



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
**ENVIRONMENTAL
MANAGEMENT**

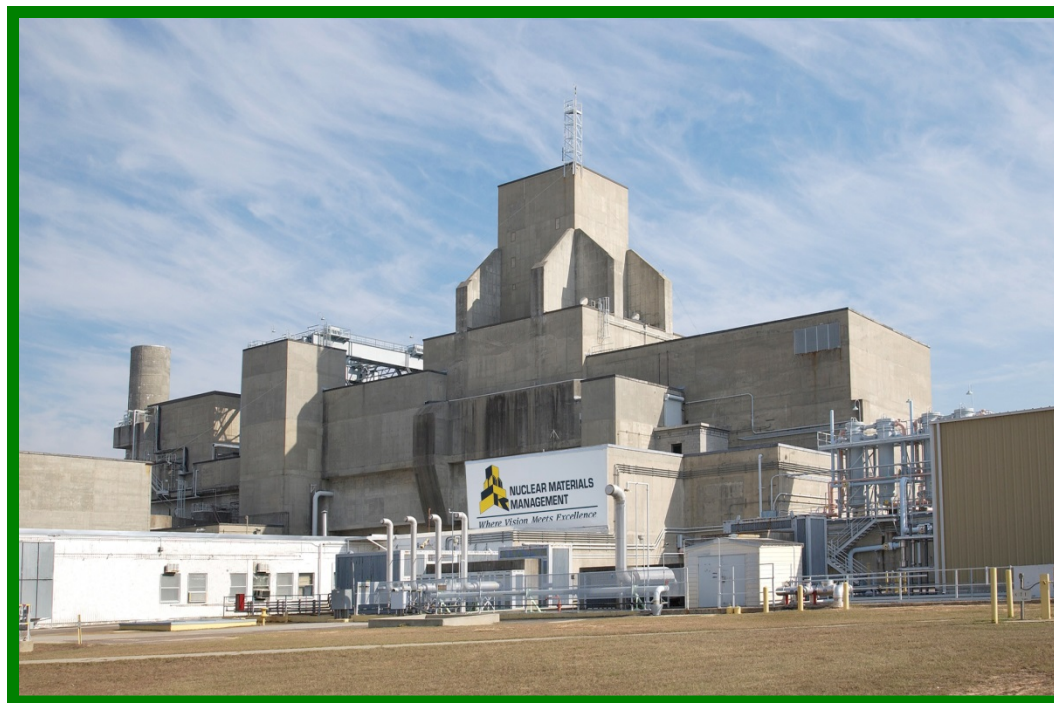
K Area Overview/Update

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**Nuclear Materials Committee
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- To provide information on K-Area and Plutonium storage which fulfills a Nuclear Materials Programs work plan item.



Acronyms

DOE – Department of Energy

DE – Destructive examination

LANL – Los Alamos National Laboratory

LLNL – Lawrence Livermore National Laboratory

MIS – Materials Identification and Surveillance

NDE – Non-destructive examination

PSI – Pounds per square inch (gas pressure above atmospheric)

Pu – Plutonium

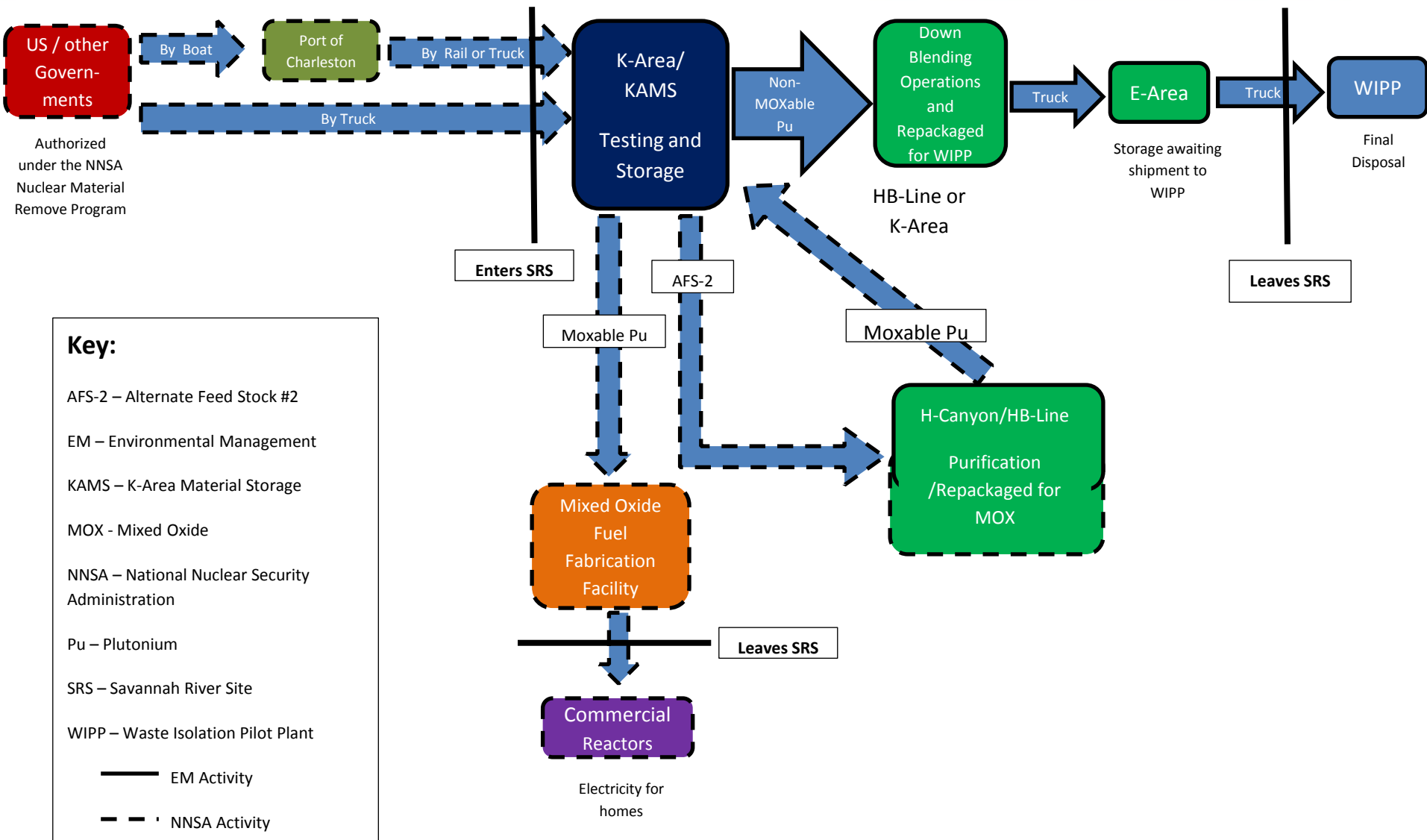
RFETS – Rocky Flats Environmental Technology Site

SRS – Savannah River Site

SRNL – Savannah River National Laboratory

- 1994 Department decided to stabilize, package and store excess plutonium until final disposition
- 1994 Department issued Standard DOE-STD-3013, “Stabilization, Packaging, and Storage of Plutonium-Bearing Materials”
 - Robust oxide stabilization – at least 950 °C for two hours
 - Robust packaging – two welded, nested stainless steel containers
 - Requires surveillance program to assure there is no long term degradation of containers
- Plutonium stabilization and packaging began in late 2001
 - Rocky Flats Environmental Technology Site (RFETS)
 - Hanford Site
 - Los Alamos National Laboratory (LANL)
 - Lawrence Livermore National Laboratory (LLNL)
 - Savannah River Site (SRS)

SRS Plutonium Flow Path



K Area Storage in 2000



K Area Storage in 2009



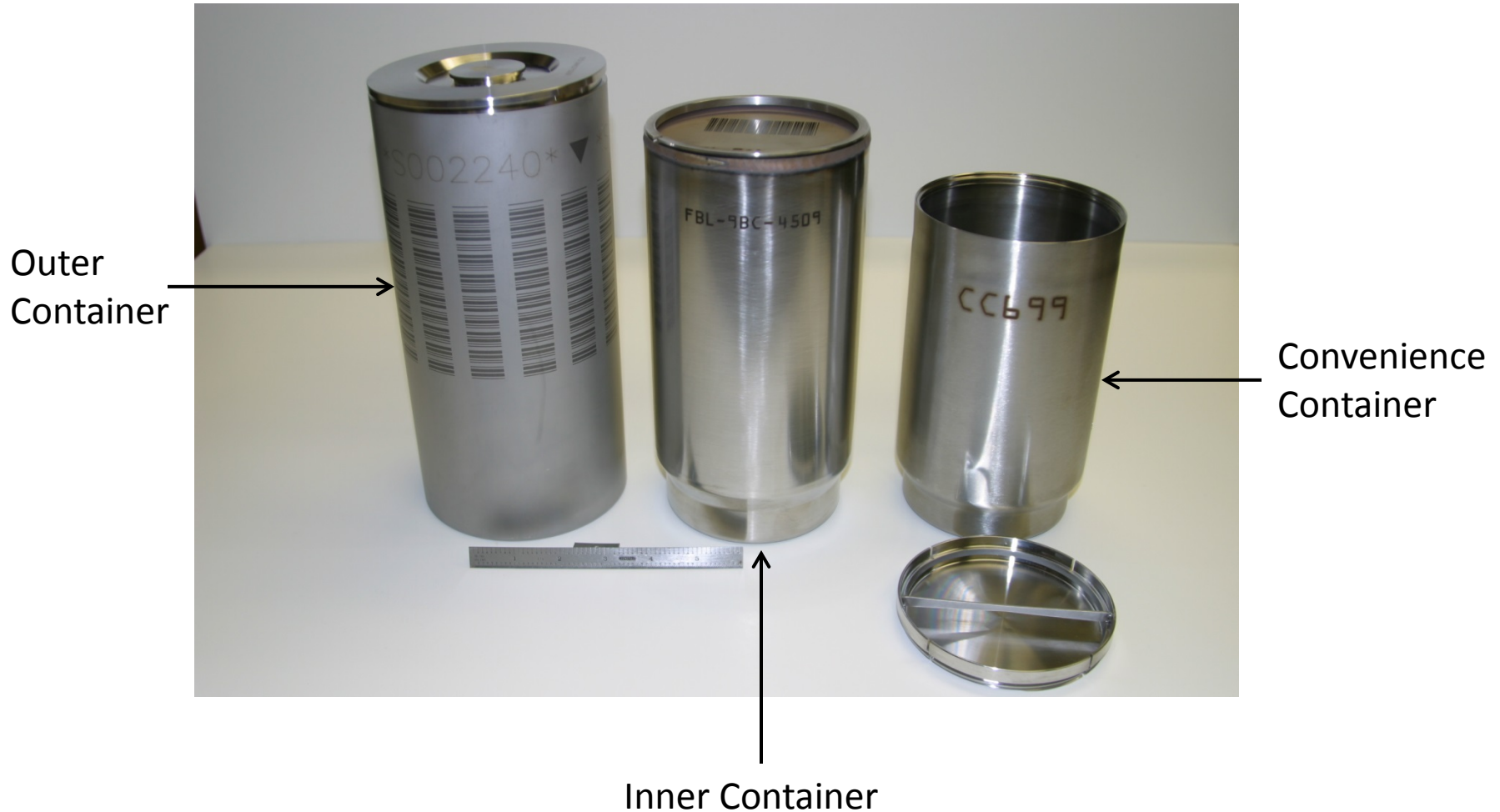


3013 Container
(~30 lbs.)



9975 Shipping Container
(~400 lbs.)

Example 3013 Container Set (SRS)

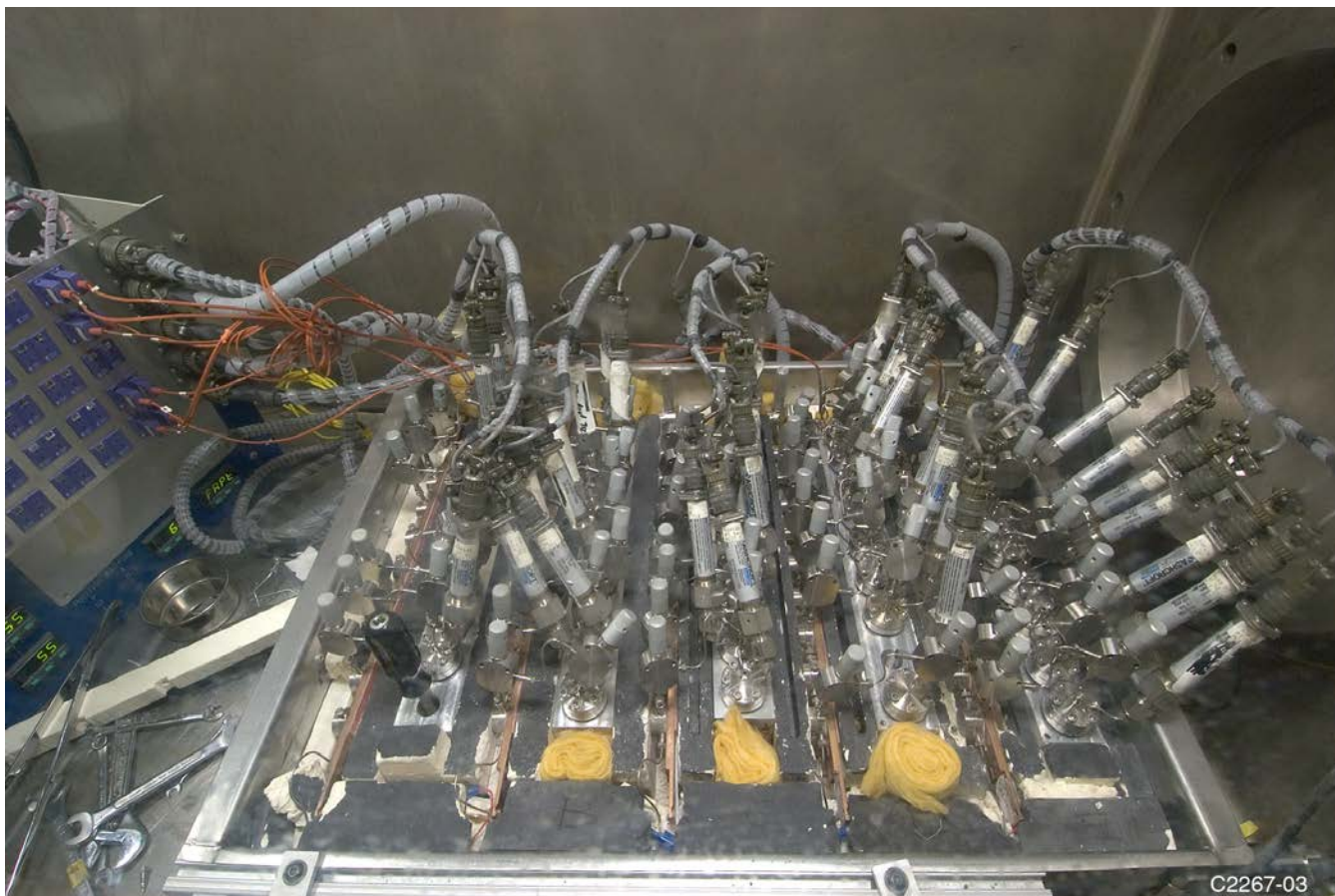


Cross Sectional of 9975 Shipping Container

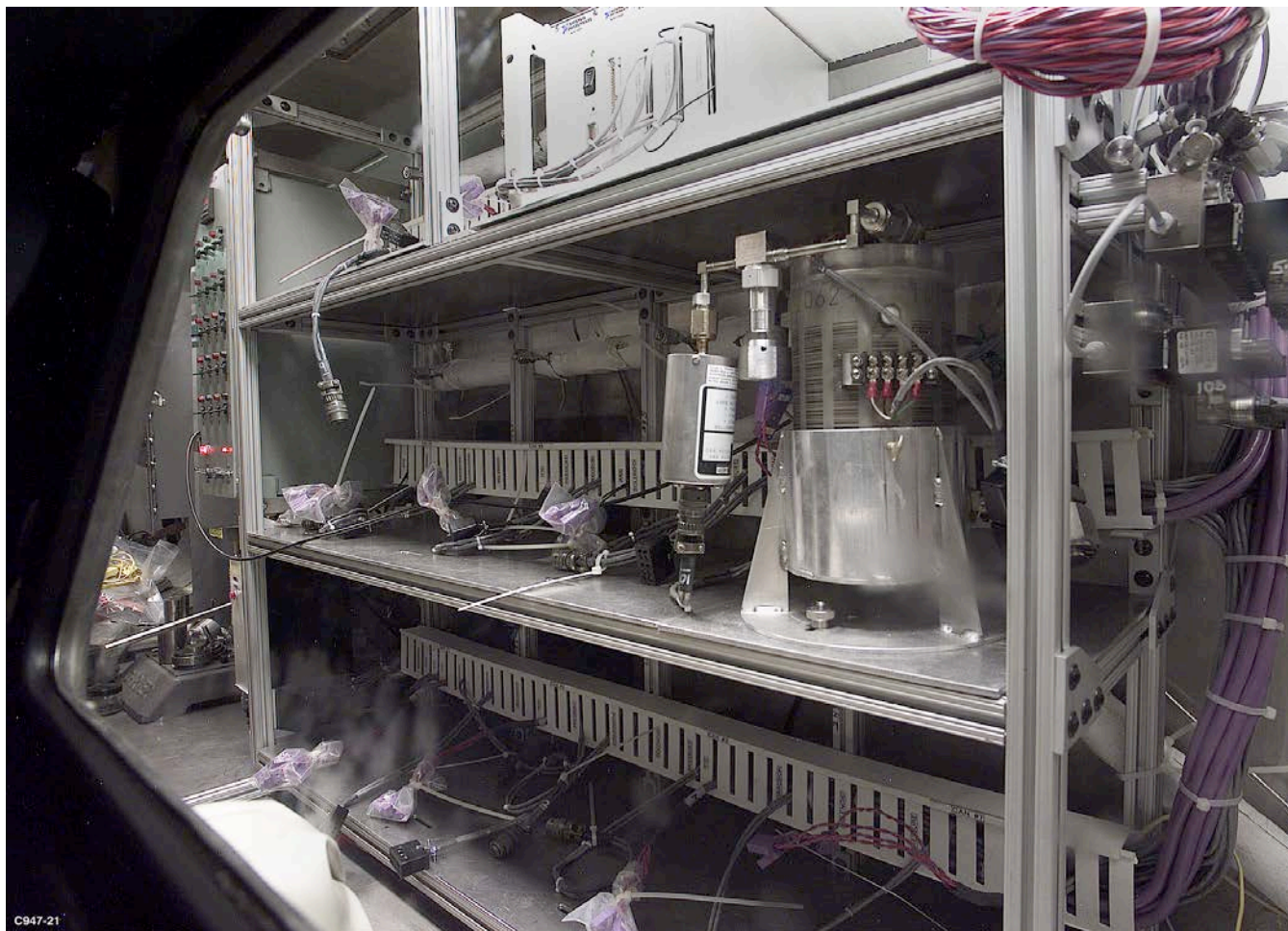


- Surveillance and Monitoring Program approved in 2003
- Materials Identification and Surveillance (MIS) Working Group provides guidance and performs the technical oversight for the program
 - Consists of technical experts from the plutonium processing sites and laboratories (SRS, Hanford, LANL, and LLNL)
 - Directs Shelf-Life tests and corrosion tests and evaluates the results
 - Shelf-Life tests at LANL
 - Corrosion tests at LANL and SRNL
 - Selects 3013 containers for examination at SRS and evaluates the results
 - Containers selected are a combination of randomly selected containers and ones selected by the MIS based on Shelf-Life and surveillance results
- Shelf-Life and corrosion tests
 - Containers of plutonium-bearing materials were selected that are representative of all of the different types of materials packaged
 - Instrumented tests of “representative” samples that bound the amount of water allowed by the 3013 Standard
 - Small scale (1/50th scale) – 45 test positions
 - Large scale (full scale) – 9 test positions
 - Also testing plutonium surrogates that bound the chloride salt and water contents
 - Tests bound the gas generation and corrosion that might occur in actual containers

- Non-destructive examination (NDE) and destructive examination (DE) of stored 3013 containers are performed at SRS
- NDE started in 2005
 - Radiographic examination for possible pressurization
 - External examination of containers for any evidence of corrosion
 - NDE of the randomly selected containers was completed in FY2010
- DE started in 2007
 - Analyzes gas composition and measures gas pressure
 - Metallurgical examination of containers for evidence of corrosion
 - Chemical and physical analyses of the material
 - Currently examining 6 containers per year
 - Scheduled to complete randomly selected containers in FY25
 - DE will continue as long as containers are stored at SRS



Small Scale Test Rack
(shown during installation)

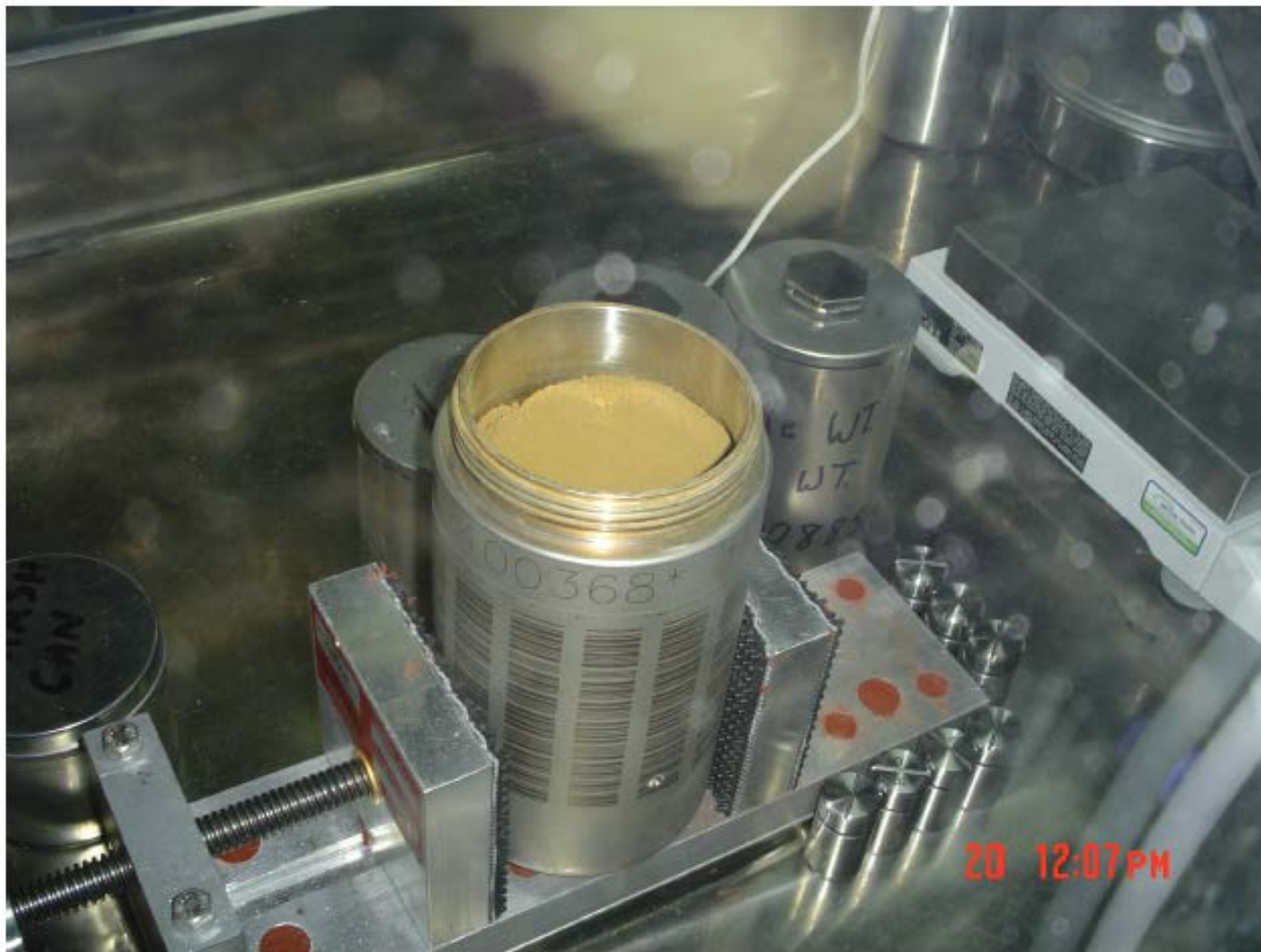


Full Scale Test Rack
(shown during installation)



3013 Container Cut for Oxide Removal and Metallurgical Examination

Convenience Container with Pu Oxide



Pu Oxide Dumped into Pan for Sampling



- Maximum Pressure inside the 3013 container is less than 10 psi compared to the 699 psi container design pressure
- No flammable gas mixtures (hydrogen with no oxygen)
- Some corrosion seen on the convenience can, usually in the gas space or oxide can interface area
- Minimal corrosion on the inside of the inner can around the weld area
- Surveillance program has not identified any condition that would challenge the 50 year storage life
- Continue to perform Destructive Examinations in K Area and Shelf-Life program at LANL to validate storage life

- Pu is safely stored in K-Area
- SRS continues to evaluate storage conditions to ensure safe storage
- SRS has the experienced staff and facility to handle Pu