Presentation to the SRS Citizens Advisory Board

Surplus Nuclear Materials and Spent Nuclear Fuel Disposition Strategy
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Outline

• Plutonium Consolidation
• Plutonium Disposition
• Enriched Uranium and Spent Fuel Disposition
• Summary
Nuclear Materials Disposition Process

- ID Al-Clad SNF
- Foreign Research Reactor Spent Nuclear Fuel
- Domestic Research Reactor Spent Nuclear Fuel
- Plutonium Consolidation
- Non-Pit Plutonium*
- L Basin
- Non Moxable Plutonium
- Zirconium & Stainless Steel Clad Spent Nuclear Fuel
- Aluminum Clad Spent Nuclear Fuel
- Offsite Enriched Uranium
- H Canyon
- Moxable Pu
- Oxides
- New SRS Capabilities
  - Pu Disp. (Preparation) And CSSC Scope
- New SRS Facility
  - Pit Disassembly & Conversion Facility
- New SRS Facility
  - MOX Fuel Fabrication
- New SRS Facility
  - MOX Fuel
- Burn in Existing, Domestic Commercial Reactors
- Geologic Repository
- Low Enriched Uranium
- Residual Plutonium
- High Activity Waste
- Use for fuel for Power Reactors
- Minimal Impact to LW Disposition System Plan
- New SRS Capability
  - Plutonium Disposition (Vitrification)
- Vitrified Pu**
- Defense Waste Processing Facility
- Spent Nuclear Fuel
- Vitrified High Level Waste
- Foreign Research Reactor Spent Nuclear Fuel
- Domestic Research Reactor Spent Nuclear Fuel
- Spending Al-Clad Nuclear Fuel to Idaho
- Use for fuel for Power Reactors
- New SRS Facility
- Plutonium Consolidation
- Use for fuel for Power Reactors
- Minimal Impact to LW Disposition System Plan
Plutonium Consolidation

EM Non-Pit Pu Consolidation Receipts

Percent of Containers

Data Date 6/30/08
• Initial preferred alternative for Pu Disposition Project was vitrification of up to ~12.8 MT of surplus non-pit plutonium

• Pu Business Case developed utilizing up to three facilities for Pu disposition, which was basis for DOE’s disposition plan to Congress*:
  – Mixed Oxide Fuel Fabrication Facility (MFFF) under construction
  – Existing H-Canyon facilities (Pu disposition began in FY 2007)
  – Proposed plutonium vitrification capability

• Revised preferred alternative for Pu Disposition Project proposed:
  – eliminate the vitrification capability
  – prepare Pu for disposition using the MOX and H-Canyon facilities
  – integrate 3013 Container Surveillance and Storage Capability (CSSC) Project

• Revised preferred alternative utilizes existing facilities (or under construction) with demonstrated technologies and is cost effective

*September 2007 Report to Congress noted that, “DOE’s plan also includes evaluation of an alternative approach that would either reduce or eliminate the need for the proposed vitrification process.”
Plutonium Disposition Strategy

- Non-Pit Plutonium
- K Area (12.8 MT Pu)
- Pu Consolidation
- Non Moxable Pu (2 MT Pu)
- Pu (6.7 MT Pu)
- Moxable Pu (4.1 MT Pu)
- Oxides
- MOX Fuel Fabrication
- MOX Fuel
- Pu Disp. (Preparation) And CSSC Scope
- New SRS Capabilities
- Pu Disp. (Vitrification)
- New SRS Capability
- Vitrified Pu
- H Canyon
- Enriched Uranium Disposition Project
- Residual Pu
- DWPFI
- Vitrified HLW
- SNF
- Geologic Repository
- Burn in Existing, Domestic Commercial Reactors
- MOX Fuel Fabrication
- Pit Disassembly & Conversion Facility
- (4.1 MT Pu)
- (3.7 MT Pu)
- (2 MT Pu)
- (3 MT Pu)
- (6.7 MT Pu)
Plutonium Disposition Program Scope

12.8 MT Pu (Includes FFTF)

- MFFF
  - 7.8 MT Pu
    - No Preprocessing
    - Needs Oxidation

- H Canyon
  - 5 MT Pu
    - No Preprocessing
    - PuD Sampling for Flowsheet
    - PuD FFTF Decladding

Needs Oxidation
• Enriched Uranium (EU) Disposition Project
  – October 2006, approved mission need (CD-0) and alternative selection and cost range (CD-1)
  – January 2008, approved the performance baseline and authorization to implement (CD-2/3)

• Disposition ~21 MT of surplus HEU by processing in H-Canyon facilities as part of the EU Disposition Project
  – ~ 7.5 MT of HEU (processing ~25% complete and will be completed by FY 2010)
  – ~ 13.5 MT of HEU in the form of aluminum-clad spent nuclear fuel (processing to start in FY 2010 and estimated to be completed in FY 2019)

• HEU will be blended down to low enriched uranium (LEU) and sold to an end user (such as TVA) for use in fabricating fuel for commercial nuclear reactors

Note: NNSA has responsibility for DOE’s overall surplus HEU disposition program
Highly Enriched Uranium Disposition Strategy

- **Al-Clad SNF from INL**
  - L Area SNF Storage (~4 MTHM)
  - (~6 MTHM) FRR/DRR

- **SS/ZR Clad SNF to INL**
  - (~20 MTHM)

- **Al-Clad SNF**
  - (~13.5 MT HEU or ~18 MTHM)

- **HEU from Oak Ridge, LANL, LLNL, SNL, INL, KAPL, & SRS**
  - (~7.5 MT HEU)

- **Low Enriched Uranium**
  - (~250 MT LEU)

- **Liquid Waste**

- **Defense Waste Processing Facility**
  - Vitrified Waste

- **Fuel for Commercial Reactors**

- **Geologic Repository**
Incremental Impacts to Liquid Waste Operations

- **H-Canyon**
  - LEU Offsite
  - 5 MT Pu

- **Tank Farms**
  - 7.5 MT HEU (0.4 Mgal LLW)
  - 13.5 MT Spent Fuel (4.2 Mgal total waste)
  - 2.9 Mgal HLW
  - 1.3 Mgal LLW

- **SLUDGE**
  - Sludge Batch Processing Tanks
  - 51/40

- **Washed Sludge**

- **GWSP**
  - Cs, Sr., Actinides
  - Canisters

- **DECONTAMINATED SALT SOLUTION**
  - Canisters
  - GWSB

- **Low Level Waste**
  - SPF
  - Grout
  - SDF Vaults
  - Additional Vaults

- **FEDERAL REPOSITORY**

**Table:**

- | Waste Type       | Quantity |
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<td>Spent Fuel - Idaho</td>
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<td>Spent Fuel - FRR/DRR</td>
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<td>Spent Fuel - Total</td>
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<td>Pu</td>
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<td>Total</td>
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Nuclear Materials Summary

• Disposition of Nuclear Materials can be accomplished with minimal impact on SRS liquid waste system
  – 6 Month Extension
  – ~ 40 additional canisters

• Minimizes program risk by utilizing existing facilities or ones currently under construction to disposition nuclear materials
  – H Canyon
  – MOX