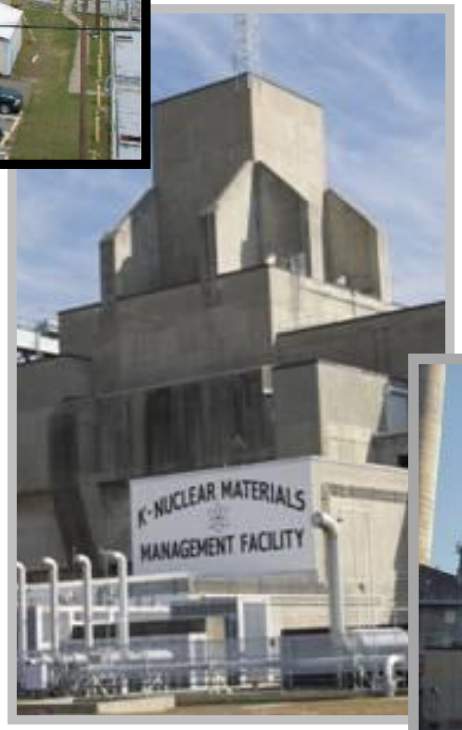
Acronyms

DRR – Domestic Research Reactor
FRR – Foreign Research Reactor
FY – Fiscal Year
HEU – Highly Enriched Uranium
HFIR – High Flux Isotope Fuel
LEU – Low Enriched Uranium
LANL – Los Alamos National Lab
LLNL – Lawrence Livermore National Lab
MT – Metric Ton(s)
MTR – Material Test Reactor (Typical Fuel type for Foreign/Domestic Research Fuels)
Np – Neptunium
ORNL – Oak Ridge National Lab
PISA – Potential Inadequacy of the Safety Analysis
Pu – Plutonium
SC – South Carolina
SNF – Spent Nuclear Fuel
SNL – Sandia National Lab
SRE – Sodium Reactor Experiment
TRM – Target Residue Material
TVA – Tennessee Valley Authority
U – Uranium
WIPP – Waste Isolation Pilot Plant

NM Storage and Disposition Facility Missions

H-Area safely dispositions uranium (including Spent Nuclear Fuel) and plutonium materials

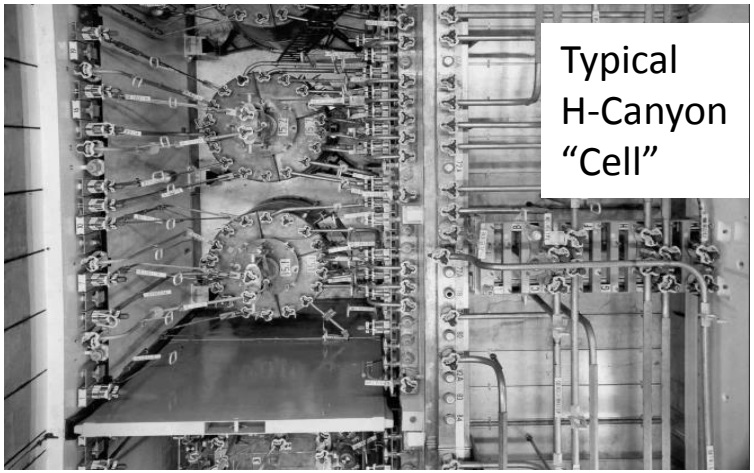


L-Area safely receives and stores Spent Nuclear Fuel awaiting disposition

K-Area safely receives and stores enriched uranium and plutonium materials awaiting disposition

H-Canyon History

- Construction began 1952
- Startup 1955 for recovery of nuclear materials for weapons production
- Began production of Pu-238 in ‘60s for space missions
- Modified in late ’60s for more efficient recovery of uranium
- Focus of H-Canyon mission shifted from weapon material production to clean-up in ‘90s
- Stabilization of legacy nuclear solutions located in H-Canyon was completed in ’06 (plutonium, neptunium and uranium); Pu and Np were converted to oxides
  - In 2001 an Interagency Agreement was signed with the Tennessee Valley Authority to disposition uranium solutions



H-Canyon History (Continued)

- Began shipping Low Enriched Uranium (LEU) to Tennessee Valley Authority in '03
  - Purified Highly Enriched Uranium solutions were blended with Natural Uranium to produce Low Enriched Uranium; three primary sources of uranium
    - Legacy uranium solutions stored in H-Canyon (from SNF processing)
    - Irradiated SNF and un-irradiated fuels from SRS Reactors
    - Surplus U from across DOE Complex (LANL, LLNL, SNL, Y-12/ORNL, etc.)
  - TVA vendor (AREVA) made commercial fuel for TVA reactors
  - This campaign was completed in 2011 with over 22.7 MT HEU blended to produce 301 MT LEU. Uranium was removed from South Carolina (SC) but could have powered all homes in SC for greater than 8 years

LEU Shipping Containers

H-Canyon Recent Missions

- August 2012 - August 2014 - Dissolution of Sodium Reactor Experiment fuel (potentially at risk for long term storage)
  - Solution transfer to the Liquid Waste System (Defense Waste Processing Facility for vitrification) is on-going (expect to complete vitrification by 2020)
- September 2014 - H-Canyon resumed processing of Spent Nuclear Fuel (SNF) to recover uranium (U) for purification
  - April 2013 - Amended Record of Decision (1000 bundles and 200 HFIR cores)
  - Foreign and Domestic Research Reactor Fuels (~1/3 of L-Area Fuels)
  - Resumption of blending process to LEU and shipment to TVA is expected to resume in 2019; complete in 2025 (~40 MT LEU to be produced/shipped)
  - H-Canyon will process enough SNF to make sufficient room to allow for L-Area receipts through mid 2030s
    - DOE exploring processing of all aluminum based SNF in L-Area

Typical Fuel Cask ("70 Ton Cask") used for SNF Shipments from L-Area to H-Area Examples: SRE, MTR and HFIR

H-Canyon Recent Missions (Continued)

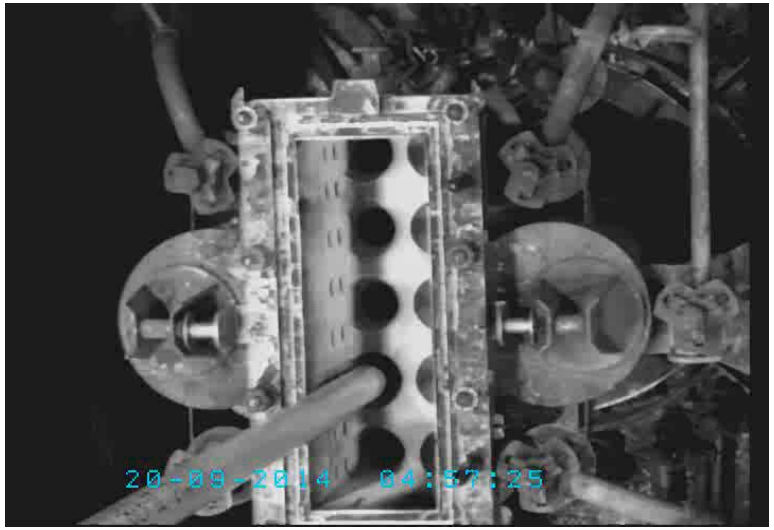
- April 2017 - Began receipt of US origin HEU from Canada
  - Approximately a 3.5 year campaign – On schedule
  - Called Target Residue Material (TRM) – Residues (liquids) left after the extraction of Molybedum-99 by Canadian Nuclear Laboratory
    - Mo-99 decays to Technecium-99m which is extracted for use as a medical tracer (nuclear stress test, liver, kidney, lung function etc.)
  - Coordinated with reactor fuel shipments from Canada to L-Area
  - Receipt/unloading going well
  - Exposure very low
  - TRM solutions will be mixed with dissolved SNF, then purified and blended to produce LEU for shipment to a TVA vendor

Intermodal Container (aka ISO* Container) with a Legal Weight Transport (LWT) Cask inside, being transported to H-Canyon

* ISO = International Organization for Standardization

MTR / HFIR Processing

- All units within H-Canyon are operational
- Must begin blending HEU to LEU in 2019; otherwise tanks will be full in 2020
- 200 bundles of MTR dissolved ('15: 80; '16: 40; '17: 80); 800 to go
  - Not currently dissolving; swapping dissolvers used for SNF and Plutonium
  - Resume dissolving Material Test Reactor (MTR) Fuel by February 2018
  - Must ramp-up dissolution rate – SRNS showing ~200 bundles /yr in ~FY22
    - Batch size increase (20%) and throughput increase (DSA revision, inline spectrophotometers, etc.)
  - Complete dissolution, purification, blending and delivery in FY25
- Start dissolution of HFIR by January 2018
  - Last dissolved HFIR > 25 years ago
  - Dissolve 20 HFIR cores in FY18
    - Must ramp up dissolution rate
    - Max of 35 HFIR cores/yr in ~FY22
  - Complete dissolution, purification, blending and delivery in FY25



Insertion of Fuel Bundle into H-Canyon Dissolver (Sep 2014)

Resumption of Blending Operations

- Resume blending operations in 2019
- Blending operations last conducted November 2011
- Some repairs/maintenance are anticipated; walk-downs have begun
- Blending control room, loading station, controls and automatic valves were built/installed in 2001 through 2003 (comparatively new)
- New operators need to be hired/trained early this FY to meet blending/startup schedule
- Will blend HEU from nominal 35% enrichment down to ~4.95% enrichment
- A Contractor Readiness Assessment (RA) will be required probably followed by a DOE led RA in early to mid FY19

Readying Loading Station

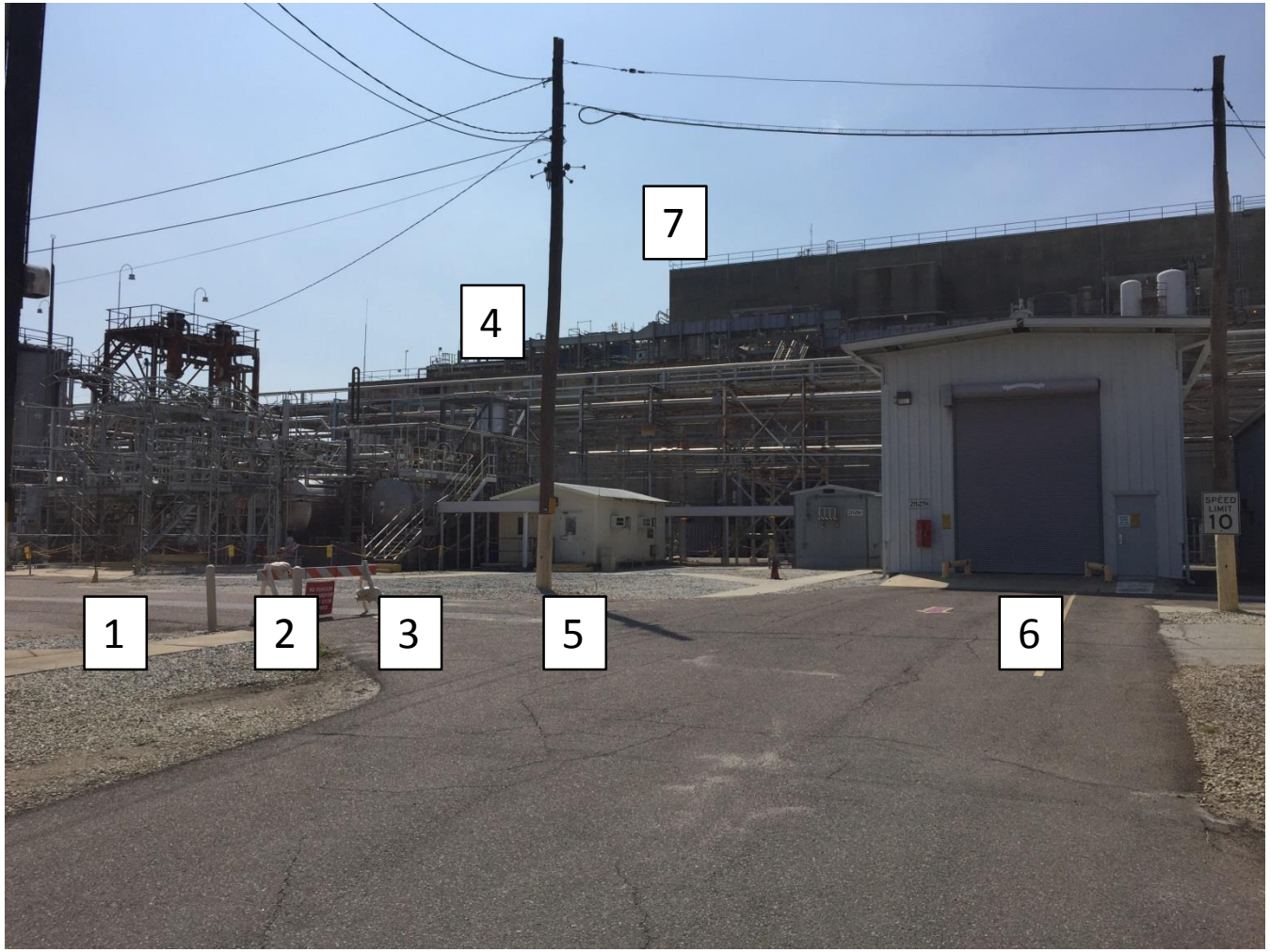
Loaded Trailer Exiting Station

Loading Station and Blend Tanks

Resumption of Blending Ops (Continued)

Area of H-Canyon Outside facility associated with storage and blending HEU to LEU in preparation for shipment to Tennessee Valley Authority

1 – NU unloading station
2 – Blend Ready HEU
3 – Blended HEU (LEU)
4 – LEU Drop Tank (225 gal)
5 – Control Room / Chg Rm
6 – Loading Station
7 – Canyon/HB-Line

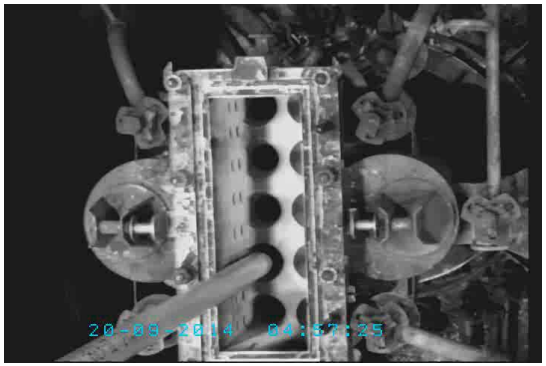


Summary

- SAFETY comes first!
- Some of our Facilities are One-Of-A-Kind National Assets (for example H-Canyon)
- We Stabilize/Disposition Nuclear Materials to:
  - Allow for de-inventory of DOE facilities
  - Meet non-proliferation goals
- We Operate in an Environmentally Sound Manner

TRM "Pig"*

*A "pig" is typically a heavily shielded vessel



Charging SNF to Dissolver

View from H-Canyon Roof

H-Canyon 2nd Level