



Nuclear Materials Management Program

Jay Ray

Senior Technical Advisor

Nuclear Material Programs Division

Department of Energy-Savannah River



Savannah River Site Citizens Advisory Board

Presentation to Nuclear Materials Committee

April 12, 2016

enterprise·srs

- Satisfy Nuclear Materials Committee work plan item regarding Nuclear Materials Management Program



Sun behind Saturn – Photo taken by Cassini

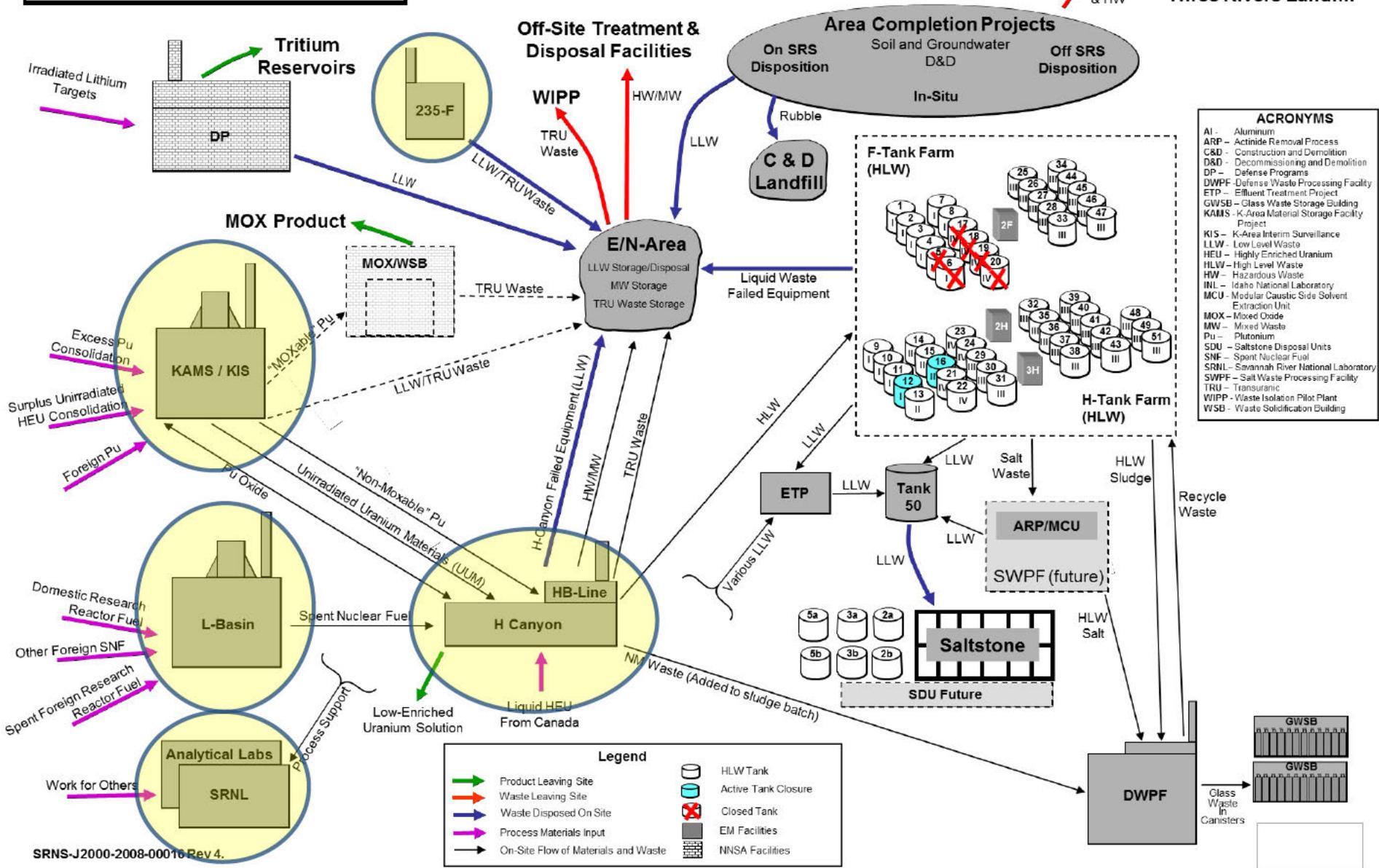
First LEU Trailer placed in LEU loading Bay



Savannah River Site Waste and Material Flow Path

This depiction of SRS activities shows only the general scope of the major facilities and missions. It does not represent all processes or all materials flow.

Off-Site Disposal
e.g., Clive, Utah,
Three Rivers Landfill



ACRONYMS

- Al - Aluminum
- ARP - Actinide Removal Process
- C&D - Construction and Demolition
- D&D - Decommissioning and Demolition
- DP - Defense Programs
- DWPF - Defense Waste Processing Facility
- ETP - Effluent Treatment Plant
- GWSB - Glass Waste Storage Building
- KAMS - K-Area Material Storage Facility Project
- KIS - K-Area Interim Surveillance
- LLW - Low Level Waste
- HEU - Highly Enriched Uranium
- HLW - High Level Waste
- HW - Hazardous Waste
- INL - Idaho National Laboratory
- MCU - Modular Caustic Side Solvent Extraction Unit
- MOX - Mixed Oxide
- MW - Mixed Waste
- Pu - Plutonium
- SDU - Saltstone Disposal Units
- SNF - Spent Nuclear Fuel
- SRNL - Savannah River National Laboratory
- SWPF - Salt Waste Processing Facility
- TRU - Transuranic
- WIPP - Waste Isolation Pilot Plant
- WSB - Waste Solidification Building

DE – Destructive Examination
DRR – Domestic Research Reactor
DSA – Documented Safety Analysis
DWPF – Defense Waste Processing Facility
FRR – Foreign Research Reactor
HEU – Highly Enriched Uranium
LEU – Low Enriched Uranium
MOX – Mixed Oxide
NM – Nuclear Materials
NNSA – National Nuclear Security Administration
Np – Neptunium
NRC – Nuclear Regulatory Commission
Pu – Plutonium
RA – Readiness Assessment
R&D – Research and Development
S&S – Safeguards and Security
SNF – Spent Nuclear Fuel
SRE – Sodium Reactor Experiment
TVA – Tennessee Valley Authority
U – Uranium
WIPP – Waste Isolation Pilot Plant

- The presentation today provides:
 - Assumptions and Approved Missions



Sampler in H-Canyon
(Long Path Ultra-
Violet / Visible Light)

Fuel Cask in L-Area



Three foot diameter access hole cut for insertion
of Robot for H-Canyon Tunnel Inspection



Nuclear Material Operational Facilities

- H-Canyon
- HB-Line
- K-Area
- L-Area

P-Reactor
Confirmed
Neutrino
Existence



Supporting Facilities/Interfaces

- F-Area/H-Area Analytical Laboratories (F/H Lab)
- SRNL
- Liquid Waste
- Transuranic Waste (E-Area)

Deactivated/Inactive Facilities

- 235-F
- F-Canyon/FB-Line
- Receiving Basin for Offsite Fuels (RBOF)
- C-Area (Surveillance of Heavy Water only)



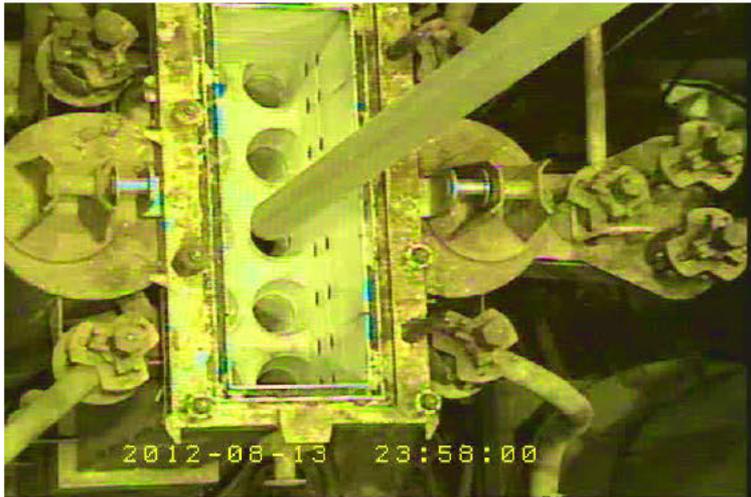
K-Area safely receives and stores enriched uranium and plutonium materials awaiting disposition

L-Area safely receives and stores Spent Nuclear Fuel awaiting disposition



H-Area safely disposes uranium (including fuel) and plutonium materials

- The general assumptions are:
 - Support safe and secure operation of Nuclear Material facilities to disposition uranium and plutonium
 - Meet Department of Energy – Environmental Management and National Nuclear Security Administration non-proliferation missions
 - Support efficient operations and minimize waste generation



Spent Fuel Charging to Dissolver



Model 9975 Storage/Transportation Drums

H-Canyon Assumptions

- Dissolution of Sodium Reactor Experiment fuel was completed August 2014. Solution transfer to the Defense Waste Processing Facility for vitrification is on-going
- H-Canyon is processing Spent Nuclear Fuel to recover uranium (U) and blend to Low Enriched Uranium for the Tennessee Valley Authority (Dissolution of Spent Fuel for recovery of U began September 2014)
 - Dissolving, Head End and 2nd Cycle are operational; 1st Cycle is expected to be operational by June
 - Once 1st cycle is operational we can begin purifying U solutions and prepare for additional dissolution of Spent Fuel
 - Blend-down to Low Enriched Uranium is expected to begin Summer of 2018
- H-Canyon will process sufficient Spent Nuclear Fuel to allow for L-Area receipts through 2035
- Receipts of Canadian Target Residue Material will begin in Summer of this year
- H-Canyon is supporting HB-Line with the dissolution of plutonium (see HB-Line Assumptions slide)
- Missions are integrated with the High Level Waste System*

*High Level Waste

Limits (gallons/yr):

- 2015: 200,000
- 2016: 200,000
- 2017+: <300,000



HB-Line Assumptions

- HB-Line began plutonium oxide production in July of 2014 and will produce oxide through approximately 2023 to provide for permanent disposition of weapons usable nuclear material



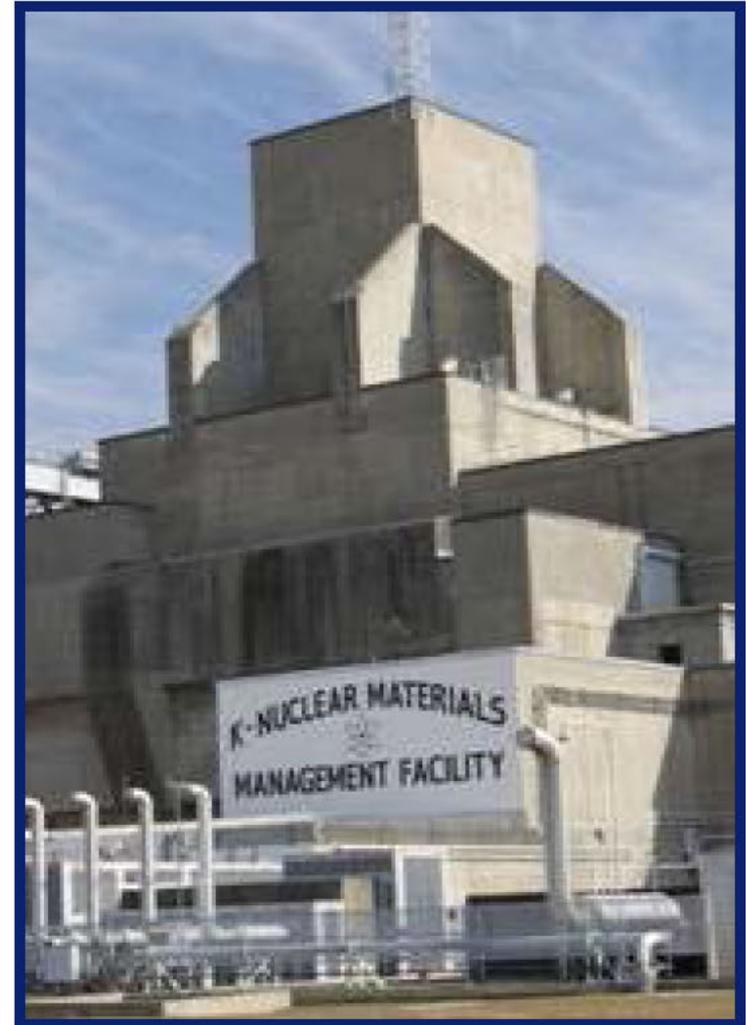
Glove-boxes in HB-Line



View of H-Canyon/HB-Line (looking North)

K-Area Assumptions

- K-Area will store the plutonium oxide produced by HB-Line until shipped for disposition
- K-Area will continue with safe storage, receipts and shipments until approximately 2039 (Basis: one glove-box line for disposition of non-MOXable plutonium)
- Continue Destructive Examinations of plutonium oxide containers (Department of Energy Standard 3013 containers) through approximately 2034 to support continued safe storage



L-Area Assumptions

- Spent Nuclear Fuel processing in H-Canyon will eliminate the need for installation of new storage capacity (racks) in L-Area
- No new Foreign Research Reactor fuel receipts past May 12, 2019 (Per a Record of Decision)
- L-Area will support Domestic Research Reactor fuel receipts through 2035
- Heavy water will continue to be safely stored in L-Area, K-Area, and C-Area until a disposition path is determined/established

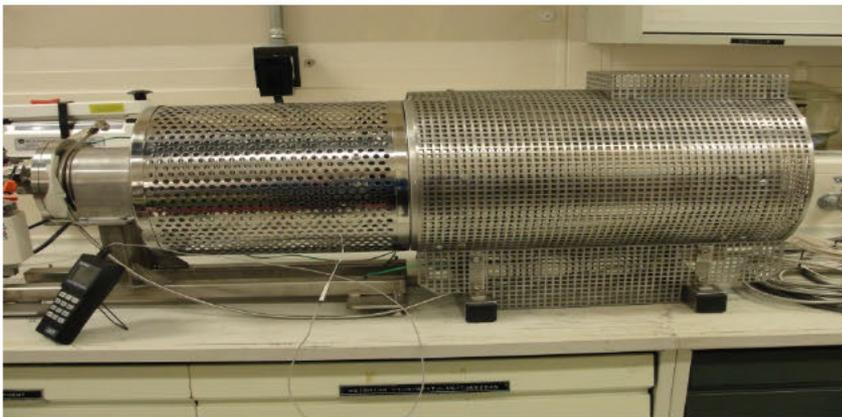


Savannah River National Laboratory & F-Area/H-Area Laboratory

- Savannah River National Laboratory & F-Area/H-Area Laboratory will continue to support Nuclear Materials facilities with flowsheet development and analytical results, respectively, at the level necessary to support missions

Site Infrastructure

- Department of Energy – Savannah River will continue to support the infrastructure (for example: waste management, site services, medical facilities, etc.) and safeguards and security capabilities (for example: physical security, security workforce, material accountability, etc.)



Vacuum Salt Distillation Equipment for HBL



Shielded Cells in SRNL for High Rad Work

The following facilities are not addressed in detail, but are included here for information

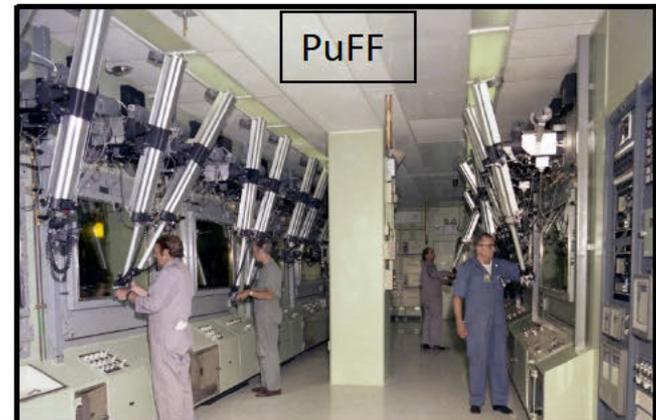
- F-Canyon, FB-Line and C-Area – some deactivation, awaiting further deactivation
- Receiving Basin for Offsite Fuels – initial deactivation, awaiting turnover to Deactivation and Decontamination organization (D&D)

Deactivated Equipment in F-Area



235-F

- Previous missions included: Neptunium-237 target and plutonium-238 pellet manufacturing for National Aeronautics and Space Administration missions and vault storage for nuclear materials
- Currently executing “Risk Reduction” Project – goal is to remove and/or immobilize majority of the residual radiological material in the Building.
 - Actions support DNFSB Recommendation 2012-1.
 - Focus for risk reduction is on the Plutonium Fuel Fabrication (PuFF) Facility (9 cells)
 - Deactivation Project Plan was approved 3rd quarter of 2013
 - Accomplishments to date:
 - Removed large amount of combustibles in 235-F
 - Deactivated un-necessary electrical systems in 235-F and electrically isolated PuFF cells 6-9
 - Installed Fire Detection and Alarm System in 235-F
 - Begun restoring infrastructure in PuFF cells 6-9
 - Completed Enhanced Characterization of PuFF cells 6-9
 - (i.e. new/better holdup measurements)



- SAFETY comes first!
- Some of our Facilities are One-Of-A-Kind National Assets (for example H-Canyon)
- We Stabilize/Disposition Nuclear Materials to:
 - Allow for de-inventory of DOE Environmental Management facilities
 - Meet non-proliferation goals
- We Operate in an Environmentally Sound Manner



Rhea



Clouds seen from H-Canyon



3013



H-Canyon 2nd Level