



U.S. DEPARTMENT OF  
**ENERGY**



# H Canyon Facility Operations

*MTR, HFIR, and TRM*

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# H Canyon Background

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- Has operated since 1955
- SRS has never had an uncontrolled criticality accident
- Recovers Highly Enriched Uranium-235 (HEU) from on- and off-site reactor fuel rods and scrap
- Also can recover neptunium-237, plutonium-238 & plutonium-239
- Primary Objectives in SRNS Contract are to:
  - Stabilize SRS and other DOE complex wide legacy material to support footprint reduction and Category 1 & 2 Nuclear Fuels de-inventory (Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Y-12, Hanford)
  - Working to resume Blend Down of HEU with natural uranium to provide Tennessee Valley Authority with a Low Enriched Uranyl (LEU) Nitrate to produce fuel for use in commercial power reactors
  - Support U.S. non-proliferation goals

# H Canyon Facility – A National Treasure

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- Proven Performance - over 55 years of safe, reliable operation
- Only operational U.S. large-scale, shielded radiochemical separation facility capable of dispositioning surplus Spent Nuclear Fuel (SNF), and uranium, plutonium, and neptunium materials
- Demonstrated technology with flexible capabilities and low risks; operations **comply with today's environmental standards**
- Proven and qualified work force with demonstrated world class safety performance and disciplined operations
- Robust Systems and Support Infrastructure
  - Safety Class seismically qualified structure and exhaust ventilation
  - Engineered features for risk reduction
  - Modular/flexible process cells
  - Extensive support systems (e.g., cold chemicals, cooling water, steam)
  - Modern Safety Basis Analysis Document
- Stable operational costs and limited capital costs.

# Key Dates

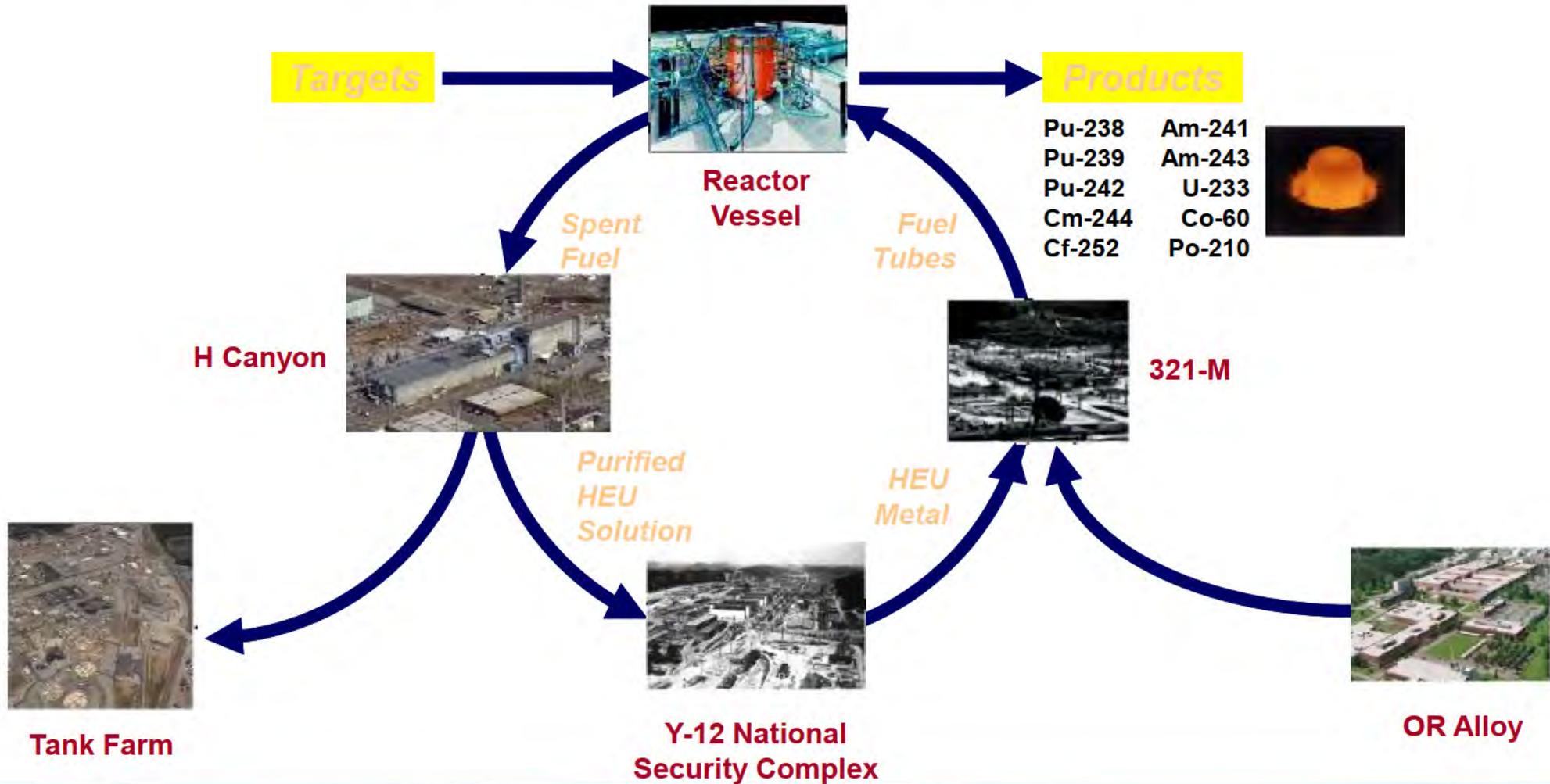
- **1955-1961**
  - Recovered Pu-239
- **1961-1964**
  - Recovered Pu-240
- **1961-1984**
  - Operated Frames for Pu-238 for Space Missions
- **1964-1969**
  - Recovered U-233 (THOREX)
- **1972-90**
  - Recovered U / Pu from stainless steel clad LEU fuels
- **1991-1992**
  - Recovered Pu-242
- **1992-95**
  - Cassini Pu-238 mission
- **1997-2003**
  - Stabilized Spent Fuel
- **2001-2002**
  - Stabilized legacy plutonium
- **2003-present**
  - HEU blending operations began
- **2004-2008**
  - Stabilize neptunium
- **2006**
  - Completed disposition of all SRS reactor fuel
- **2008-2010**
  - Processing NNSA HEU materials
- **2009**
  - Process Pu from 3013 Surveillance Program
- **2010**
  - Ready to process used HEU research reactor fuel
- **2017**
  - Target Residue Material



**H-Canyon/HB Line Pu-238  
Cassini campaign  
1992-1995**

# SRS Fuel Cycle

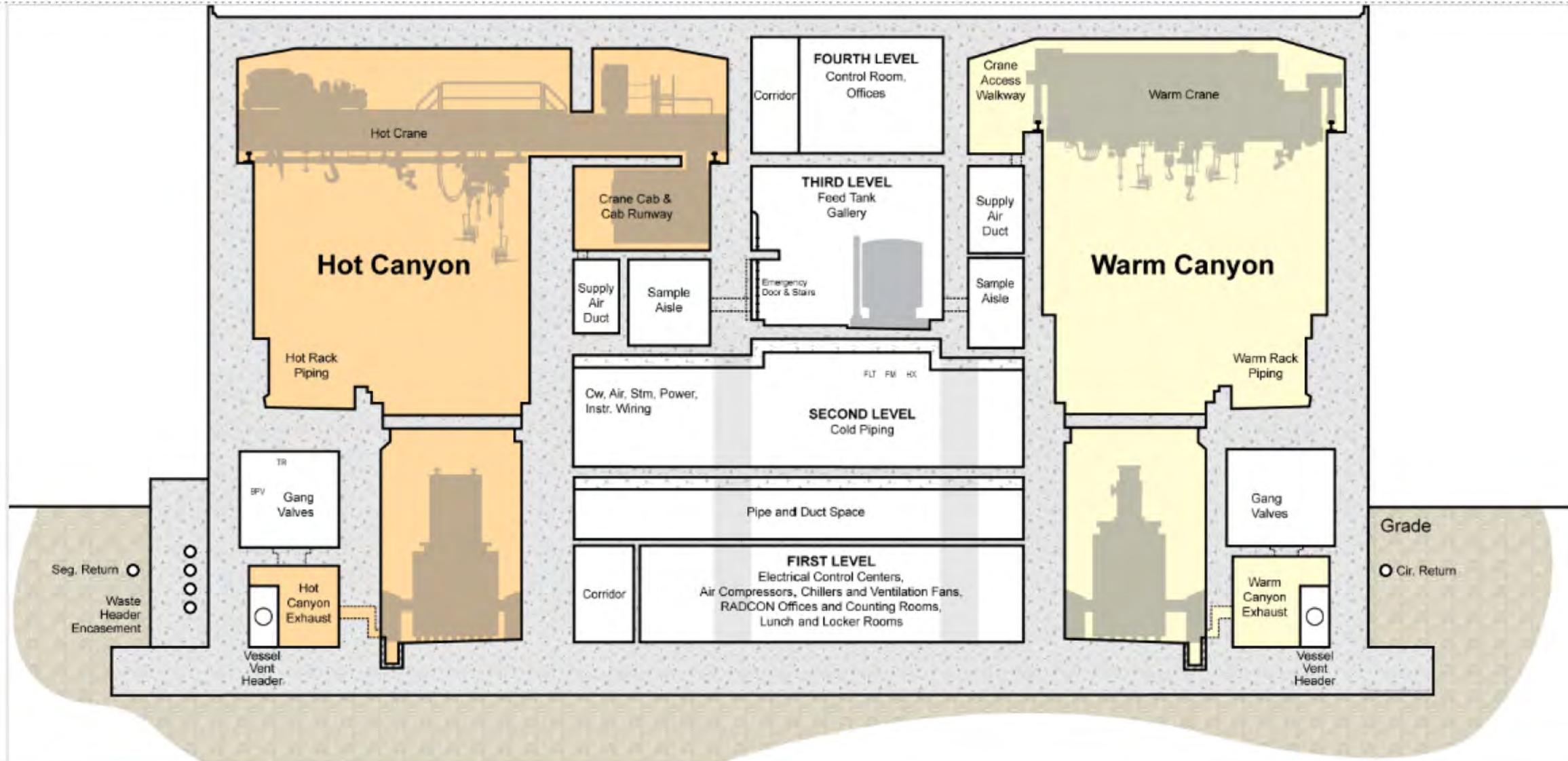
185 MT of HEU Processed Through Cycle (1960-1988)



# H Canyon



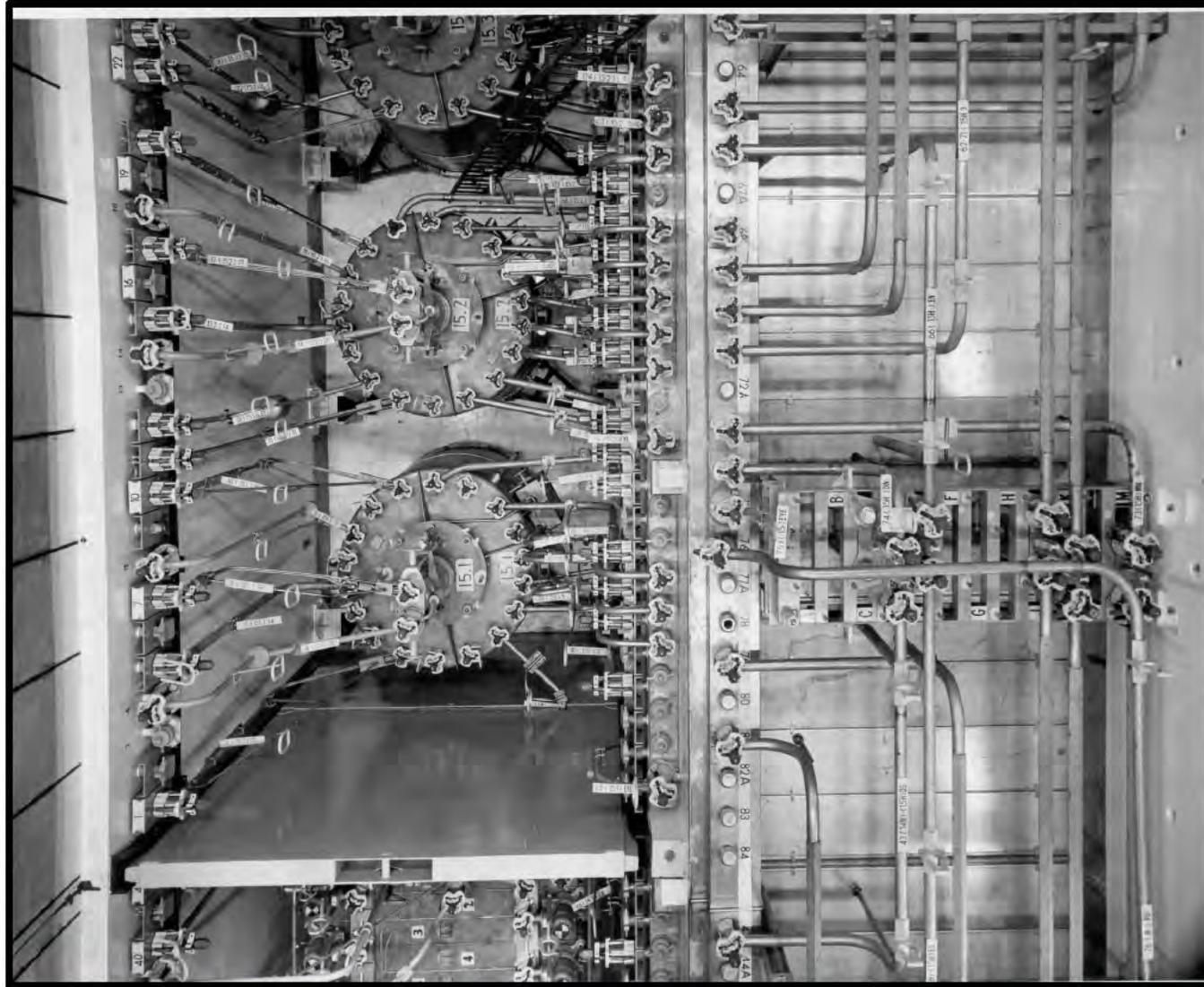
# H Canyon Cross Section



# Warm Canyon Interior – No Cell Covers



# Canyon Cell Arrangement (Typical)



# Sand Filter (Safety Class Credited Exhaust System)



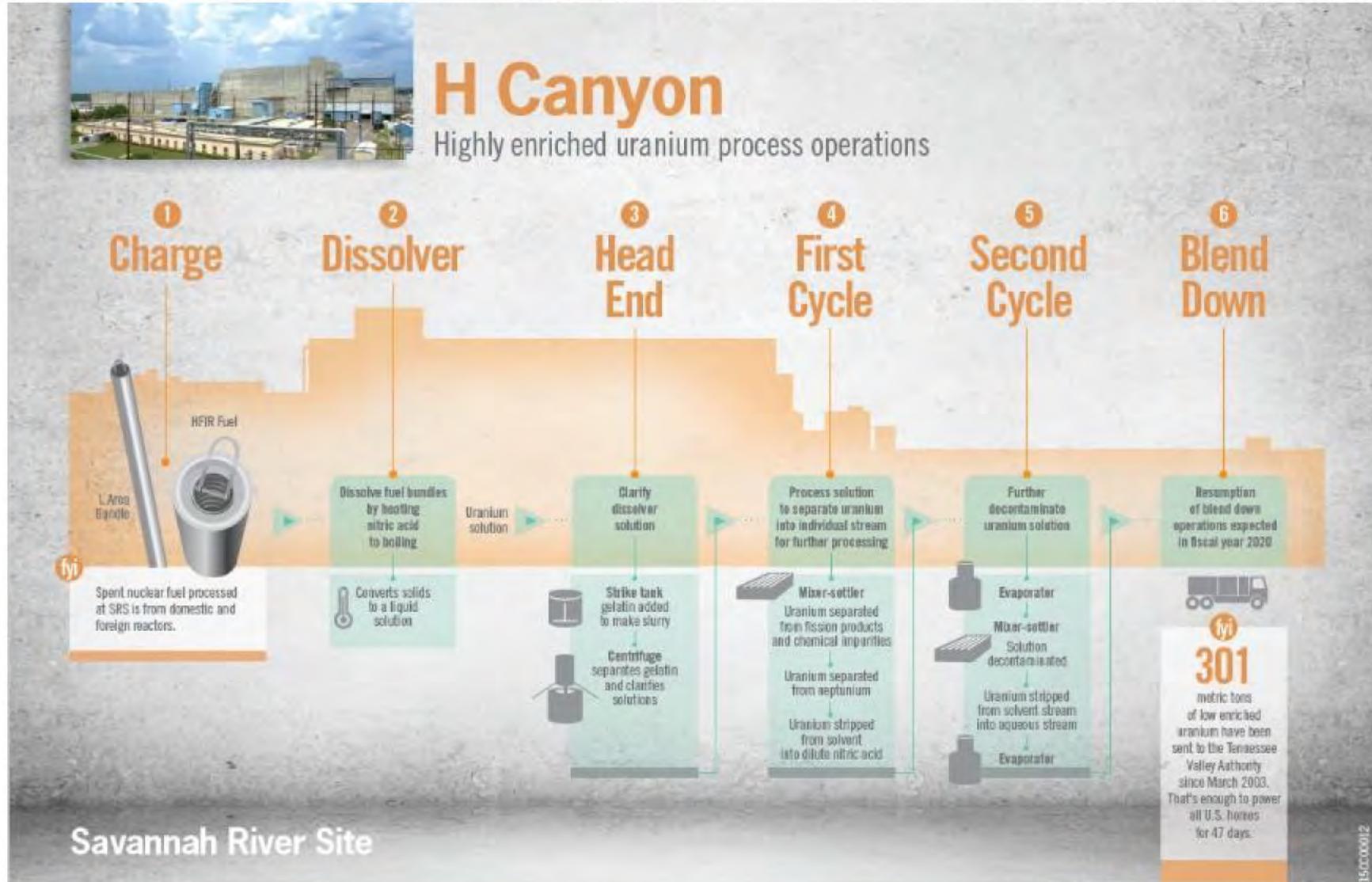
# Tunnel Inspection

## General Equipment Layout Inside

- Robotic Crawler
- Overhead Trolley and Hoist
- Video Display Inside Hut/Control Trailers



# H Canyon Process



# HFIR Shipping

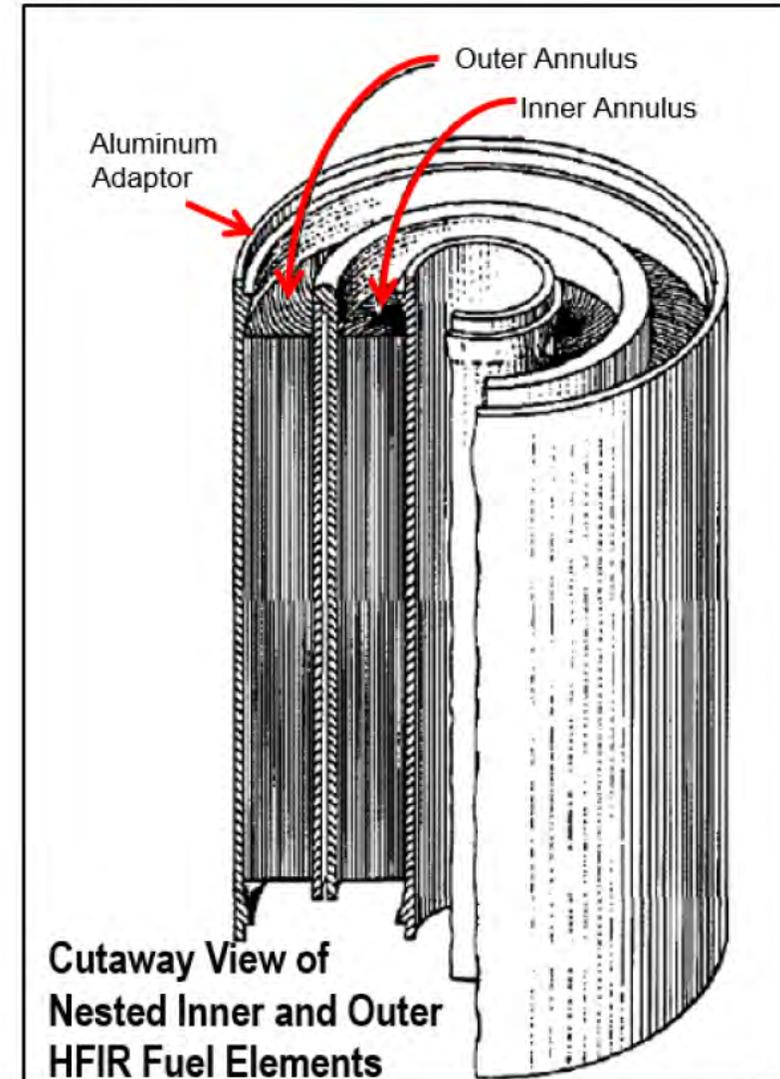


- 70-Ton Cask Car with HFIR Insert



# High Flux Isotope Reactor (HFIR) Elements

- A HFIR assembly is composed of
  - an outer element that is approximately 17" in diameter and 31" long,
  - and an inner element that is approximately 10.5" in diameter and 31" long.
- These fuel elements both contain a large number of involute (curved) fuel plates within nested cylindrical aluminum side plates.
- The fuel plates are composed of aluminum-clad with the uranium enriched to approximately 93.1%  $^{235}\text{U}$ .



# Material Test Reactor Fuel Types



# Canadian Target Residue Materials (TRM)

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- Highly Enriched U-235 Liquid
  - HEU > 60 wt% U-235
- Funding Provided by Canada
- Brought to SRS in Containers (4 per cask)
- Unloaded in the Truckwell and pumped to Tank 8.8
- Control Room will monitor Tank 8.8 for increase during pumping

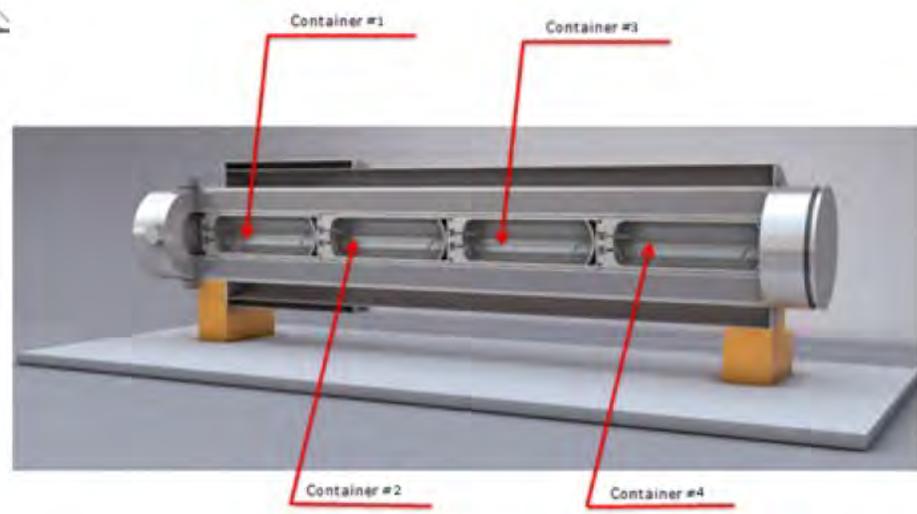
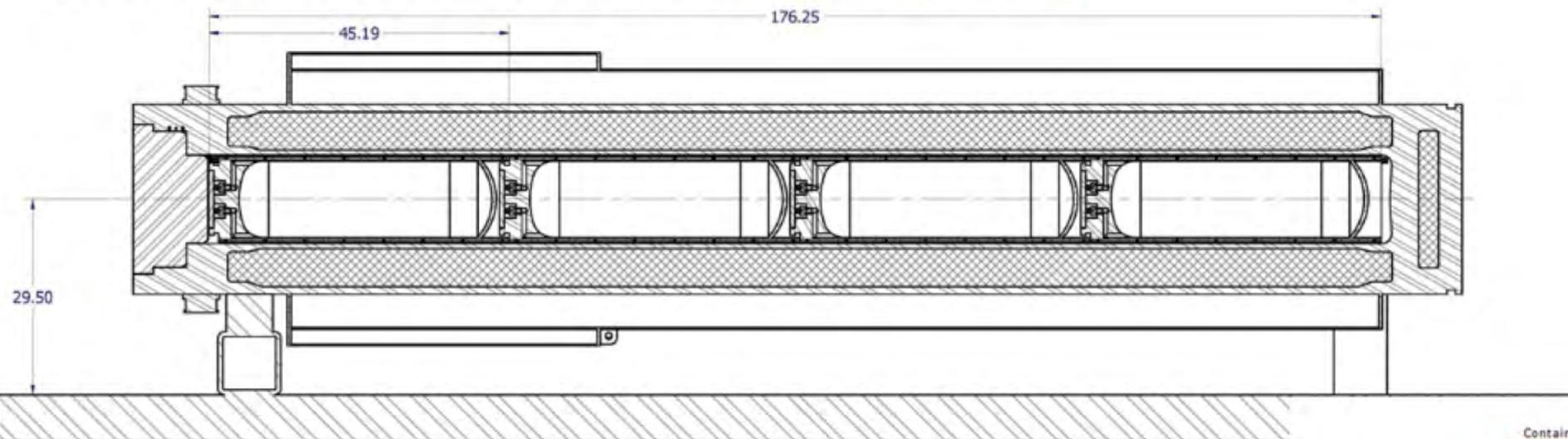
# TRM Delivery



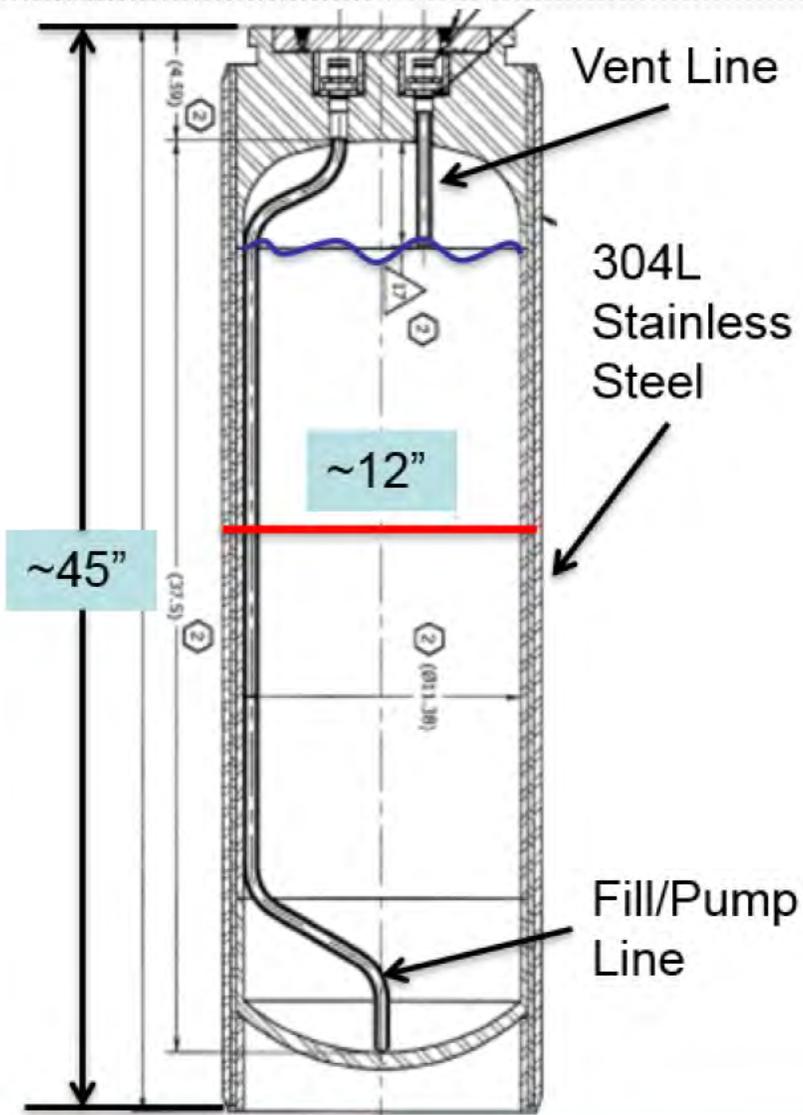
# Cask Removal from Trailer



# Cask and Lid Removal Tool (NAC)



# NAC Container



- Container holds ~14.0 gal
- 1 gal Head space at top for H<sub>2</sub> buildup and expansion
- Filled and emptied vertically, shipped horizontally
- Volume set for Critical Mass Controls U-235 700 gram
- Each Container holds significantly less U-235 than Critical Mass

# TRM Unloading Equipment



# LEU Shipment Leaving SRS



# Questions?

