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Load Planning in the Dark, RH-TRU Waste Container Load Planning at Sandia National Laboratory

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Sandia is a multi-program laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Background

- Experiments during the 1970s and 1980s with fresh and irradiated mixed oxide (MOX) and uranium oxide (UO_2) materials
- Designed to simulate various responses under varying reactor conditions
- Research materials from light water and breeder mixed oxide reactors

Background

- Experimental vessels and extraneous piece parts identified as eligible for disposal as remote-handled (RH) transuranic (TRU) waste
- Central Characterization Project provided certified Acceptable Knowledge, Visual Examination, and Dose-to-Curie
- Sandia required to prepare plan describing how to load each daughter container

What Was Known and Unknown

Known

- Packaged 20-30 years ago
- Had MC&A radiological data, no sampling required
- Had outer dimensions of packaging

Unknown

- No inner dimensions of items
- Limited information regarding packaging
- Extend of outer contamination
- Experiment breached

Material

- **Based on outer packaging configuration and radiological data:**
  - **Small FD experimental vessels, Campaign 11**
  - **Pieces and kerf, Campaign 12**
  - **Large experimental vessels, Campaign 14**

Campaign 11, Fuel Disruption Casks

- 18 FD casks
- 1 small container
- 55-gallon drum
- 89-769 kilograms

Campaign 12, Pieces and Kerf

- 11 containers
- In marked bags, metal tubes, cans, or direct loaded
- 42 to 2,000 kg

Campaign 14, Large Vessels

- **Seven assemblies**
  - **5 large vessels**
  - **FD cask**
  - **Drum**
- **76 cm to 3.1 m in length**
- **~113 kg**

Technical Challenges

- Minimize number of containers
- Direct load or shield pots in 30-gallon drums then into 55-gallon
- Load 1 parent to 1 daughter, or multiple parents to one daughter, not load 1 parent to 2 daughters
- Fit large items into 30-gallon drum

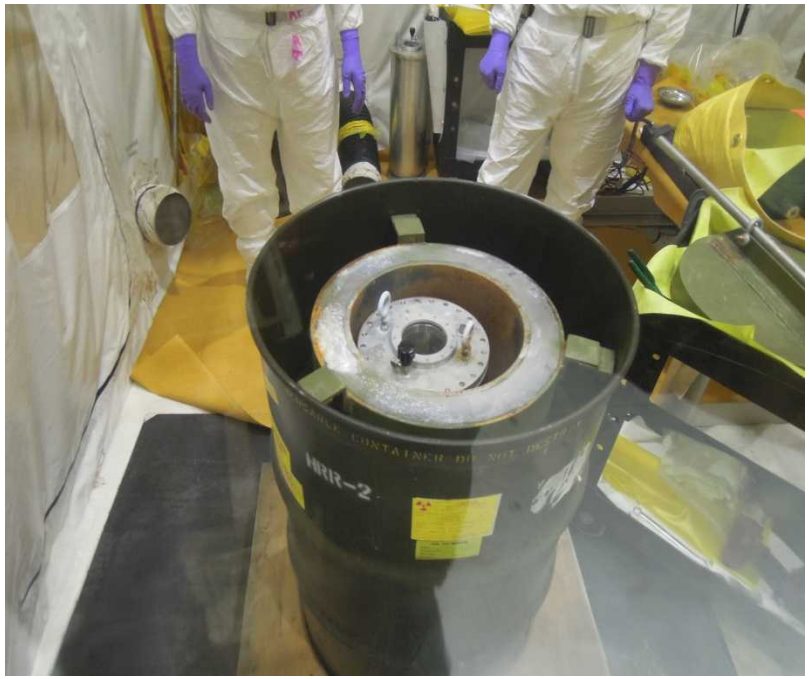
Auxiliary Hot Cell (AHC)

Physical Challenges

- **Entry into the hot cell is limited through a small roof opening**
- **Weights of casks between a few hundred to several thousand pounds**
- **Some containers could not physically fit through the entry port**
- **Casks opened behind shield wall in a confinement tent**

Campaign 11 Processing

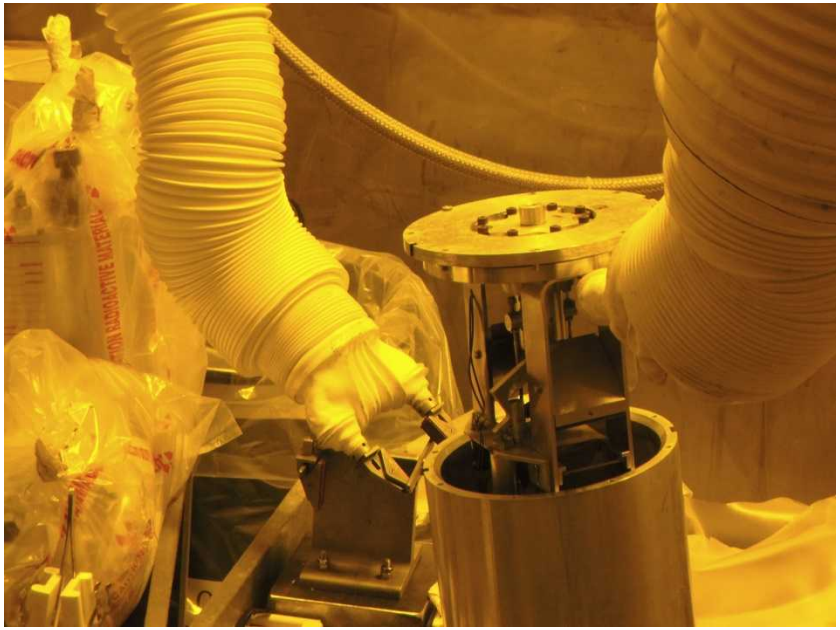
- Inner container removed in tent
- Transferred to hot cell
- VE into 30-gallon
- Removed and placed into 55-gallon



Campaign 11, Daughters

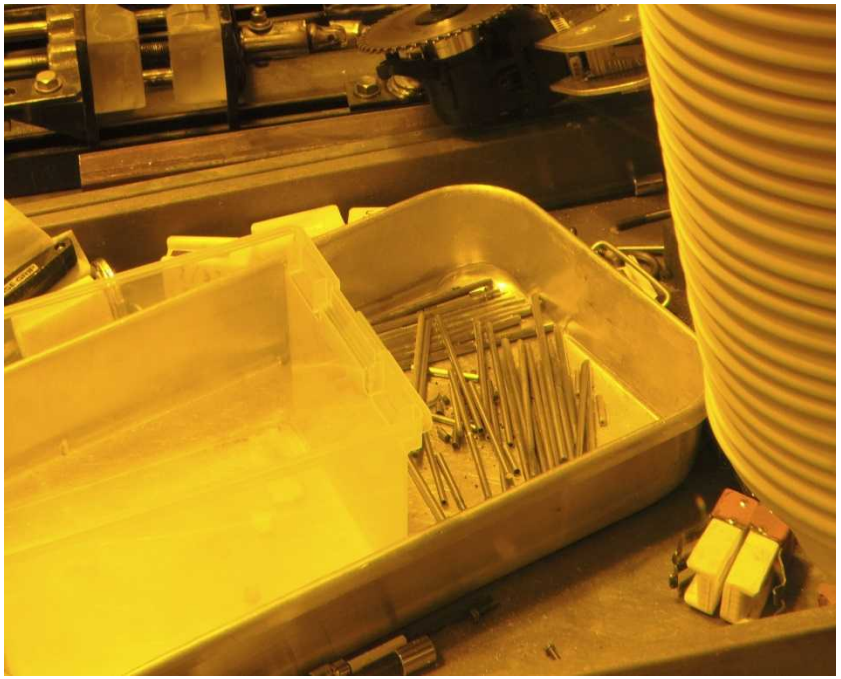
19 original containers

3 55-gallon drums



Campaign 12 Processing

- Removed cans and tubes in tent
- Transferred to hot cell
- Opened cans and tubes
- VE, into shield pots
- 7-gallon/30-gallon
- Removed/placed in 55-gallon

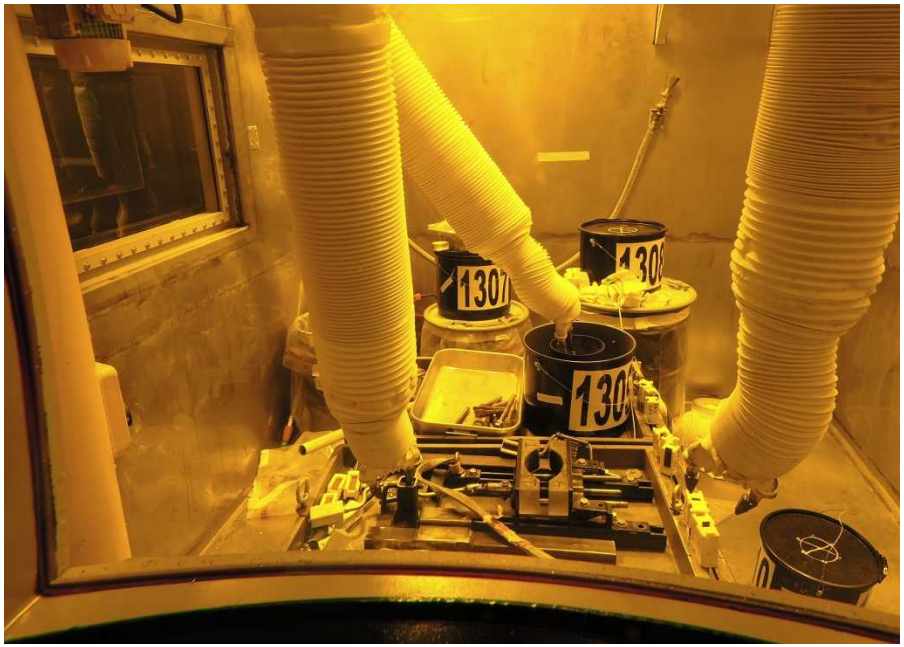


Campaign 12, Daughters

11 original containers

4 55-gallon drums

- **2 with shield pots**
- **2 direct load**



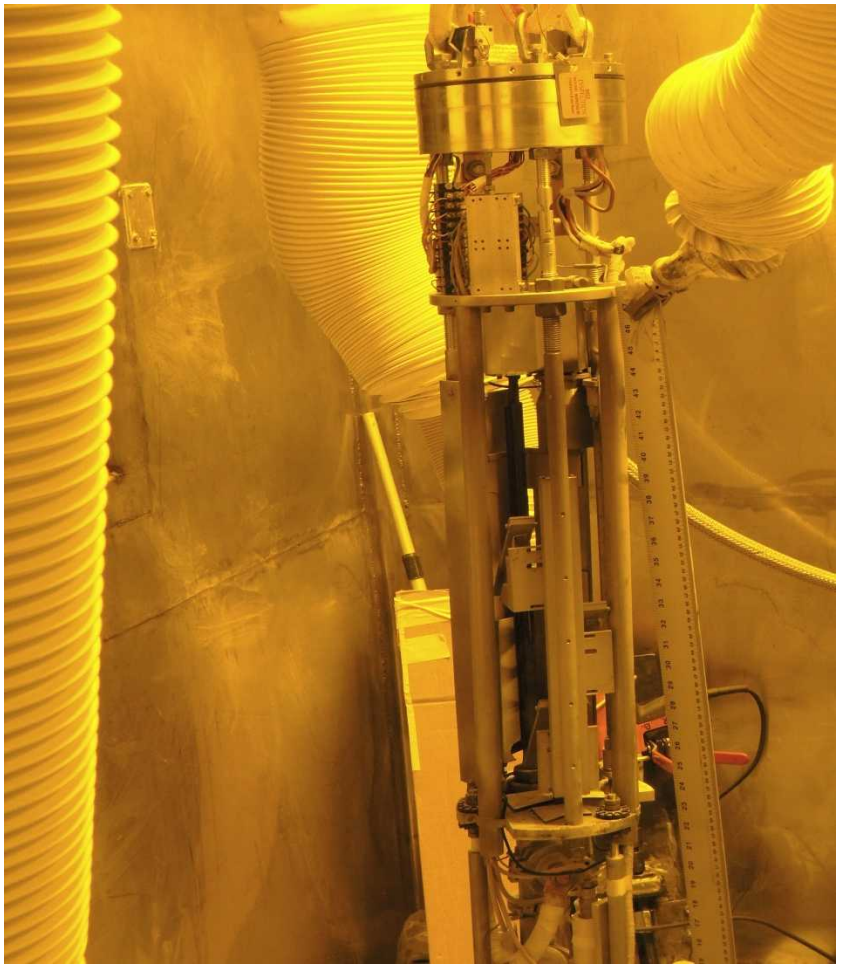
Campaign 14 Processing

- Stored in silos in tent
- Removed outer containers
- Transferred to hot cell
- Cut up, VE, 30-gallon
- Removed into 55-gallon

Campaign 14 Daughters

7 original containers

5 55-gallon drums



Path Forward

- **February 2014 began repackaging**
- **Two VE operators assigned to this project**
- **Completed VE of campaigns in December 2014**
- **Currently packaging PGW**
- **Dose to Curie will be scheduled in spring 2015**

Baseline Report

- **Baseline certification program at Sandia closed after 2012 shipment**
- **EPA, NMED, CTAC in July 2014**
- **Draft Baseline Report in process**

Conclusions

- **Sandia, Sandia Field Office, CBFO, and NWP worked together to develop and implement a path forward for the TRU waste**
- **ANL support very beneficial and reduced planning time**
- **End goals for all involved have been the same**

Thanks

- AHCF operators
- TA-V RP
- TA-V management and support staff
- NWP RH Manager, SPM, AKEs, Rad engineers
- VE operators from INL and LANL
- DTC operator from SRS