U.S. DEPARTMENT OF ENERGY

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SRS Plutonium Storage and Downblend Program

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The Big Picture – Today's Take Away

- K-Area Complex (KAC) has been expanding from primarily a Plutonium (Pu) storage facility, to a Pu processing & handling facility
- Mission scope is being performed using the robust K-Reactor facility footprint supplemented with new construction to expand capability.
- Plutonium disposition through downblend processes is a strong partnership between the DOE Office of Environmental Management (EM) and the National Nuclear Security Administration (NNSA).
- Over the past couple of years, we have had success in safely ramping up processing rates through expansion of staff, investment in infrastructure, and improvements to documentation defining the safety envelope in KAC.
- We are still progressing:
  - Processing rates continue to increase
  - Additional infrastructure improvements needed
  - Staffing continues to expand this year
  - Construction projects are ongoing to improve processing capability and efficiency
  - Shipping Downblended material to WIPP from KAC expected this calendar year

K-Area Complex (KAC) and Downblend History

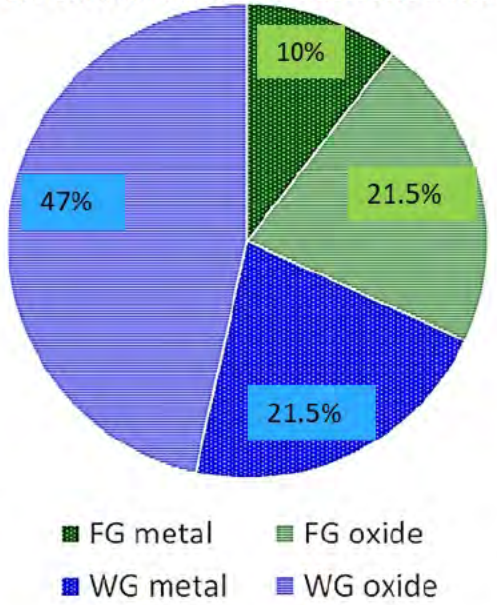
- Plutonium Production Reactor (1954-1992)
- K-Reactor facility begins modifications needed to be converted into a surplus Plutonium repository (1997)
- KAC receives its first shipment of Plutonium surplus material (2002)
- KAC starts up a small glovebox line (K-Area Interim Surveillance, aka KIS) to perform destructive evaluations of stored material to ensure safe long-term storage (2007)
- HB-Line Facility initiates first SRS Plutonium Downblend mission (2011-2013)
- KAC initiates limited scope Plutonium Downblend process in KIS (2016)
- Downblend programmatic scope expanded with the decision to end the Mixed Oxide (MOX) facility construction (2018)
- KAC funded by NNSA to complete process optimization initiatives for the KIS glovebox and to construct a Criticality Control Overpack (CCO) Storage Pad (2018)
- KIS glovebox improvements (optimization) completed and Downblend processing restarts (2020)
- CCO Pad begins operation & KAC transitions to 1 shift funded by EM and 3 by NNSA (2021)

Storage and Inventory Overview

- Variability exists in the form/purity of the ~9.5 MT Plutonium outlined in the 2020 settlement agreement with the state of South Carolina.
- 5.5 MT →NNSA; 4 MT →DOE-EM

Plutonium Inventory Summary Information for SRS K-Area Facility

(Based on end of FY2019 reconciled inventory)



Note: About 1/3 of inventory contains fuel grade plutonium (higher radiation dose and heat load) and 1/3 of inventory is metal requiring future oxidation.

MT = Metric Ton

Storage and Inventory Overview, Continued

- Metal/Oxide exchange with LANL needed to disposition the Pu metal inventory
- We continue to safeguard Pu that is monitored/managed within the U.S. Voluntary Offer Agreement (VOA) with the International Atomic Energy Agency (IAEA)
- Working with IAEA to define monitoring processes needed for disposition of VOA material
- Recently reconfigured material storage area, consolidating 9975 storage to make room for Surplus Plutonium Disposition (SPD) project footprint
- Receipt and storage of U.S origin material from international locations in support of non-proliferation objectives

9975 Shipping Container

K-Area Nuclear Materials Storage

De-inventoried for SPD Project

What is the Downblend Process?

- K-Area Complex Dilute and Dispose - YouTube

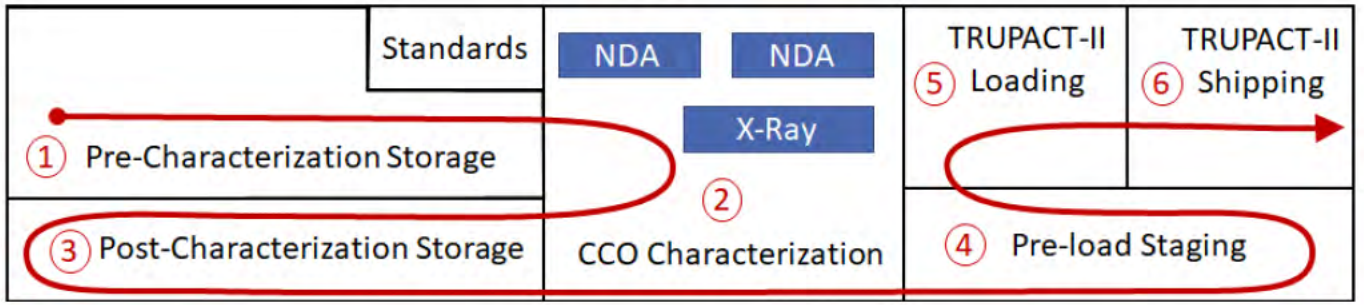
CCO Characterization and Storage Pad

For storage, characterization, and shipments of CCOs to WIPP

K-Area CCO Storage Pad

K-Area Aerial View

Layout for CCO Staging and Characterization



Production Ramp-up, Mission Progress

- People (Staffing):
  - Reallocation of skilled glovebox resources with Plutonium processing experience from other SRS facilities
  - Increase of roughly 100 cross-functional staff to support sustained mission of Downblend
  - Transition to 4-shift glovebox processing (Summer 2021)
  - Funding for staffing shared between DOE-EM and NNSA
  - Ramping up community outreach and Apprenticeship Programs (roughly 30 additional KAC operators to be onboarded this upcoming year)
- Plant (Infrastructure):
  - Optimized existing glovebox for Downblend processing
  - Staging/Storage capacity improvements
  - Housing for additional personnel, roof replacements, security enhancements
  - Electrical upgrades to improve long term electrical power reliability
  - Installed 2 HVAC 100-ton chillers for 105-K Reactor Building

Production Ramp-up, Mission Progress, Continued

- **Paper:**
  - Completed multiple revisions/improvements to the governing KAC Safety Basis documents (affords flexibility in the process without compromising safety)
  - Numerous internal and external assessments/audits over the past few years evaluating KAC & the expanding mission scope
  - Investment in modeling, metrics, and performance trending
  - Team-centric process improvement (e.g. Value Stream Analysis)
- **The Path Ahead & Challenges:**
  - Complete WIPP Certification processes & begin shipments
  - Surplus Plutonium Disposition Project (NNSA)
  - Integration of continued processing and expanding program/project objectives
  - Additional infrastructure improvements needed on support systems for the long-term mission
  - Nearly doubling the staff in KAC in the coming years to support the mission

Summary

- Safe storage of Surplus Pu remains a core function and focus of KAC.
- K-Area Complex (KAC) scope continues to grow.
- DOE-EM/NNSA are working together towards commitments to remove plutonium from South Carolina.
- Downblend processing rates continued to increase during COVID-19 and are still climbing.
- Surplus Pu disposition requires integration across the DOE Complex. Continued coordination with LANL and WIPP for material movements will be key to the program success.
- The CCO Pad became operational in the summer of 2021 and provides key storage, characterization, and shipping capability. Shipments targeted late CY22.