

***Briefing to the NRC
Commissioners***

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Administration***

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Office of Fissile Materials Disposition***

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Presentation Outline

- **Program objectives**
- **U.S. off-specification highly enriched uranium disposition**
- **Update on Bilateral Plutonium Disposition Agreement**
- **U.S. plutonium disposition**

Program Objectives

- **Dispose of 174 metric tons of surplus U.S. highly enriched uranium**
- **Dispose of 50 metric tons of surplus U.S. plutonium**
- **Work with Russia to dispose of their surplus plutonium**

NRC Involvement in Fissile Materials Disposition

- **Highly enriched uranium**
 - **Use of off-specification highly enriched uranium (HEU) in Tennessee Valley Authority (TVA) reactors**
- **Plutonium**
 - **MOX fuel fabrication, qualification, utilization, packaging, and transportation**

NRC Involvement (cont.)

- **International**
 - **Interagency IAEA collaboration for facilities under international safeguards**
 - **Participation in Regulatory Working Group established under 1998 Scientific and Technical Cooperation Agreement with Russia**

Off-Specification HEU Blend Down

- **DOE and TVA are nearing completion of an Interagency Agreement to blend down 34 MT of off-specification HEU to low enriched uranium for use as fuel in TVA reactors**
 - **Process some of the material at Savannah River prior to transfer to TVA vendors for fuel fabrication; transfer remainder directly to TVA vendors**
 - **Requires new solution transportation containers**

Bilateral Plutonium Disposition Agreement

- **United States and Russia to each irreversibly transform 34 metric tons of excess weapons plutonium into forms unusable for weapons**
 - **Formally announced by President Clinton and President Putin at the June 4, 2000 Moscow Summit**
 - **Signed by Vice President Gore and Prime Minister Kasyanov -- *effective September 1, 2000***

Bilateral Plutonium Disposition Agreement

Key Provisions

- **Each country to dispose of 34 metric tons (MT) of weapon-grade plutonium**
 - **Irradiation as MOX fuel in reactors**
 - **Immobilization with high-level radioactive waste**

	<u>U.S.</u>	<u>Russia</u>
MOX	25.6 MT	34 MT
Immobilization	8.4 MT	----

Bilateral Plutonium Disposition Agreement

Key Provisions (cont.)

- **U.S.-Russian disposition to proceed in rough parallel**
 - **Begin operation of industrial-scale facilities in 2007**
 - **Initial disposition rate of 2 MT/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***

Bilateral Plutonium Disposition Agreement

Key Provisions (cont.)

- **Prohibits separation of plutonium in spent MOX fuel until all 34 metric tons have been disposed -- *Any subsequent (Russian) reprocessing of irradiated MOX fuel subject to mutually agreed monitoring measures***
- **Immobilized plutonium may never be separated**

Bilateral Plutonium Disposition Agreement

Key Provisions (cont.)

- **U.S. to provide near-term financial assistance; additional multilateral financial assistance to be developed within one year of signing**
- **Additional plutonium may be added in the future -- *need not be reciprocal***

U.S. Plutonium Disposition Strategy

- **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**

Spent Fuel Standard

- **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***

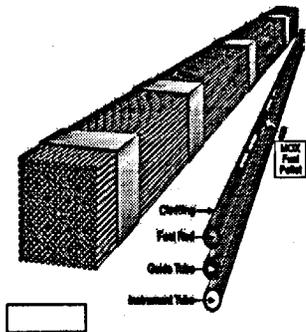
Key U.S. Plutonium Disposition Facilities



Advanced Recovery and Integrated
Extraction System (ARIES)

Pit Disassembly & Conversion Facility

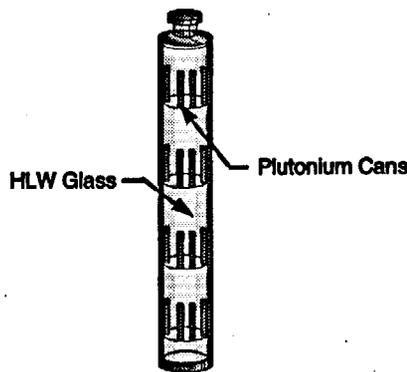
**Disassemble plutonium “pits” and convert
the resulting metal to an oxide powder**



MOX Fuel Assembly

MOX Fuel Fabrication Facility

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



Can-in-Canister

Plutonium Immobilization Facility

**Convert “non-pit” plutonium to
plutonium oxide, mix with ceramic
material, array in canister, surround
with molten high level waste**

MOX Prime Contract

- **Fuel qualification: Qualify MOX fuel for use in PWRs**
- **Fuel fabrication: Design, license, construct and operate a MOX Fuel Fabrication Facility (MOX FFF)**
- **Fuel packaging: Package fresh MOX fuel for transport from MOX Fuel Fabrication Facility to reactors**
- **Fuel irradiation: Irradiate fuel to the spent fuel standard with partial MOX cores**

Duke, Cogema, Stone & Webster (DCS), LLC



DUKE COGEMA
STONE & WEBSTER

 **Duke Engineering
& Services.**
A Duke Energy Company


COGEMA, INC.

 **Stone & Webster**

• MAJOR SUBCONTRACTORS

Duke Power; Irradiation services
FCF; Fuel design services
NFS; Security related services
Cogema; European MOX experience

MOX Fuel Fabrication Facility

- **Non-reactor nuclear facility -- 320,000 sq. ft. and conventional structures -- 120,000 sq. ft.**
- **Hardened space comprising three interconnected areas:**
 - **Shipping and receiving**
 - **Aqueous purification (polishing)**
 - **Fuel fabrication**
- **Incorporates operational French technologies -- modified to meet NRC licensing requirements**
- **All plutonium processing in gloveboxes**

Lead Assemblies

- **Lead assemblies are required by reactor operator for confirmation of MOX fuel design**
- **Two fabrication alternatives under consideration:**
 - **Fabrication in Europe using prototypic processes and equipment**
 - **Fabrication in the MOX Fuel Fabrication Facility**

Irradiation Services

Four Duke Energy-operated PWRs will be used to irradiate MOX fuel -- *two McGuire plants, two Catawba plants*

- Will meet 2 MT/yr goal (bilateral agreement)**
- Will disposition 25 MT of plutonium by 2019**
- Will irradiate MOX fuel for 2 cycles**
- Spent fuel to be stored on-site pending geologic disposal (similar to LEU fuel)**

MOX Facility to be NRC Regulated

**FY 1999 Defense Authorization Act
(Public Law 105-261) -- SEC. 3134.
*Licensing of Certain Mixed Oxide Fuel
Fabrication and Irradiation Facilities***

- **Requires any person constructing or operating a new or operating an existing facility to fabricate mixed oxide (MOX) fuel for use in a commercial nuclear reactor to be subject to NRC licensing**

Submittals to NRC

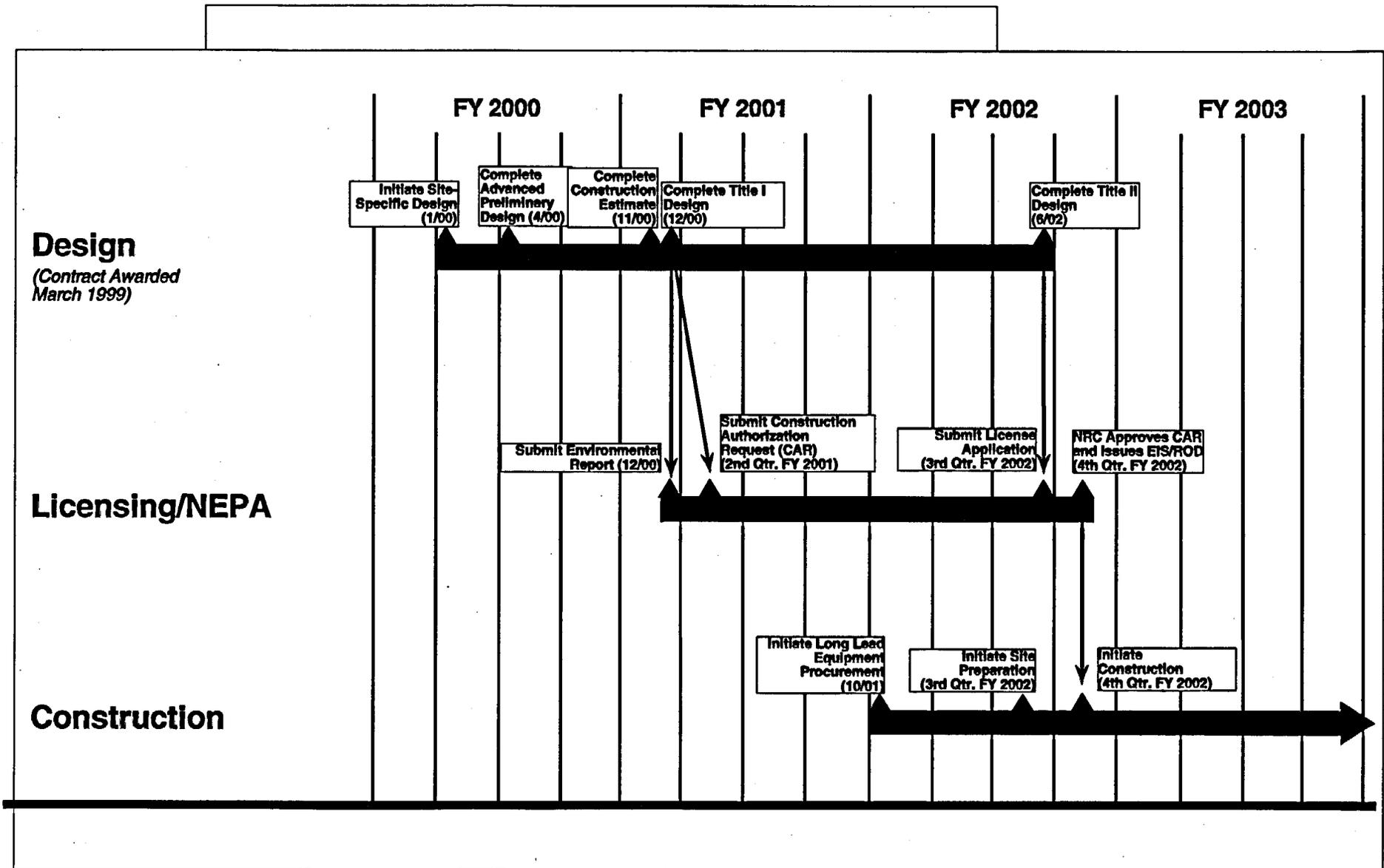
**Mixed Oxide
Fuel Fabrication
Facility**

**Environmental Report
--to be submitted by
DCS in Dec for NRC's
EIS development**

**Construction
Authorization Request
--to be submitted by
DCS in early-CY 01**

**Facility License
Application--to be
submitted in mid-CY
02**

MOX Facility Schedule



Submittals to NRC

**Fuel qualification
and irradiation**

**Topical reports for
MOX fuel design
and performance**

**Application for
reactor license
amendments for MOX
fuel and, possibly, a
separate amendment
for inserting lead
test assemblies**

**Fuel packaging
& transportation**

**Request for issuance
of a Certificate of
Compliance**

MOX Issues

- **MOX Fuel Fabrication Facility is first facility to be licensed under new 10 CFR 70 rule**
- **New performance requirement for worker exposure during MOX Fuel Fabrication Facility accidents will require DCS, DOE, and NRC to agree on how performance is demonstrated**
- **Process for determining fuel qualification needs**

NRC/DOE Interfaces

- **Conclude a Memorandum of Understanding on security approach**
- **DOE/NRC need to maintain continuing dialogue to support this National Security Program**