EM Plutonium Disposition Strategy

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Citizens Advisory Board

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Repurposed Reactor Facility at Savannah River Site for storage/disposition of Surplus Pu

Acronyms

CCO – Criticality Container Over-pack

DOE – Department of Energy

DE – Destructive examination

FGE – Fissile Gram Equivalent

KIS – K Interim Surveillance

LANL – Los Alamos National Laboratory

LLNL – Lawrence Livermore National Laboratory

MIS – Materials Identification and Surveillance

NDA – Non-destructive assay

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

SWMF – Solid Waste Management Facility

WIPP – Waste Isolation Pilot Plant

Pu Stablization and Packaging for Storage

- 1994 Department decided to stabilize, package and store excess plutonium until final disposition

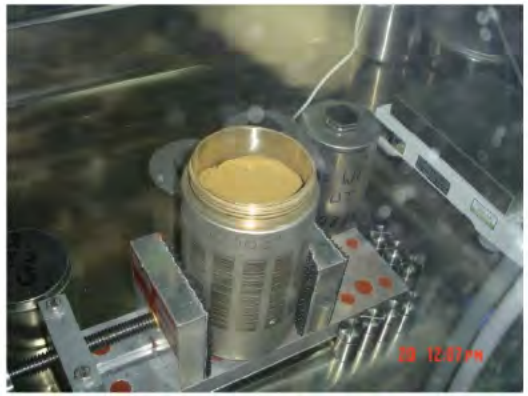
- 1994 Department issued Standard DOE-STD-**3013, "Stabilization, Packaging, and Storage of** Plutonium-**Bearing Materials"**
  - Robust oxide stabilization – at least 950 °C for two hours
  - Robust packaging – two welded, nested stainless steel containers
  - Requires surveillance program to assure 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)

Storage in K-Area

3013 Container
(~30 lbs.)

Type B - 9975 Plutonium Shipping container (~400 pounds)



Opened 3013 Container

3013 Surveillance Program

- Surveillance and Monitoring Program approved in 2003

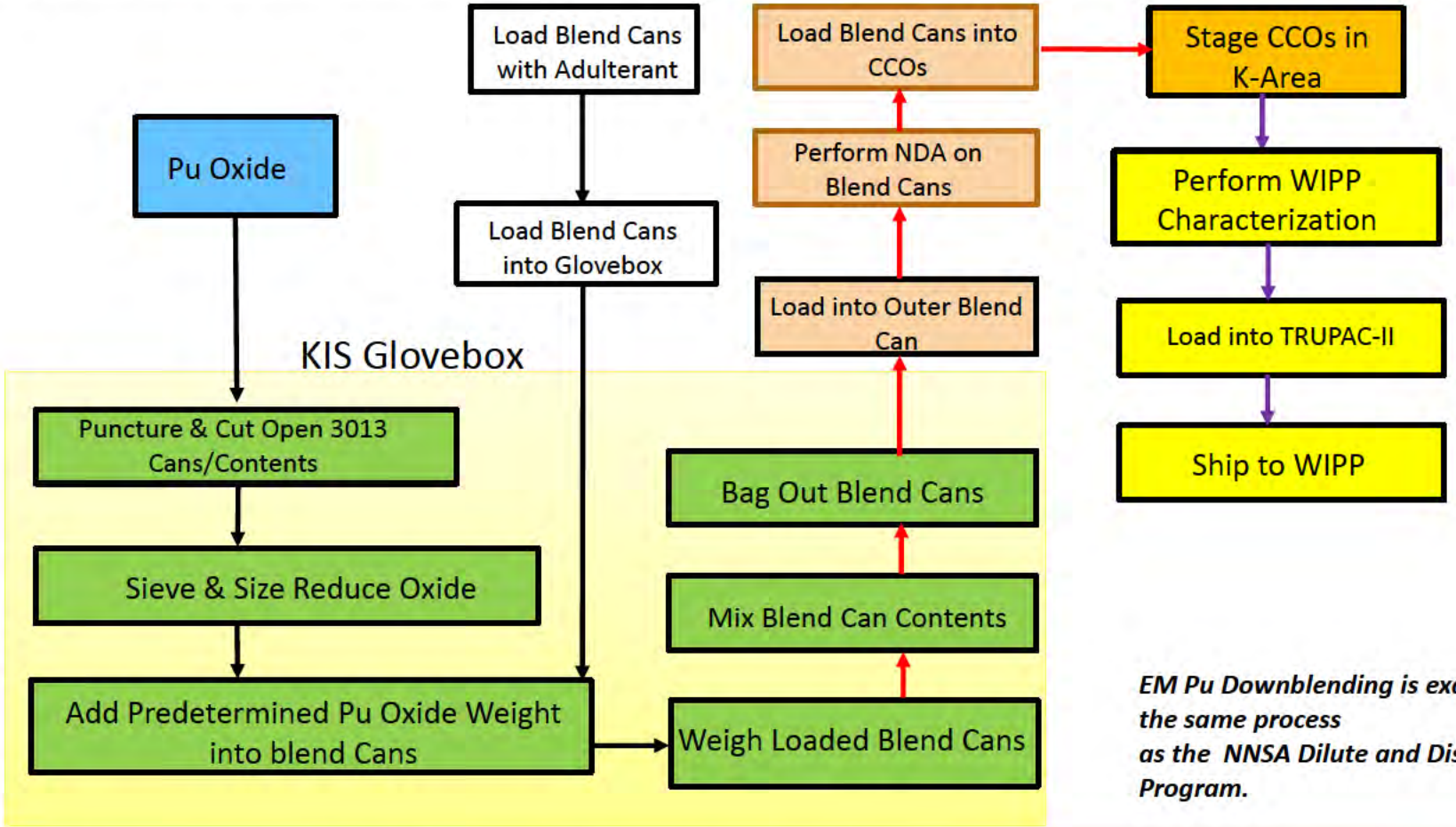
- Materials Identification and Surveillance (MIS) Working Group provides guidance and performs the technical oversite for the program
  - Consists of technical experts from the plutonium processing sites and laboratories (SRS, Hanford, LANL, and LLNL)
  - Selects 3013 containers for Destructive Examination 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*
    - *6 MT is composed of both Weapons Grade and Fuels Grade Pu with various impurities (e.g., salts and chlorides)*

- Shelf-Life and corrosion tests
  - Containers of plutonium-bearing materials were selected that are representative of all of the different types of materials packaged
  - Tests bound the gas generation and corrosion that might occur in actual containers

3013 Surveillance Program (continued)

- 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
  - Examine 7 containers per year
  - Scheduled to complete randomly selected containers in FY2025
  - DE will continue as long as containers are stored at SRS
- Surveillance program has not identified any condition that would challenge the 50 year storage life
- Continue to perform DEs in K Area and Shelf-Life program at LANL to validate storage life

K-Area Plutonium Downblending Flowsheet



EM Pu Downblending is exactly the same process as the NNSA Dilute and Dispose Program.

Pictures of the process

KIS Glovebox

Pu Oxide

Blend Can

Blend Can bagged out of Glovebox

Bagged Blend Can in outer blend can

Criticality Control Over-pack (CCO)

- Each CCO can hold 2 outer Blend Cans
- Each Blend Can holds up to 150 grams of Pu fissile gram equivalents

SUMMARY

EM Lifecycle for Disposition of the 6 MT of Surplus Plutonium:

- Assumes the 6MT is dispositioned by FY2046 with all materials being shipped to WIPP
- Requires additional funding for additional shifts and oxidation capabilities

Collaboration with NNSA allows:

- Expedited downblending/dilute and dispose of Pu Oxide
- Establishment of WIPP characterization and storage capabilities within K-Area for more efficient operations