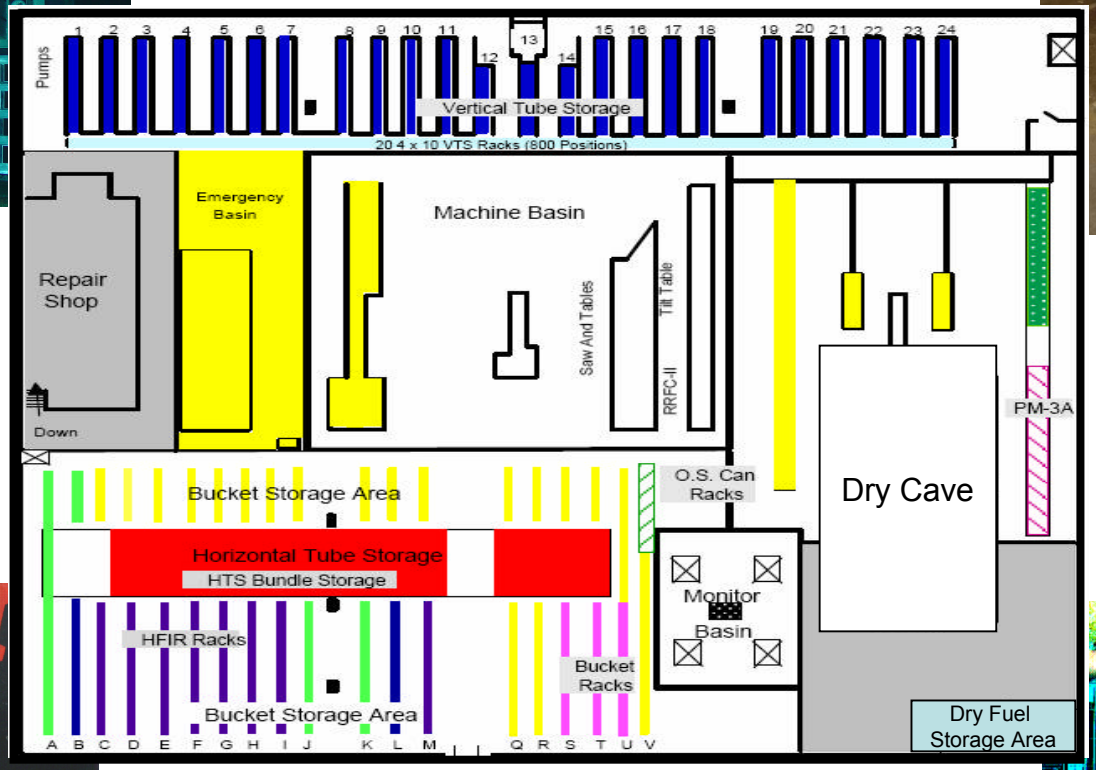
- Mission
- SNF Storage
- SNF Inventory
- SNF Receipt Forecast
- L to H Transfers
- INL SNF Exchange
- Summary
- SNF Introductory Video

Mission

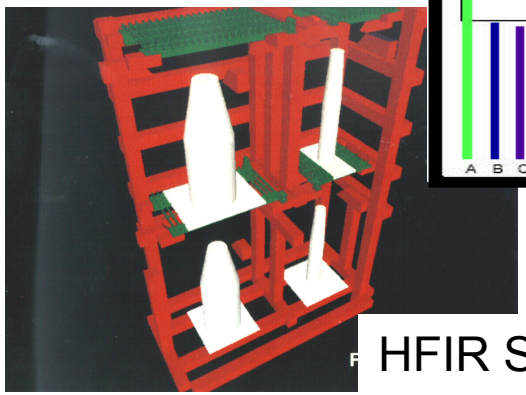
- **L Area Complex (LAC) is operational through FY19 for receipt and interim wet storage of spent nuclear fuel (SNF) pending final disposition through the Enriched Uranium Disposition Project.**
- **LAC SNF receipts are part of NNSA's Global Threat Reduction Initiative which supports the removal of this nuclear material from research reactor sites worldwide.**
- ***"President Barack Obama identified preventing terrorists from acquiring nuclear and radiological weapons as his number one National security priority."*** (Kenneth E. Baker, Principal Assistant Deputy Administrator, National Nuclear Security Administration)

SNF Storage

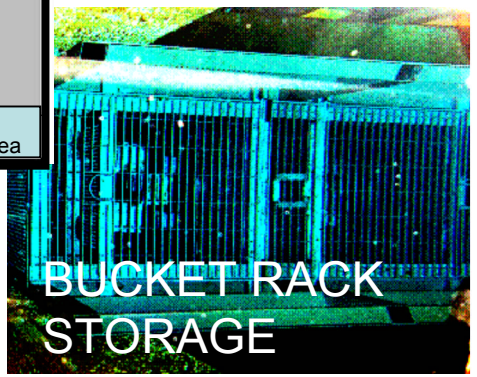




Dry Fuel Storage Area 2



HFIR STORAGE



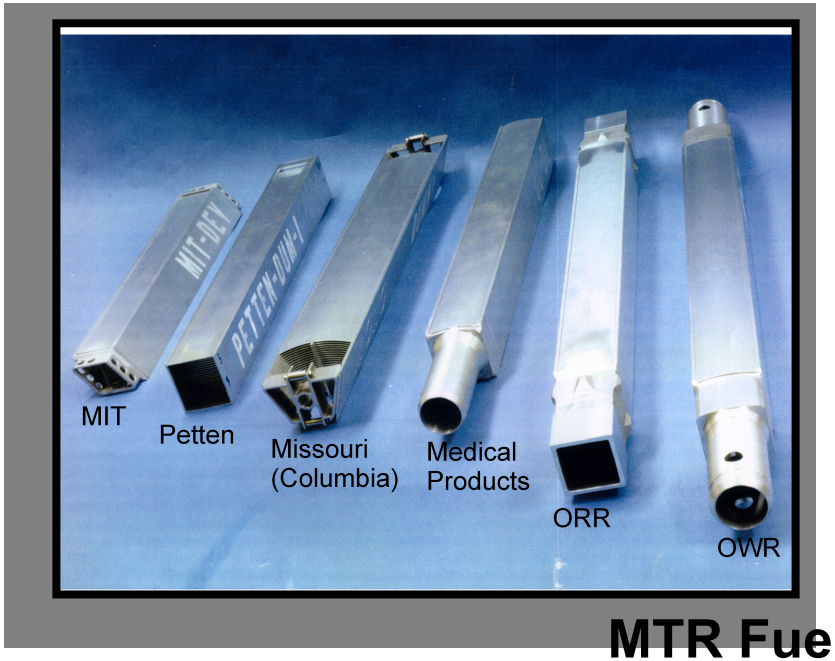
SNF Storage

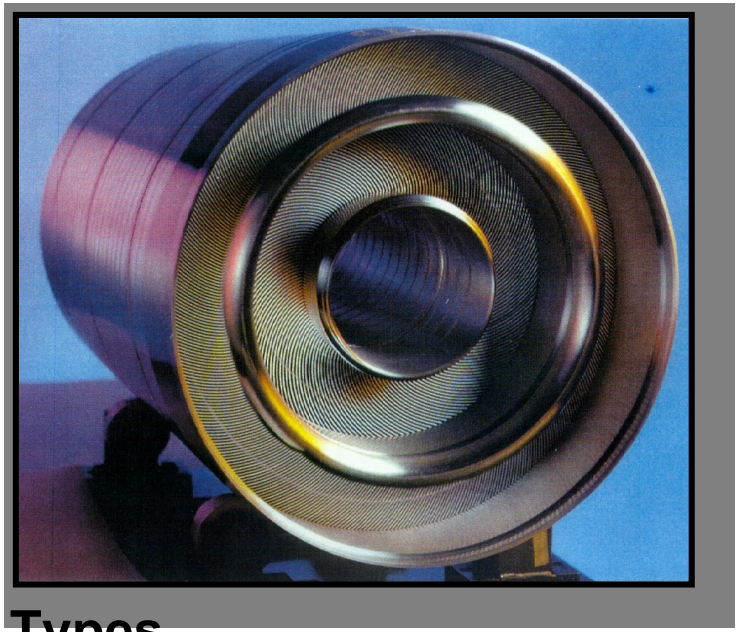
Storage Type	Total Approved Positions*	Percent Filled (Rounded)
HFIR	120	79
Vertical Tube Storage	3500	84
Dry Cave	150	0
Bucket Row Storage	27	37
Bucket Racks	36	44
Dry Fuel Storage Area 1	27	85
Oversized Can Racks	42	55
Dry Fuel Storage Area 2	16	100

* Positions may hold multiple assemblies or “pieces” of fuel depending on type of fuel

SNF Inventory

Uranium and Thorium Metal Fuels	64
MTR Fuels	11734
Higher Actinide Targets	125
Non-Al Clad	1976
Total	13899





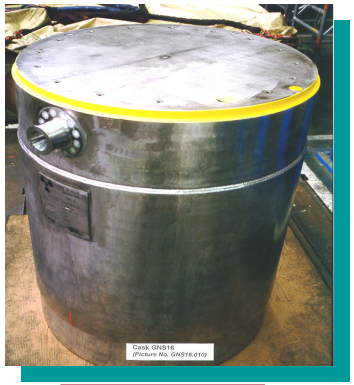
MTR Fuel Types

SNF Receipt Forecast

Estimated Number of Assemblies

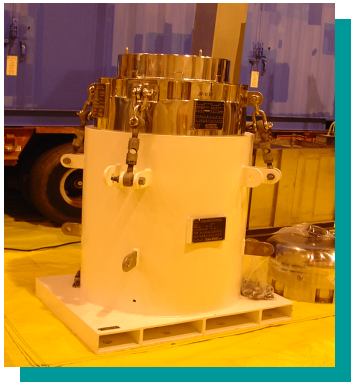
Type	Location	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
DRR	Maryland	126		126				126				**378**
	Massachusettes		12		12		12		12		12	**60**
	Missouri		27	18	27	18	27	18	27	18	27	**207**
	Tennessee	12	12	12	12	12	12	12	12	12	12	**120**
DRR Total		138	51	156	51	30	51	156	51	30	51	**765**
FRR	Australia			174					174			**348**
	Canada			1								**1**
	Germany	66	66		66			33			33	**264**
	Israel	102										**102**
	Jamaica				1							**1**
	Japan	180	176		176		164	160	160	220	130	**1366**
	Peru					29						**29**
	Portugal								14			**14**
	S. Africa	49										**49**
	Turkey	29										**29**
FRR Total		426	242	175	243	29	164	193	348	220	163	**2203**
Grand Total		**564**	**293**	**331**	**294**	**59**	**215**	**349**	**399**	**250**	**214**	**2968**

SNF Casks Received



GNS-16

TN-7/2

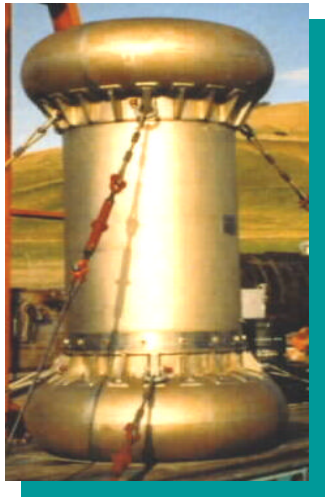


JRF-90Y-950K

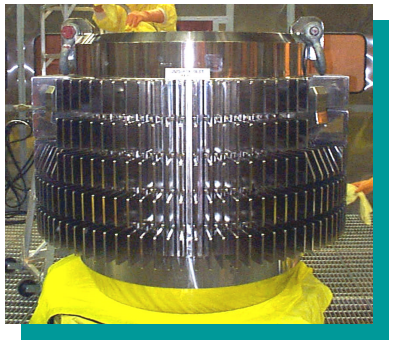
LWT

JRC-80Y-20T

TN-MTR



GE-2000



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L to H Transfers and INL SNF Exchange

- **H Canyon scheduled to start processing SNF May 2011**
  - Current Al-based L Area inventory: ~12,000 assemblies
  - Future FRR/DRR receipts: ~ 3,000 assemblies
  - INL Al-based Exchange receipts: ~ 4,000 assemblies
  - Total SNF to be processed: ~19,000 assemblies

- **SNF Exchange scheduled to start April 2012**
  - L Area SS/Zr-clad inventory to INL: ~ 2,000 items
  - INL Al-based inventory to SRS: ~ 4,000 assemblies
  - Approximately 20 shipments per year each way through 2019

L-Basin to H-Canyon Transfers

- **Preparations to ship SNF from L to H Area**
  - **Onsite Railroad Upgrade FY08-FY10**
    - **Begun FY08, suspended FY09, expected to restart and finish FY10**
  - **Upgrade of 70-Ton Casks FY09-FY10**
  - **L Area Crane Upgrade FY10**
  - **First shipment from L to H Area planned for 3QFY11.**

INL SNF Exchange

- **Preparations for shipping non-Al-based SNF to INL and receiving Al-based SNF from INL**
  - **Begin preparations in FY10**
  - **FY10 funding supports:**
    - **Start of procurement and licensing of a commercial cask for the exchange**
    - **Start of L Area project to modify cask and fuel handling equipment for SNF packaging and cask loading**

Closing Summary

- Expect completion of unirradiated HEU dissolution by end of 2011
- EUD Material processing estimated to complete 2019
- Current SNF baseline assumptions include:
  - FRR/DRR Receipts
  - INL Exchange
  - H-Canyon processing of Al-based SNF