Presentation to the Governor’s Nuclear Advisory Council

SNF Processing at H-Canyon and the H-Canyon Roadmap

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Aerial View of H Area
Nuclear Materials Disposition Process

- **L Basin Storage**
- **K Area Storage**
- **H Canyon / HB-Line**
- **FRR & DRR SNF**
- **GAP SNF**
- **Non MOXable Pu & Transuranic Waste**
- **High Activity Liquid Waste**
- **Enriched Uranium**
- **MOXable Pu**
- **MOX Fuel Fabrication Facility**
- **Glass Waste Storage**
- **Defence Waste Processing Facility**
- **Vitrified Waste**
- **Low Enriched Uranium**
- **Spent Nuclear Fuel**
- **Final Repository**

- **Commercial Power Reactors**
  - **Excess Plutonium (Pu) Consolidation** (Rocky Flats, Hanford, Lawrence Livermore National Lab, & Los Alamos National Lab)
  - **AFS-1 Pu**
  - **AFS-2 Pu**

- **Aluminum Clad SNF**
- **Vitrified Waste**
- **Defence Waste Processing Facility**
- **MOX Fuel Fabrication Facility**
- **MOXable Pu**
- **Non MOXable Pu & Transuranic Waste**
- **Enriched Uranium**

**EM - Environmental Management**

- **safety**
- **performance**
- **cleanup**
- **closure**

www.em.doe.gov
H-Canyon - Cross Section
H-Canyon Warm Canyon
HM Process

HB-Line Feed Materials

Dissolving

Head End

First Cycle Solvent Extraction

Second U Cycle Solvent Extraction

Second Prod Cycle Solvent Extraction

1EU Product Concentration

HEU to LEU Blending

LEU Loading & Shipping

Natural Uranium

Waste

Natural Uranium

TVA
Mixer-Settler

ISOMETRIC DRAWING SHOWING 3 ADJACENT STAGES
H-Canyon – Hot Canyon Crane

Hot Canyon Overhead Crane viewed from Maintenance Area
Key NEPA Decisions

- 1996 – FRR EIS and ROD issued
  - Begin FRR receipts (US origin material)
- 2000 - SRS Spent Nuclear Fuel EIS and ROD was issued with Melt and Dilute of Al-clad UNF
  - Melt and Dilute
    - Al-clad fuel cropped
    - Melted with depleted uranium to form low enriched uranium metal
    - Cast in disk and placed in cans for disposal with high level waste canisters
  - Other alternatives evaluated:
    - Processing through H Canyon; Wet Storage; Other Technologies
- 2006 - Department approved the Uranium Disposition Project which included processing unirradiated highly enriched uranium materials and the Al-clad UNF. Recover the enriched uranium, down blend to low enriched uranium, and ship to TVA.
  - Required issuance of Amended Record of Decision for UNF processing
- 2013 – EM-1 signed an Supplement Analysis and Amended Record of Decision
  - Process 1,000 bundles of Material Test Reactor fuel
  - 200 cores of High Flux Test Reactor Cores
  - Recover the Enriched Uranium and Down Blend to 4.95% enrichment and use as feed for Tennessee Valley Authority reactor fuel
H Canyon –SNF Disposition Status

- “Vulnerable”
  - Completed the dissolution of Sodium Reactor Experiment (SRE) SNF on August 14, 2014
  - SRE and other Hi Al/Low Uranium SNF campaigned as a blend to mitigate viscosity issues of thorium-based fuel (SRE) in caustic solution
  - Disposition of resulting solution directly to sludge batch tank
  - Initiated transfers to the sludge batch tank

- “Highly Enriched Uranium Al-clad SNF”
  - Initiated the dissolution of Material Test Reactor Fuel on September 14, 2014
Waste Generation

- Processing of Al-clad SNF and plutonium materials are expected to generate between 150,000 and 250,000 gallons annually of high level liquid waste
- H Canyon has a concerted effort to identify facility and process changes that reduce the amount of high level liquid waste H Canyon will generate and send to the waste system
- Based on projected budgets, Savannah River Operations Office issued the following guidance to Savannah River Nuclear Solutions identifying waste receipt volumes in the tank farms to be used in program planning, these fully support program:
  - FY15 – 150,000 gallons
  - FY16 -17 – 200,000 gallons yearly
  - FY18 -25 – 300,000 gallons yearly
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Required Upgrades

- Savannah River Site has maintained and will continue to maintain the safety systems in H Canyon which ensure the protection of the public, environment, and workers.
- DOE must provide adequate funds to support required infrastructure upgrades and spare equipment inventory to support continued H Canyon operations.

- Some examples of the production support systems that need to be upgraded which have been identified on a consolidated site priority lists:
  - Substation
  - Transformers
  - Roofs
  - Exhaust Fan
Modifications Required to Process non-Aluminum SNF

- H Canyon utilizes a nitric acid based modified PUREX process to dissolve and recover enriched uranium from Al-clad SNF which is not compatible with stainless steel or zirconium clad SNF.

- In order to dissolve non-Al SNF, a modified head-end process (shear) would have to be installed on H Canyon.

- The shear would expose the uranium in the fuel assembly allowing the uranium material to be leached out utilizing the existing H Canyon process chemistry.

- Included in the modifications would be a capability to remove and dispose of the residual hulls.
Questions?