PLUTONIUM IMMOBILIZATION OVERVIEW FOR THE US NWTRB

THE OFFICE OF FISSILE MATERIALS DISPOSITION

Bill Danker

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Immobilization Topics

Office of Fissile Materials Disposition

- Background on plutonium disposition program
- Progress since January 1996 briefing to NWTRB
- Immobilization project overview
- Immobilized form
  - description
  - development
  - characterization

Disposition Program Background

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- "Excess fissile materials pose a clear and present danger to national and international security" [1/94 NAS report]
- Permanent fissile materials disposition office established, reporting to DOE Under Secretary [P.L. 103-337, 10/94]
- "I believe that the dual-track approach for eliminating excess U.S. weapons plutonium stockpiles best serves our arms reduction and nonproliferation goals" [President Clinton, 2/97]

Surplus Plutonium

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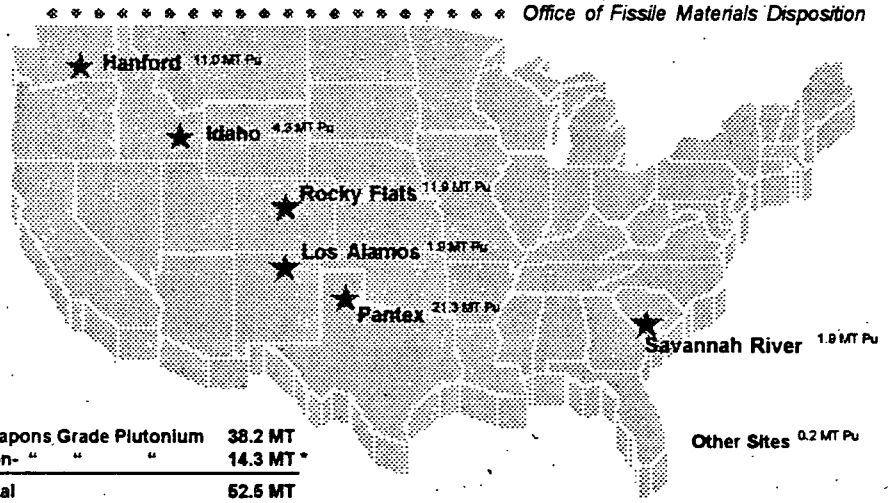

Weapons Grade Plutonium	38.2 MT
Non- " " "	14.3 MT *
Total	52.5 MT

* *This total includes ~ 7 MT of irradiated fuel*

Progress Since 1/96 TRB Briefing

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- Hybrid approach for plutonium disposition [MOX fuel in existing reactors and Pu immobilization] picked in 1/97 record of decision (ROD) and based on:
  - environmental analyses [DOE/EIS-0229]
  - technical, cost and schedule considerations [DOE/MD-0003]
  - nonproliferation analyses [DOE/NN-0007]
- Can-in-canister at Savannah River Site announced as preferred immobilization approach in 5/97 [notice of intent to prepare tiered EIS]

Hybrid Approach

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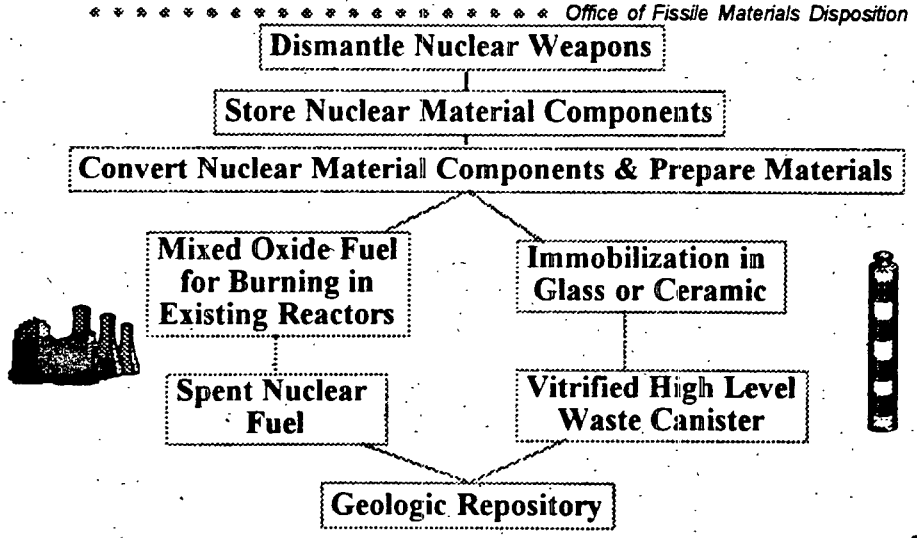

Immobilization Project Objectives

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- Project goal: Develop and deploy can-in-canister immobilization by 2005
- Immobilized form that:
  - Meets the spent fuel "standard"
  - Qualifies for repository acceptance
  - Can effectively incorporate Pu, U, and neutron absorbers as well as expected impurities
- Immobilization process that:
  - Meets ES&H and S&S requirements
  - Is sufficiently flexible to attain quality products while accomodating available Pu feeds
- Facility concept that is cost effective and flexible

Can-in-canister Immobilization approach

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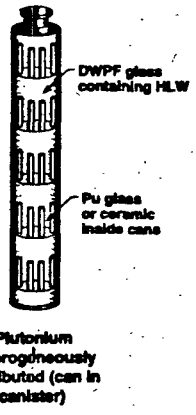
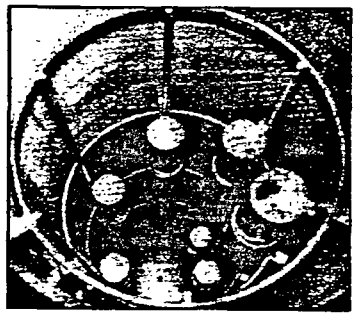


Plutonium heterogeneously distributed (can in canister)



Immobilization assumptions

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- Plan on immobilizing 50 MT Pu [pending decision in '98 on split of material to MOX and CIC] in ~10 years.
- Incoming material will be unclassified and stabilized: metals, oxides, unirradiated reactor fuel.
- HLW canisters are available for plutonium mission
  - ~ 175 canisters/year [if 50MT in 10 years]
  - > 100 r/hr 30 years after fabrication
- Immobilized Pu/HLW canisters will go to the federal waste management system [once "qualified" by meeting all applicable acceptance criteria]

Immobilization Project

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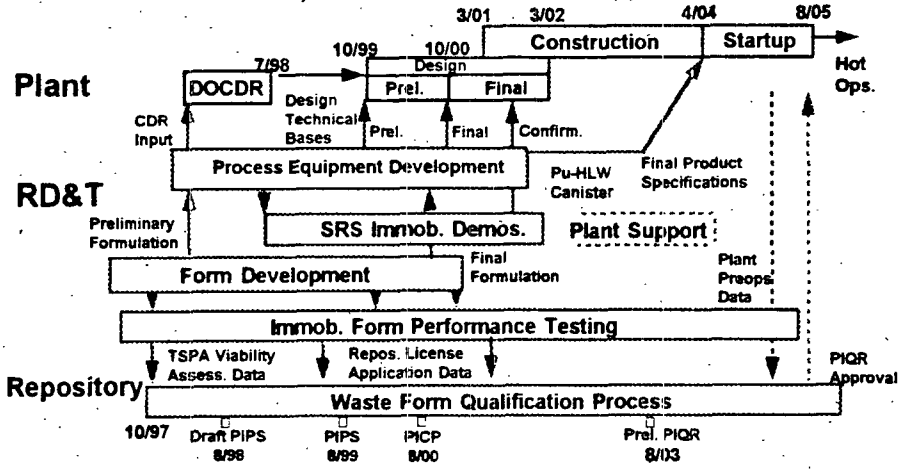

Immobilization Technology Selection

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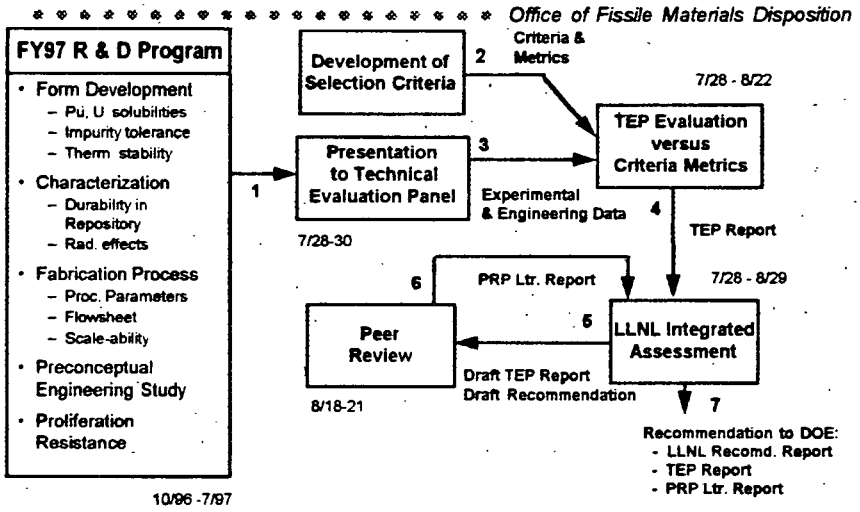

R&D for Form Downselect

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- Forms developed to handle expected impurities in feed materials
  - approximately 90 glass and 30 ceramic samples with plutonium produced and tested
- Flowsheets/layouts developed and key process equipment evaluated
- Focus on ceramics as immobilized form based on
  - both glass and ceramics have the potential to meet mission objectives
  - ceramics offer small to moderate advantages in proliferation resistance, potential worker dose, and cost effectiveness

Savannah River Site

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- Preferred site for plutonium immobilization
  - Leverage off operational Defense Waste Processing Facility
  - Backup site is Hanford due to planned HLW vitrification plant
- Potential to leverage off planned Actinide Packaging and Storage Facility by expanding storage.
- Involved with LLNL in developing the immobilization technology
- Early demonstration of the can-in-canister technology is planned at SRS.

Immobilization Project Organization

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