Savannah River Site – Citizens Advisory Board

Plutonium Consolidation Program Update

and the Surveillance Program Update

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Purpose

- To update the SRS CAB on the status of the Plutonium Consolidation Program and the Surveillance Program at the Savannah River Site.

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Acronyms

- Pu Plutonium
- DOE Department of Energy
- MT Metric Tons
- STD Standard
- DNFSB Defense Nuclear Facilities Safety Board
- NDE Non-destructive Examination
- DE Destructive Examination
- DWPF Defense Waste Processing Facility
- MFFF Mixed Oxide Fuel Fabrication Facility

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Plutonium Consolidation

- Scope
  - Quantity: 12.8 Metric Tons (MTs)
  - Material: Surplus, Non-Pit Plutonium-239
  - Form: Solid form (metal, oxide powder, scrap, and unirrradiated fuel)
- Shipping and Storage
  - DOE Standard 3013 Storage Container, except unirradiated fuel
  - DOE 9975 Shipping Package (also storage)
  - Safe, Secure Transport Trailers
- Storage Location
  - K-Area
  - Existing Reactor Building
  - Meets 2005 Design Basis Threat Guidance
  - Continuous Surveillance to Ensure Safe Storage

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3013 Containers

PU Metal Button

Bagless Transfer Can

Sectioned Outer 3013 Can with One Bagless Transfer Can

Outer 3013 Can

Exterior View of 9975 Shipping Container

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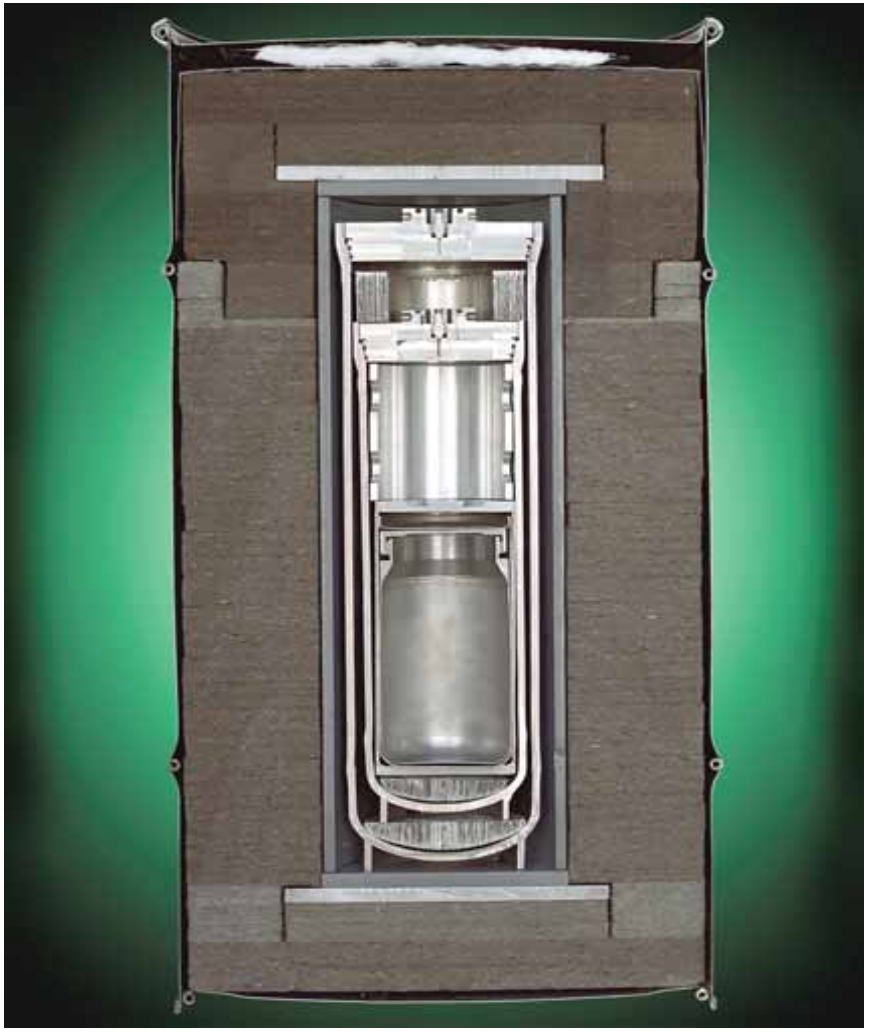
Cross Sectional View of 9975 Shipping Container



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KAMS in 2000

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KAMS in 2009

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Plutonium Consolidation

- Shipping Sites
  - Savannah River – 910 containers (completed)
  - Rocky Flats – 1889 containers (completed)
  - Hanford – 2257 containers
  - Hanford Unirradiated Fast Flux Test Reactor Fuel – 13 casks
  - Lawrence Liver National Laboratory – 115 containers
  - Los Alamos National Laboratory – 96 containers
  - Potential Future Surplus Material Receipts
    - » LLNL and LANL – 500 containers
- Future Storage Capability
  - Pre-Conceptual Design for new Vault (ECD: Sept. 2009)
  - Within existing K-Area Reactor Building
  - 500 -900 additional storage locations (3013 containers)

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Plutonium Consolidation

- Plutonium Consolidation Rationale
  - Reduces risk to public and environment by consolidating to a single location
  - Improves Homeland Security
    - » Reduces the number of facilities to protect
  - Allow sites to deinventory to meet regulatory commitments
  - Significant cost avoidance (billions of dollars) to consolidate surplus nuclear materials at a single location
    - » Eliminates multiple (existing) storage vaults across the complex
    - » Avoid building new storage vaults to replace outdated facilities
    - » Eliminates multiple security projects across the complex
  - Allow facilities to close reducing the DOE national nuclear footprint (and avoid operating costs)

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EM Non-Pit Pu Consolidation Receipts

Note: Reflects campaign extension due to proposed LANL shipment schedule

Data Date 3/31/09

Plutonium Consolidation Summary

- Plutonium Consolidation is 75% complete with an Completion Date of FY2013
- New Vault may be installed to receive all non-pit plutonium
- All plutonium is safely and securely stored in K-Area
- The Department has a pathway for dispositioning plutonium out of South Carolina (H-Canyon/DWPF and MFFF)
- Evaluating alternatives to optimize Plutonium Disposition, forecast completion summer of 2009

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Plutonium Surveillance Program

Purpose

- DOE-STD-3013 provides for safe, stable storage of Pu metal and oxide for up to fifty years.
- Surveillance program is required by DOE-STD-3013.
- Surveillances are conducted to ensure continued integrity of 3013 containers during storage and funded under PBS-11C.

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Background

- In early 1990's, DOE suspended weapons production operations
  - no long-term plans for storage or disposition of surplus Pu (>50 MT) and other nuclear materials
  - Pu materials in various forms (pits, metal, oxide, residues, scrap, solutions)
  - safety issues associated with storage
- DNFSB Recommendations (1994-1 and 2000-1) identified need for stabilization and safe storage of nuclear materials.
- DOE developed DOE-STD-3013 for long-term storage.

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DOE-STD-3013

- Scope
  - Pu plus Uranium (>30 wt%)
  - Storage for up to 50 years (3013 container)
  - Assurance of safety via a surveillance program (non-destructive exam (NDE) and destructive examination (DE))

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DOE-3013 Standard (cont)

- Stabilization
  - Metal
    - » Brush off oxide
    - » No small pieces less than 50 grams
  - Oxide
    - » Crush material
    - » Heat to 950^{o}C for minimum of two hours in oxidizing atmosphere
      - ◆Removes moisture
      - ◆Removes organics
      - ◆Reduces particle surface area
    - » Package in dry atmosphere with helium

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DOE-3013 Standard (cont)

- Packaging
  - Two nested, welded, leak-tight containers
  - Compatible with material to be stored
  - Outer container must pass 30 ft drop test
  - Outer can must be capable of being designated Safety Class

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DOE-3013 Standard (cont)

- Surveillance
  - Surveillance and Monitoring program approved 2003 by DOE-EM1
  - NDE looks for pressurization
    - » Began 3 years after packaging (2005)
    - » ~ 40 per year
  - DE looks for corrosion, gas analysis, and material characteristics
    - » Began 5 years after packaging (2007)
    - » ~ 15 per year

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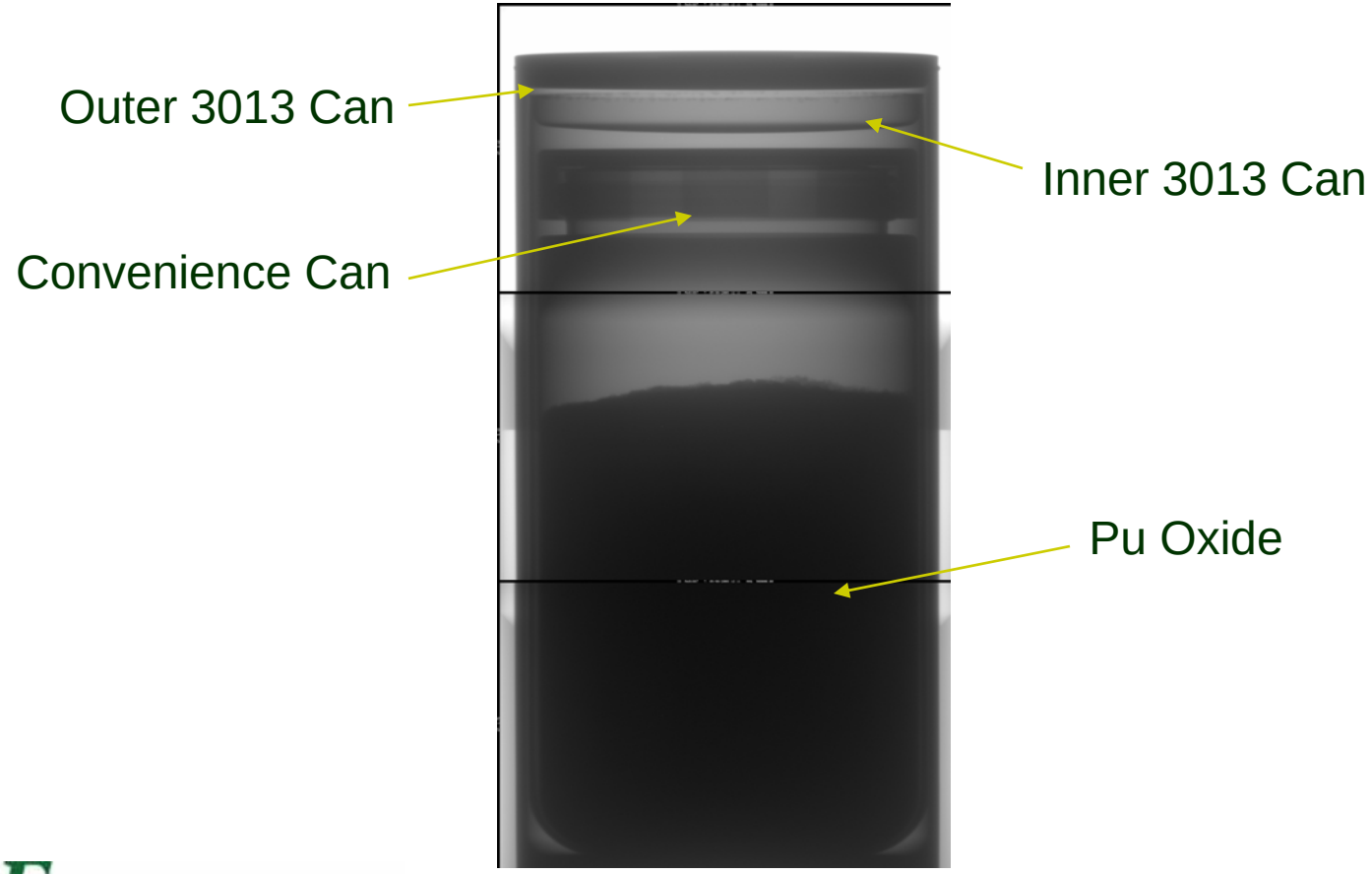
DIGITAL RADIOGRAPHY



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CAN PUNCTURE DEVICE

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CAN CUTTER

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CUT OUTER LID

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Pu OXIDE IN CONVENIENCE CAN

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Pu OXIDE IN WEIGH PAN

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Surveillance Program Results

- Non-Destructive Examinations
  - Containers are intact
  - No visible signs of corrosion on outer can
  - No contamination on outer surface
  - No measurable pressure identified via Radiography
  - No degradation impacting performance of the 9975 shipping container
    - O-rings
    - Fiberboard

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Surveillance Program Results

- Destructive Examinations
  - Maximum measured pressure has been less than 15 psig compared to theoretical maximum pressure of 699 psig
  - No flammable gas mixtures (hydrogen with no oxygen)
  - Minimum surface corrosion of convenience can
  - No degradation of inner or outer can

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Plutonium Surveillance Program Summary

- Material and packaging performing as predicted in the standard.
- Surveillance program has identified no safety issues that challenge 50 year storage.
- Site will continue to validate safe storage with on-going surveillance program.

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