

***Fissile Materials
Disposition Program
DNFSB Workshop***

***National Nuclear Security Administration
Defense Nuclear Nonproliferation
Office of Fissile Materials Disposition***

April 4, 2001

National Nuclear Security Administration
Office of Defense Nuclear Nonproliferation
OFFICE OF FISSILE MATERIALS DISPOSITION



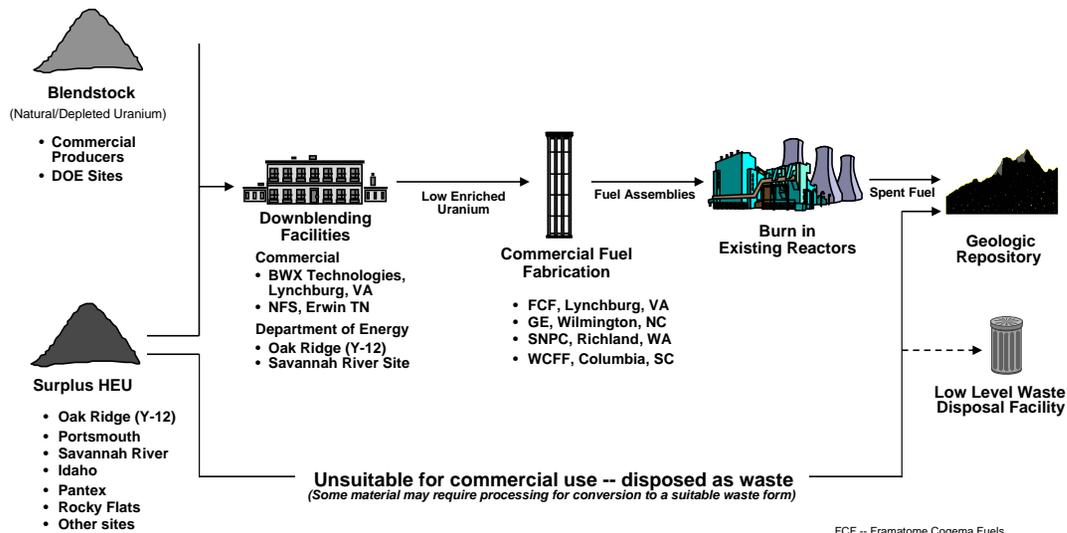
Fissile Materials Disposition Goals

- **NNSA's overall nonproliferation objective:**
 - Reduce the global danger from the proliferation of weapons of mass destruction
- **NN-60 focuses on three supporting goals**
 - Dispose of surplus U.S. highly enriched uranium
 - Dispose of surplus U.S. plutonium
 - Dispose of similar quantities of surplus Russian plutonium

U.S. Uranium Disposition

- **U.S. declared 174 metric tons (MT) of highly enriched uranium (HEU) excess to U.S. defense needs** -- *President Clinton, March 1995*
- **Strategy: Down-blend HEU to low enriched uranium for peaceful use as commercial reactor fuel**
 - Provide surplus HEU to United States Enrichment Corporation and Tennessee Valley Authority for down-blending
 - Dispose of additional quantities of surplus HEU over 15-20 year period

Disposing of Surplus U.S. Highly Enriched Uranium



FCF -- Framatome Cogema Fuels
 GE -- General Electric
 SNPC -- Siemens Nuclear Power Corporation
 WCFF -- Westinghouse Columbia Fuel Facility

Off-Specification HEU Project

- **Purpose: Down-blend off-specification highly enriched uranium in canyons for eventual transfer to TVA vendors for reactor fuel**
- **Design**
 - October 2000 -- October 2001
- **Construction**
 - January 2001 -- April 2004
- **Operation**
 - Begin September 2002
- **Key Features**
 - Saves government \$600 million by avoiding costs to convert and process material as low-level waste
 - Project impacted by tritium production in TVA reactors

Plutonium Management and Disposition Agreement

Key Provisions

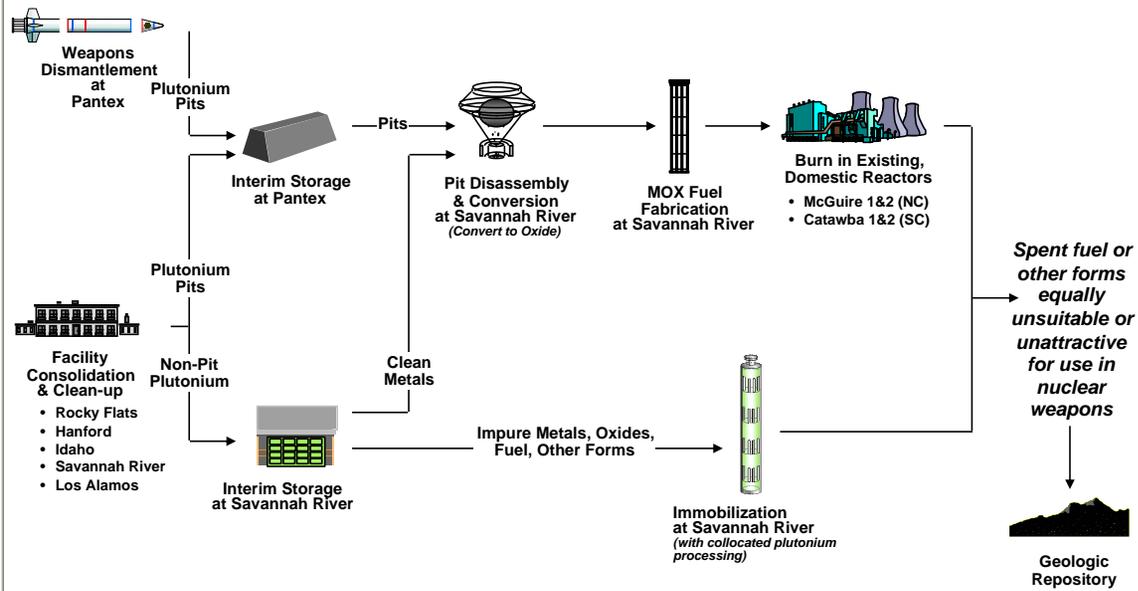
- **Each country to dispose of 34 metric tons (MT) of weapon-grade plutonium**

	<u>U.S.</u>	<u>Russia</u>
– Irradiation as MOX fuel in reactors	25.6 MT	34 MT
– Immobilization with high-level radioactive waste	8.4 MT	--
- **U.S.-Russian disposition to proceed in rough parallel**
 - Begin operation of industrial-scale facilities by 2007
 - Initial disposition rate of 2 metric tons/year
 - Develop plan to double disposition rate within one year of signing
- **Bilateral monitoring and inspection procedures to be developed by December 2002**
 - Agreement for international inspection to follow

U.S. Plutonium Disposition

- **DOE to implement two technologies** (*hybrid strategy*)
 - **Immobilization** -- *Immobilize surplus plutonium with ceramic material surrounded by vitrified high level radioactive waste*
 - **MOX/Reactors** -- *Burn surplus plutonium as mixed oxide (MOX) fuel in existing, domestic, commercial reactors*
- **Both technologies meet the “Spent Fuel Standard”**
 - Surplus plutonium is made as inaccessible and unattractive for retrieval and weapons use as the residual plutonium in spent fuel from commercial reactors

Disposing of Surplus U.S. Weapons Plutonium

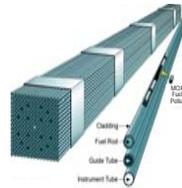


Key U.S. Plutonium Disposition Facilities



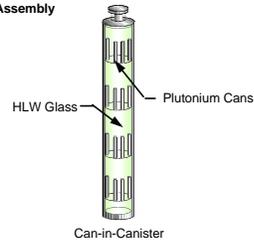
Pit Disassembly & Conversion Facility

Disassemble plutonium “pits” and convert the resulting metal to an oxide powder



MOX Fuel Fabrication Facility

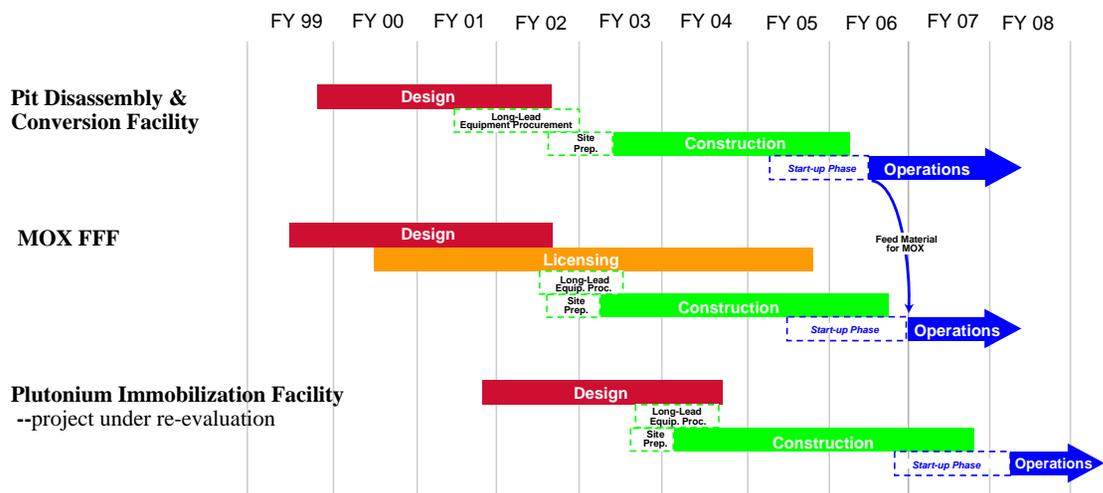
Fabricate plutonium oxide powder into mixed oxide fuel and fresh fuel assemblies



Plutonium Immobilization Facility

Convert “non-pit” plutonium to plutonium oxide, incorporate into ceramic disks, array inside canister, surround with molten, vitrified high level waste

U.S. Plutonium Disposition: Facilities Schedule



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U.S. Plutonium Disposition: Issues/Challenges

- **Cost growth/project controls**
- **Project schedule slips**
- **Regulation by NRC and DNFSB**
- **Cost of plutonium disposition: irradiation vs. immobilization**
- **Bow-wave funding of three, parallel construction projects**