



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
**ENVIRONMENTAL
MANAGEMENT**

K Area Overview/Update

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DOE-Savannah River

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

Pu Stabilization and Packaging for Storage

- 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)

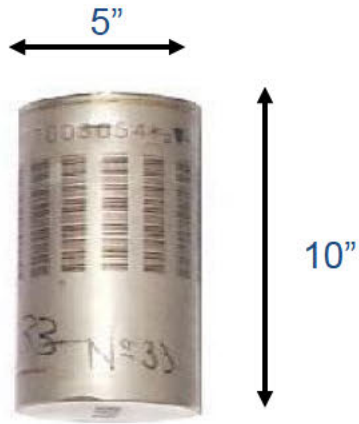
K Area Storage in 2000



K Area Storage in 2009



K Area Storage Configuration

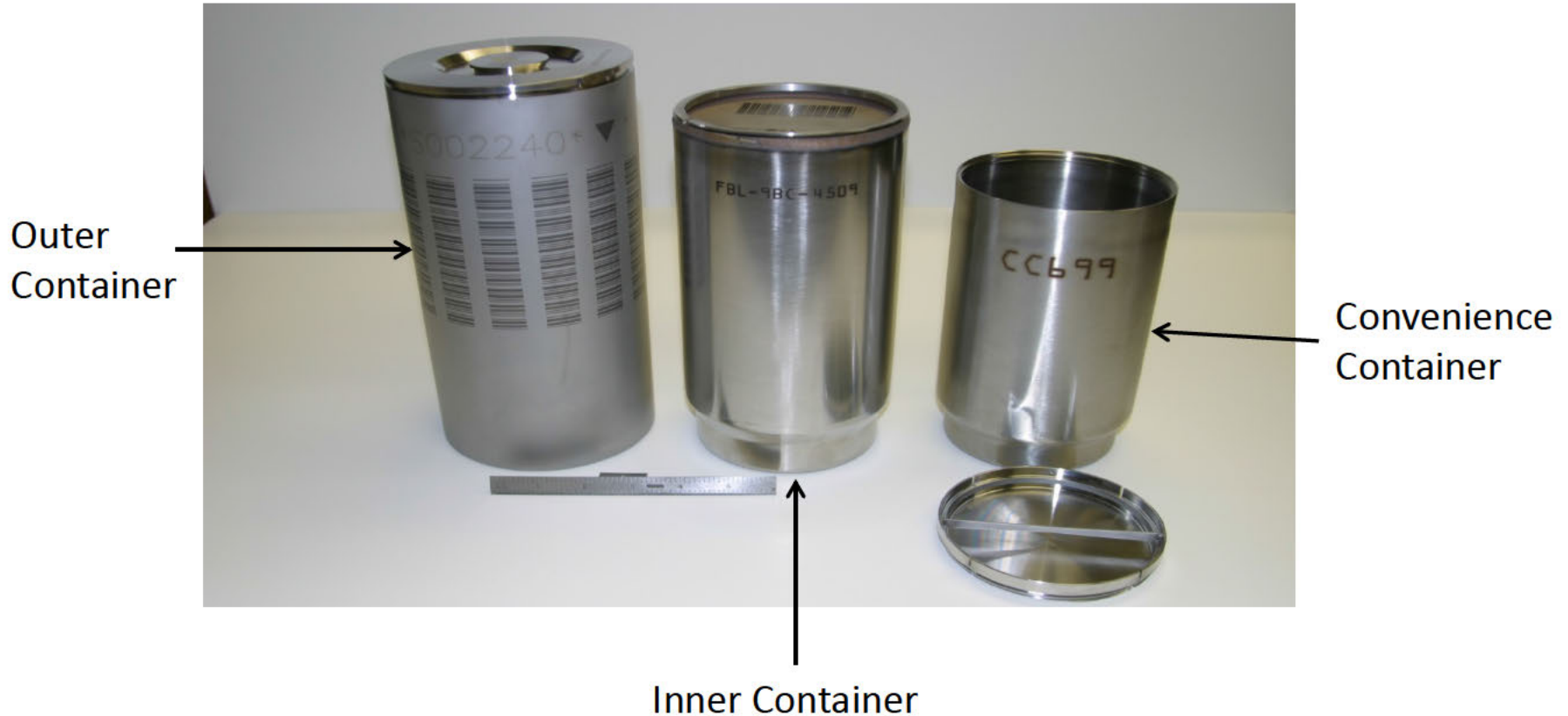


3013 Container
(~30 lbs.)



9975 Shipping Container
(~400 lbs.)

Example 3013 Container Set (SRS)



Cross Sectional of 9975 Shipping Container

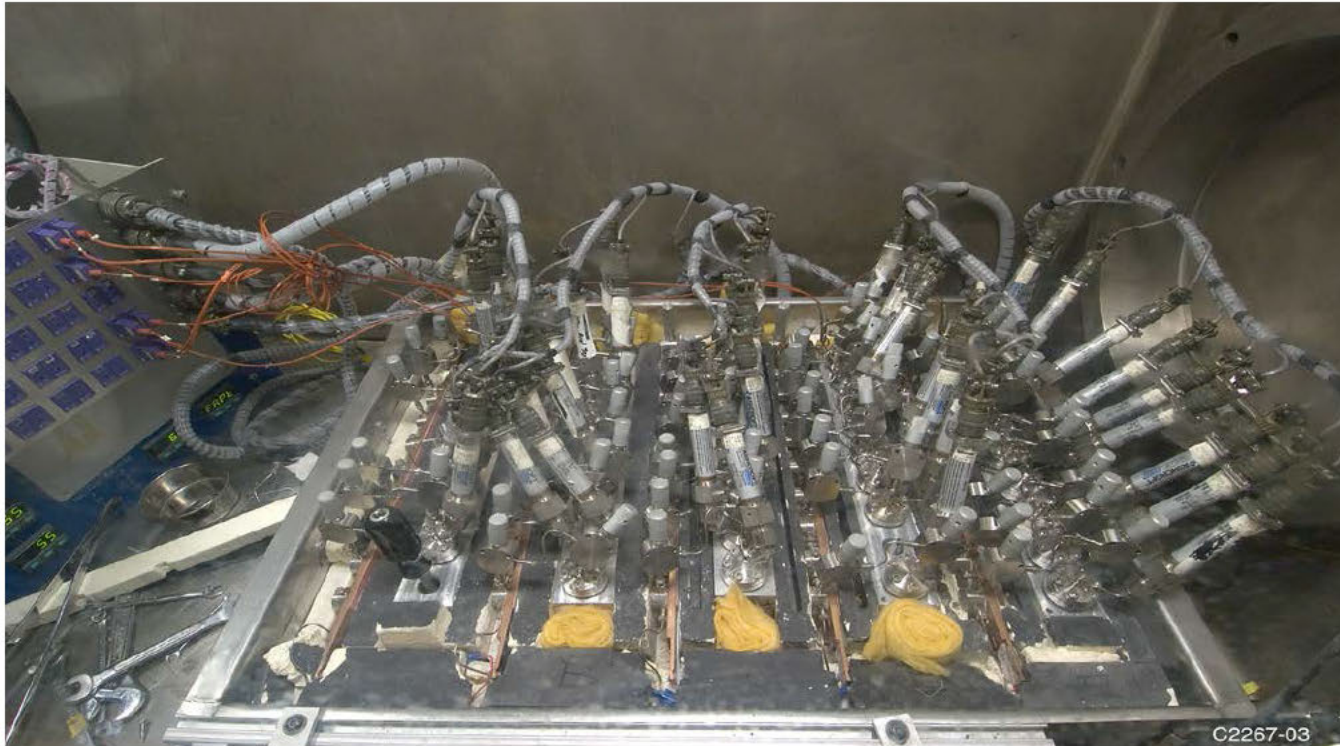


2013 Surveillance Program

- 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

3013 Surveillance Program (cont.)

- 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)



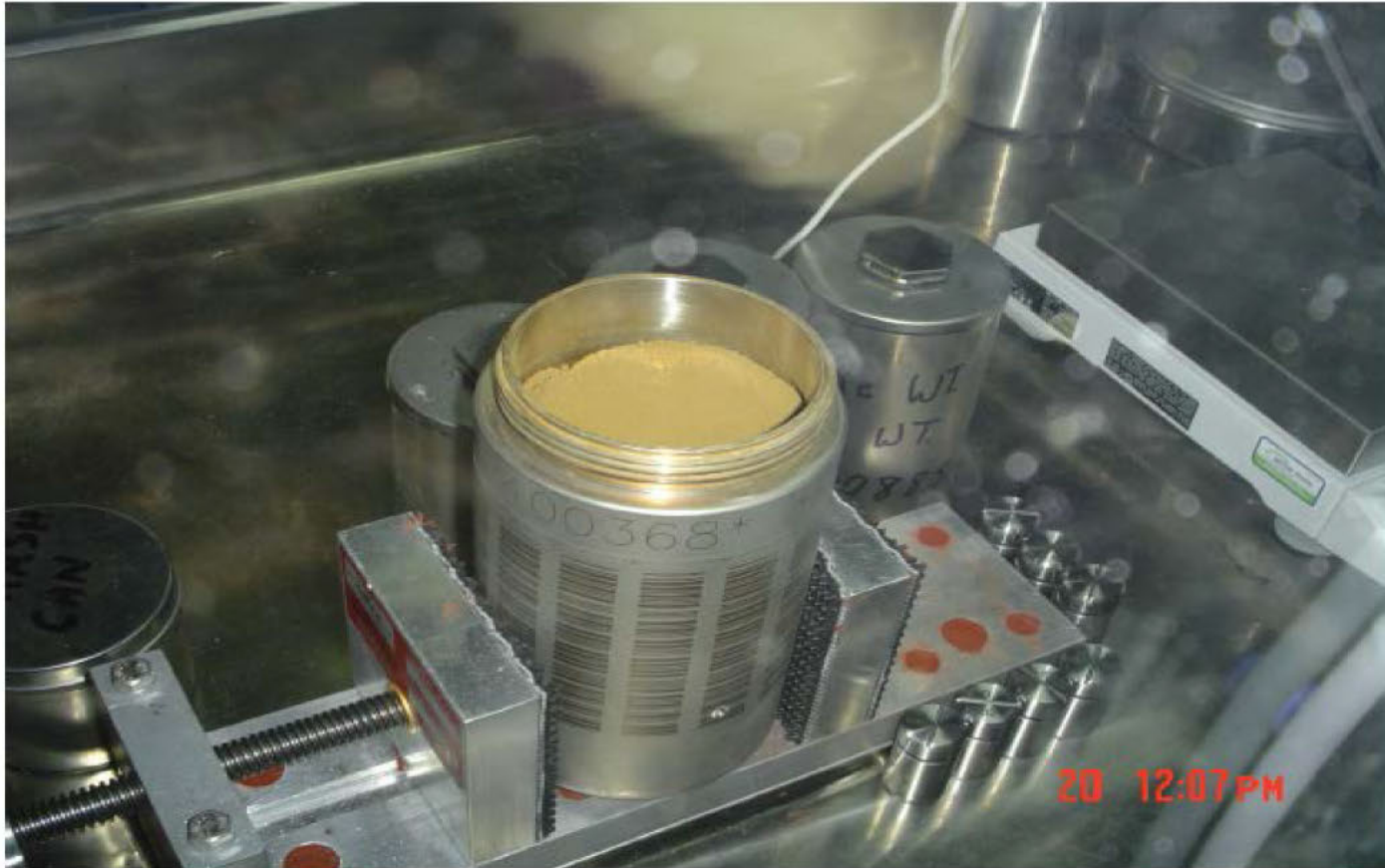
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Full Scale Test Rack
(shown during installation)



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

Summary

- 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