

Fissile Materials Disposition

Program Mission

In the aftermath of the Cold War, significant quantities of weapons-usable fissile materials (primarily plutonium and highly enriched uranium) have become surplus to national defense needs both in the United States and Russia. The Department of Energy's (DOE) Office of Fissile Materials Disposition is responsible for implementing a path forward for the storage of weapons-usable fissile materials and the disposition of fissile materials declared surplus to national defense needs. The efforts undertaken by the Office of Fissile Materials Disposition contribute to the Administration's approach to reduce the nuclear danger and the threat of proliferation. The Department will irreversibly dispose of the Nation's surplus plutonium and highly enriched uranium, reduce the number of sites where surplus weapons-usable materials are stored, and provide key negotiation and technical support for efforts to attain reciprocal actions for the disposition of surplus Russian plutonium.

In January 1997 the Department issued a Record of Decision covering the storage of all weapons-usable fissile materials and the disposition of surplus plutonium. Key elements are:

Future Storage

The Department is reducing the number of sites where plutonium is stored through a combination of storage and disposition alternatives. Surplus plutonium pits from Rocky Flats and SRS have been moved to Pantex to be stored, along with other surplus pits residing at Pantex, in upgraded facilities.

In August 1998, the Department issued an amended Record of Decision to remove all surplus non-pit plutonium from Rocky Flats by 2002, in accordance with the Department's June 1998 Accelerated Closure Pilot Project that calls for closing the site by 2006. The plan calls for the Department to transfer surplus non-pit plutonium from Rocky Flats to Savannah River for storage in a modified building 105-K. The expanded storage vault in the Actinide Packaging and Storage Facility at SRS will be used to store the non-pit material to be transferred from the Hanford Site. The amended Record of Decision is expected to result in a cost reduction to the Department of approximately \$1.3B by eliminating plutonium storage at the Rocky Flats and Hanford sites several years sooner than originally planned.

In FY 2000 DOE will begin shipment of the surplus non-pit material from Rocky Flats to building 105-K at SRS. DOE will complete upgrades for storage of surplus plutonium pits at the Pantex Plant and begin storage of surplus pits in upgraded facilities.

Plutonium Disposition

The Department is proceeding with a hybrid plutonium disposition strategy that includes immobilization of surplus weapons plutonium with ceramic material and burning of surplus plutonium as mixed oxide (MOX) fuel in existing domestic commercial reactors to achieve the spent fuel standard. The Department plans on immobilizing non-pit surplus plutonium which is not suitable for use in MOX fuel without extensive purification, but reserves the option to immobilize the entire 50 metric tons (mt) of

declared surplus. The Administration will not construct new facilities for disposition of U.S. plutonium unless there is significant progress on plans for plutonium disposition in Russia. The success of these efforts will directly contribute to national security, enhance cooperation with Russia, and attain reciprocal action for the disposition of Russian surplus plutonium.

In FY 2000 DOE will begin design of an Immobilization and Associated Processing Facility; complete Title I and initiate Title II design of a full-scale Pit Disassembly and Conversion Facility and a MOX Fuel Fabrication Facility; continue testing of the pit disassembly and conversion prototype for disassembling plutonium weapons components and converting the plutonium to stable forms suitable for international inspection and disposition; establish the technical baseline for ceramic immobilization plant process; and initiate a MOX lead test assembly program. These implementation efforts will directly contribute to the advancement of U.S. and international nonproliferation interests and to improving the cost-effectiveness of the Department's management of stockpiles of surplus fissile materials.

Uranium Disposition

The Program's efforts will continue to focus on implementing the July 1996 Record of Decision to disposition up to 85% of the surplus highly enriched uranium (HEU) by down-blending it with other uranium materials to commercially-usable low enriched uranium, thereby advancing U.S. nonproliferation goals, reducing storage and security costs, and providing revenues to the Treasury from the commercial sale of these surplus assets over time. The remaining surplus HEU, originally determined to be in forms unsuitable for commercial use, was to be down blended and disposed of as waste. Subsequently, it was determined that the material is in forms suitable for down-blending and sale or suitable for disposition as waste without down blending.

To date, approximately 174.3 mt of HEU have been declared excess to national security needs. Some of that material is in the form of spent fuel, and not available for down-blending. Because of the various forms of HEU and the availability dates from weapons dismantlement and site cleanup operations, blending would take place over an estimated 15 to 20-year period. Title to 63 mt has already been transferred to the United States Enrichment Corporation (USEC). DOE expects that an additional 33 mt of off-specification HEU will be down blended and transferred to the Tennessee Valley Authority (TVA). (Additional quantities would be available after that date.) Ten mt of high quality excess HEU (currently under IAEA safeguards at the Oak Ridge Reservation) may also be down blended for commercial sale resulting in receipts starting in FY 2003.

In FY 2000 DOE will continue to transfer surplus HEU to USEC for blend down; continue plans and initiate testing for disposition of 33mt of off-specification HEU by blend down and irradiation in TVA reactors (generating receipts for the U.S. Treasury from TVA's savings in fuel costs); plan for the blend down and sale of 10mt of HEU currently under IAEA safeguards (generating receipts to partially offset future budget requests); and issue a draft environmental impact statement on disposition of approximately 1mt of U-233.

Cooperation and Reciprocity with Russia and Other Nations

In addition to domestic-based activities, FY 2000 efforts will focus on work with Russia on programs to facilitate the disposition of surplus Russian weapons plutonium. Plans are to implement a U.S./Russian accord (currently being negotiated) for disposition of excess weapons plutonium with participation from other nations. A series of collaborative disposition efforts which include analyses and small-scale tests and demonstrations of plutonium disposition technologies will continue. Technical areas being jointly evaluated include: burning the surplus plutonium in reactors; immobilization of plutonium in solid matrices; and stabilization of liquid and other forms of nuclear materials. The Department's work will directly facilitate progress with Russia in the safe, secure, verifiable disposition of surplus Russian plutonium in a manner that helps preclude its reuse in nuclear weapons.

Program Goal

Reduce the global nuclear danger by eliminating inventories of surplus weapons-usable fissile materials through strategies and implementing actions to provide safe, secure, cost effective and inspectable storage of U.S. weapons-usable fissile materials, and dispose of these surplus materials in accordance with terms set forth in agreements between the United States and Russia.

Program Objectives

- # *To Provide a Department-wide Storage Configuration for Surplus Weapons-Usable Fissile Materials that is Safe, Secure, Environmentally Sound, Inspectable and Cost-effective* - Strategies are: (1) Eliminate the storage of separated, weapons-usable plutonium at the Rocky Flats Environmental Technology Site and the Hanford Site; (2) Utilize existing facilities and infrastructure to the extent practical and upgrade, as necessary, these facilities to meet safety, security, and inspection requirements; and (3) Design and construct a facility for surplus non-pit materials at the Savannah River Site (EM Project 97-D-450) and upgrade buildings for surplus pit materials at Pantex (MD Project 97-D-140). Continue the storage of surplus plutonium at the Idaho Engineering and Environmental Technology Site and Los Alamos National Laboratory, pending disposition.
- # *To Eliminate the Stockpile of Surplus Uranium* - Strategies are: (1) Decrease site inventories of surplus highly enriched uranium and associated management costs by down blending HEU for subsequent sale; (2) Engage the private sector, to the extent practical, to process and disposition surplus highly enriched uranium, thereby developing the industrial infrastructure to accommodate the blend down of increased quantities of surplus HEU to commercially-usable low enriched uranium over time; and (3) Where practical, generate revenues from the disposition of HEU for the Treasury and to partially offset future budget requests.
- # *To Eliminate the Stockpile of Surplus Weapons-Usable Plutonium* - Strategies are:
 - 1) Demonstrate the early feasibility of an integrated process for the disassembly and conversion of plutonium from weapons components into forms suitable for international inspection and disposition;
 - 2) Design, construct and operate necessary facilities to disposition surplus plutonium;
 - 3) Rely on commercial industry for disposition activities to the extent practical; and
 - 4) Decrease inventory of surplus plutonium and associated management costs.

- # *Conduct Joint Technical Activities with Russia and Other Nations in Support of U.S. Efforts to Encourage Russia to Dispose of Stockpiles of Excess Weapons Plutonium* - Strategies are:
(1) Support government-wide efforts to negotiate bilateral or multilateral agreements necessary to implement the disposition of U.S. and Russian plutonium no longer required for defense purposes; (2) Conduct jointly with Russia tests and demonstrations of plutonium disposition technologies; and (3) Contribute to an international effort to implement plutonium disposition in Russia.

Performance Measures

Future Storage

- # Complete the upgrade of storage facilities at the Pantex Plant for storing surplus plutonium pits.

Uranium Disposition

- # Transfer 7mt of the 50mt of surplus HEU to USEC for downblending to LEU for sale and subsequent use in commercial nuclear reactors.

Plutonium Disposition

- # Establish technical baseline for ceramic immobilization plant process.
- # Complete Title I and initiate Title II design for the Pit Disassembly and Conversion Facility.
- # Complete Title I and initiate Title II design for the MOX Fuel Fabrication Facility.
- # Initiate Title I design for the Immobilization and Associated Processing Facility.

Cooperation and Reciprocity With Russia and Other Nations

- # Continue small scale tests and demonstrations in accordance with the U.S./Russian Scientific and Technical Cooperation Agreement.
- # Begin to implement a bilateral agreement with Russia for disposing of plutonium in Russia.

NEPA

- # Issue a draft environmental impact statement on disposition of U-233 and conduct public outreach, including public meetings.

Significant Accomplishments and Program Shifts

Future Storage

- # Completed shipment of surplus weapons pits from Rocky Flats to Pantex.
- # Completed shipment of surplus weapons pits from SRS to Pantex.
- # Accelerated the timetable for reducing the number of sites where plutonium is stored.
- # Completed design for a future storage facility at SRS for surplus non-pit materials and issued a Request for Proposal (RFP) for construction of the Actinide Packaging and Storage Facility (EM Project 97-D-450).

Uranium Disposition

- # Signed a Memorandum of Agreement with USEC for the transfer and blend down of 50mt of surplus HEU.
- # Began shipping HEU to USEC's blending subcontractor.
- # Prepared a Project Plan for the transfer and subsequent blend down of approximately 33mt of surplus off-specification HEU to the Tennessee Valley Authority (TVA).
- # Blended down the first installment of off-specification HEU for lead test assemblies for TVA.

Plutonium Disposition

- # Pit Disassembly and Conversion
 - ▶ Started operation of the pit disassembly and conversion prototype.
- # Immobilization
 - ▶ Established baseline immobilization form.
 - ▶ Completed conceptual design of the Immobilization and Associated Processing Facility.
 - ▶ Immobilized plutonium waste form included in repository technical baseline program.
- # MOX/Reactor
 - ▶ Issued an RFP, solicited and evaluated proposals for the selection of a private contractor consortium to provide MOX fuel fabrication and irradiation services.

- ▶ Initiated tests of MOX fuel made from weapons-derived plutonium in the Advanced Test Reactor (ATR) in Idaho.
- ▶ Conducted preliminary experiments on the effects of gallium on fuel performance.

Cooperation and Reciprocity With Russia and Other Nations

- # Negotiated a Scientific and Technical Cooperation Agreement with Russia, signed by the Vice President of the United States and the Russian Prime Minister, to proceed with tests and demonstrations for surplus plutonium disposition up to and including pilot scale.
- # Supported negotiations which resulted in a Joint Statement of Principals for Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes with Russia, signed by the President of the United States and the President of the Russian Federation.
- # Initiated feasibility studies on a plutonium conversion system in Russia.
- # Initiated testing in Russia of processes for converting plutonium metal to specification oxide.
- # Continued small-scale tests in Russia of vitrification and performed analysis of using MOX fuel in Russian reactors.
- # Started discussions on U.S./Russian plutonium disposition accord.

NEPA

- # Issued an amended Record of Decision to remove and ship all weapons-usable surplus non-pit plutonium from Rocky Flats to SRS by 2002, and remove and ship Hanford surplus weapons-usable plutonium to SRS during 2002 through 2005, in accordance with the Department's June 1998 Accelerated Closure Pilot Project.
- # Prepared analyses and issued a draft environmental impact statement which identified preferred sites for the facilities for implementing the hybrid disposition approach for surplus plutonium disposition.
- # Issued environmental assessments (EAs) on the operation of the pit disassembly and conversion prototype.

Funding Profile

(dollars in thousands)

	FY 1998 Current Appropriation	FY 1999 Original Appropriation	FY 1999 Adjustments	FY 1999 Current Appropriation	FY 2000 Request
Fissile Materials Disposition					
Operation and Maintenance	99,451	116,372	0	116,372	129,766
Russian Plutonium Disposition	0	200,000	0	200,000	0
Program Direction	4,345	4,588	0	4,588	7,343
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Subtotal, Fissile Materials Disposition	103,796	320,960	0	320,960	137,109
Construction	0	48,000	0	48,000	62,891
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Subtotal, Fissile Materials Disposition	103,796	368,960	0	368,960	200,000
Use of Prior Year Balances	-119	-1,469	0	-1,469	0
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Total, Fissile Materials Disposition	103,677	367,491	0	367,491	200,000
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Public Law Authorization:

PDD-13 Nonproliferation and Export Control Policy - 9/93
 Public Law 103-337 Establishes permanent DOE Office - 10/94
 PDD-41 Improving Nuclear Security in Russia - 10/95
 Public Law 104-134 USEC Privatization Act - 4/96

Funding by Site

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	\$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	30,917	35,035	36,768	1,733	4.9%
Pantex	175	930	4,300	3,370	362.4%
Sandia National Laboratory	3,575	2,410	3,100	690	28.6%
Total, Albuquerque Operations Office	34,667	38,375	44,168	5,793	15.1%
Chicago Operations Office					
Argonne National Laboratory	1,993	1,785	1,809	24	1.3%
MOX Fuel Fabrication Facility Design	0	28,000	12,375	-15,625	-55.8%
MOX Fuel Fabrication & Irradiation Contractor	0	9,000	15,000	6,000	66.7%
Total, Chicago Operations Office	2,715	39,548	30,044	-9,504	-24.0%
Federal Energy Technology Center					
	5,515	1,884	3,650	1,766	93.7%
Nevada Operations Office					
	850	1,660	2,175	515	31.0%
Oakland Operations Office					
Oakland Operations Office	770	0	0	0	0.0%
Atomic Energy of Canada, Ltd	1,025	500	0	-500	-100.0%
Lawrence Livermore National Laboratory	25,154	30,760	25,466	-5,294	-17.2%
Total, Oakland Operations Office	26,949	31,260	25,466	-5,794	-18.5%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	13,754	15,507	16,136	629	4.1%
Y-12	3,814	3,295	3,353	58	1.8%
Total, Oak Ridge Operations Office	17,568	18,802	19,489	687	3.7%
Richland Operations Office					
Richland Operations Office	65	0	0	0	0.0%
Pacific Northwest Laboratory	2,105	2,023	1,842	-181	-8.9%
Total, Richland Operations Office	2,170	2,023	1,842	-181	-8.9%
Rocky Flats Field Office					
	44	0	0	0	0.0%
Savannah River Operations Office					
Savannah River Operations Office	281	0	0	0	0.0%
Westinghouse Savannah River	7,516	10,640	15,067	4,427	41.6%
Total, Savannah River Operations Office	7,797	10,640	15,067	4,427	41.6%
Washington Headquarters					
	5,521	4,768	5,878	1,110	23.3%

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	\$ Change	% Change
Undesignated Field Offices	0	0	1,705	1,705	100.0%
Pit Disassembly & Conversion Facility Design	0	20,000	28,751	8,751	43.8%
Immobilization & Associated Processing Facility Design	0	0	21,765	21,765	100.0%
Russian Plutonium Disposition	0	200,000	0	-200,000	-100.0%
Subtotal, Fissile Materials Disposition	103,796	368,960	200,000	-168,960	-45.8%
Use of Prior Year Balances	-119	-1,469	0	1,469	100.0%
Total, Fissile Materials Disposition	103,677	367,491	200,000	-167,491	-45.6%

Site Description

Lawrence Livermore National Laboratory

The Lawrence Livermore National Laboratory (LLNL) serves as the lead laboratory in the development of technologies that will lead to immobilization of surplus plutonium materials into disposition forms that meet the spent fuel standard. LLNL develops technical and engineering data on the preferred ceramic plutonium form (using can-in-canister technology) to support facility design and qualification for repository disposal. LLNL supports the design of an immobilization facility which will contain systems for converting various incoming plutonium materials into a uniform oxide feed, blending the oxide feed with other materials into ceramic discs and placing these discs into small cans, which in turn are placed into a larger canister subsequently filled with high level vitrified waste. LLNL also performs research and development tasks and design support for the pit disassembly and conversion demonstration and full-scale facility. In addition, LLNL is conducting initial immobilization feasibility studies for possible disposition of surplus Russian plutonium.

Los Alamos National Laboratory

The Los Alamos National Laboratory (LANL) serves as the lead laboratory in the development and demonstration of a weapons pit disassembly and conversion process. This process establishes a basis for conversion of all surplus weapon pit types into an oxide powder form suitable for inspection and disposition. The Advanced Recovery and Integrated Extraction System (ARIES) at LANL serves as the current system demonstration project. A production-scale facility will be supported through the development of a knowledge base from the demonstration facility activities and through LANL's assistance in the procurement of design services for the full-scale facility. The pit disassembly and conversion team consists of LANL, LLNL, and Sandia National Laboratory (SNL). LANL has the lead on MOX fuel technology supporting Oak Ridge National Laboratory (ORNL) in the program's efforts to transform the plutonium powder produced from surplus weapons pits to commercial spent nuclear fuel. LANL performs a spectrum of research and development tasks and technical support for a MOX fuel fabrication facility which will convert the plutonium oxide powder to MOX fuel suitable for use as a fuel source in U.S. commercial nuclear reactors. LANL is capable of producing MOX fuel for reactor test

demonstration purposes. LANL also serves as the lead for the design of a plutonium conversion line in Russia which will convert surplus Russian plutonium from metal to oxide for fabrication into MOX fuel or other disposition approaches.

Oak Ridge National Laboratory

The Oak Ridge National Laboratory (ORNL) serves as the lead laboratory in the development of technologies that will enable disposition of surplus plutonium materials by burning as MOX fuel in commercial reactors. ORNL performs research and development on gallium effects on MOX fuel, develops technical and engineering data on fabrication of domestic lead fuel assemblies to reactor specifications, and conducts reactor licensing. ORNL also serves as the lead for the Parallel heavy water reactor (CANDU) fuel and irradiation experiments and the development of gas reactor technology in Russia for plutonium disposition. Physics support is also provided for analysis of Russian VVER-1000 reactors for disposition of Russian plutonium. In addition, ORNL serves as the lead for U-233 disposition activities.

Savannah River Site

The Savannah River Site (SRS) provides technology support for immobilization of surplus plutonium in the areas of ceramic form development and immobilization process and equipment development. In addition, SRS provides support in disposition of off-specification HEU at TVA and disposition of U-233. SRS is the lead on the construction of the Actinide Packaging and Storage Facility (EM Project 97-D-450).

All Other Sites

The Argonne National Laboratory (ANL) and the Pacific Northwest National Laboratory (PNNL) provide support to LLNL by performing immobilization performance testing activities. The Y-12 Site and the Oak Ridge Operations Office serve as the lead for all HEU disposition activities. The Sandia National Laboratory (SNL) provides support for pit disassembly and conversion, Russian activities, and U.S. program integration activities. The Pantex Site provides support for upgrades for storage of surplus pit materials from Rocky Flats and SRS. The Nevada Operations Office (NV) contracts for repository analysis support associated with disposition technologies. The Federal Energy Technology Center (FETC) contracts for environmental analysis support for disposition technologies. The Chicago Operations Office (CHO) provides procurement support for the private contractor consortium to provide MOX fuel fabrication and irradiation services and the contractor to provide design services for the pit disassembly and conversion facility.

Operation and Maintenance

Mission Supporting Goals and Objectives

In the aftermath of the Cold War, significant quantities of weapons-usable fissile materials (primarily plutonium and highly enriched uranium) have become surplus to national defense needs both in the United States and Russia. The threat that nuclear weapons or materials could fall into the wrong hands through theft or diversion is a clear and present danger. The danger exists not only in the potential for proliferation of nuclear weapons, but also in the potential for environmental, safety and health consequences if surplus fissile materials are not properly managed. United States policy is to seek to eliminate, where possible, accumulation of stockpiles of highly enriched uranium and plutonium, and to ensure that where these materials already exist they are subject to the highest standards of safety, security, and international accountability.

This budget reflects funds necessary to continue implementing the consolidated storage and disposition of surplus weapons-usable fissile materials based upon the Department's January 1997 and August 1998 Records of Decision. Cost and schedule estimates for plutonium disposition are based on conceptual design estimates pending completion of detailed cost estimates following site selection, contract award for a consortium to provide MOX fuel fabrication and irradiation services, and Title I design for disposition facilities. Funds requested for implementation of HEU disposition are based upon the Department's July 1996 Record of Decision to blend down U.S. surplus highly-enriched uranium to low-enriched uranium for peaceful use as commercial reactor fuel. Key storage and disposition decisions are:

Future Storage

- # **Rocky Flats:** Phase out storage of all weapons-usable plutonium at Rocky Flats Environmental Technology Site; move pits to Pantex during a two year period beginning in 1997, and move separated and stabilized non-pit materials to Savannah River during a two-year period beginning in 2000.
- # **Pantex:** Upgrade facilities at Pantex to store surplus plutonium pits including pits from Rocky Flats and SRS.

- # **Savannah River:** Upgrade building 105-K at SRS to store surplus, non-pit plutonium materials currently at the Rocky Flats Environmental Technology Site. The Department will begin moving the Rocky Flats material in 2000 and finish in 2002. Expand the planned Actinide Packaging and Storage Facility to be built at SRS to store surplus, non-pit plutonium materials currently at SRS and surplus non-pit plutonium materials from the Hanford Site pending the start of plutonium disposition. The Department will begin moving the Hanford material in 2002 and finish in 2005 (EM Project 97-D-450).^a

Plutonium Disposition

The Department plans to dispose of quantities of surplus plutonium by immobilizing it in ceramic form surrounded by vitrified high level waste and by burning surplus plutonium as mixed oxide (MOX) fuel in existing, domestic reactors. While both approaches are viable for the disposition of surplus weapons usable plutonium, the program needs to optimize the technical approach and finalize cost estimates. Accordingly, the Department's plans include completing the necessary process development and small-scale technology tests, including "can-in-canister" immobilization tests and tests of MOX fuel fabrication and irradiation, and obtaining detailed cost proposals from industry.

For the immobilization approach, the Department needs to finalize the process for formulating plutonium in ceramic materials, the production processes, and the assessment of the impact of impurities on the surplus plutonium forms. Title I design of a Immobilization and Associated Processing Facility will begin in FY 2000.

For the MOX burning in existing reactors approach, the Department needs to complete the procurement process to select a private consortium to provide a MOX Fuel Fabrication Facility and irradiation services, and finalize experiments on potential impacts of other materials alloyed in plutonium pits on fuel performance. Title I design of a MOX Fuel Fabrication Facility will be completed early in FY 2000 and Title II will commence.

Other Disposition-Related Activities

- # Complete design and operational testing of the processes that would be used to convert the plutonium from pits and other forms into oxide powder which would serve as feed material for both the disposition technologies as well as for international inspection. Title I design of a Pit Disassembly and Conversion Facility will be completed early in FY 2000 and Title II will commence.
- # Continue disposition of surplus HEU by down-blending with other uranium materials to commercially-usable low enriched uranium and subsequent sale.
- # Issue a draft environmental impact statement on disposition of U-233. This effort will provide the initial step toward the ultimate disposition decision in accordance with Defense Board

^aEM Project 97-D-450, Actinide Packaging and Storage Facility (APSF), will be reevaluated and may not be constructed. If the reevaluation results in a decision not to move forward with APSF, the Department would develop an amended Record of Decision to address the movement of non-pit material from the Hanford Site to SRS and where it will be stored.

recommendations.

- # Select sites for constructing and operating a pit disassembly and conversion facility, a MOX fuel fabrication facility, and an immobilization and associated processing facility. The Savannah River Site has been identified as the Department's Preferred Site for all three plutonium disposition. Final selection of the site(s) for plutonium disposition will be made in a Record of Decision scheduled for the spring of 1999.
- # Continue and expand a range of U.S. and U.S.-Russian small-scale tests and demonstrations of plutonium disposition technologies is needed to build trust and cooperation and help prepare for reciprocal implementation of future plutonium disposition actions and agreements . This work will complete the technical knowledge base, identify viability of certain technologies, and demonstrate the practical usefulness of some of the technologies that might be employed for disposition of surplus weapons plutonium.
- # Provide oversight and management of plutonium disposition activities in Russia as defined in the U.S./Russian accord currently being negotiated.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	\$ Change	% Change
Future Storage	330	930	4,300	3,370	362.4%
Disposition	87,640	110,824	119,862	9,038	8.2%
Technical Integration, Support & Associated Technologies	6,268	2,703	2,304	-399	-14.8%
NEPA Compliance	5,094	1,915	3,300	1,385	72.3%
Total, Operation and Maintenance	99,332	116,372	129,766	13,394	11.5%

Detailed Program Justification

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
Future Storage			
# Prepare a site-specific storage facility conceptual design for pit materials and resolve issues related to storage operations	330	930	0
# Begin operation of the upgraded storage area at Pantex for surplus plutonium pit materials (shared with Defense Programs)	0	0	4,300
Total, Future Storage	330	930	4,300
 Disposition			
# Highly Enriched Uranium (HEU) Disposition			
▶ Conduct surplus HEU planning, management, characterization, and project management	1,966	1,030	1,139
▶ Complete certification and procure new shipping containers for surplus HEU metal and oxides	943	915	565
▶ Carryout off-specification surplus HEU fuel project with TVA	556	900	1,050
▶ Provide support for transfer of 50mt of surplus HEU to USEC	489	450	499
 # U233 Disposition			
▶ Work on strategy, regulatory issues, environmental data collection for U233 disposition	500	900	2,535

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
# Plutonium Disposition			
▶ Complete construction and perform initial testing of the pit disassembly and conversion prototype system	19,120	0	0
▶ Continue Phase II testing of the LANL prototype system to disassemble and convert surplus plutonium pits to oxide	0	17,430	18,867
▶ Conduct repository analyses associated with disposition technologies	850	1,660	2,175
▶ Conduct performance testing and qualification of ceramic immobilization form, analyze first stage immobilization process and equipment development, and establish technical baseline for ceramic immobilization plant process	31,000	32,000	32,315
▶ Procure plutonium disposition services including fuel qualification, licensing, and initiate a lead test assembly program (irradiation tests)	20,516	25,594	35,772
# Cooperation and Reciprocity With Russia and Other Nations			
▶ Continue small-scale tests involving burning the surplus plutonium in reactors and immobilization of plutonium in solid matrices; develop roadmap to support negotiating and financing plutonium disposition in Russia; and expenditures in the U.S. to implement a U.S./Russian accord for disposition of excess weapons plutonium (oversight and management)	11,700	24,945	24,945
▶ Conduct joint U.S. Russian development program of gas reactor technology to dispose of surplus Russian plutonium with \$3M in Russia (Russia matches contributions or provides contributions in kind) and \$2M in the U.S	0	5,000	0
Total, Disposition	87,640	110,824	119,862

Technical Integration, Support and Associated Technologies

(dollars in thousands)

	FY 1998	FY 1999	FY 2000
# Conduct crosscutting technologies that support all disposition alternatives, including program integration efforts	6,268	2,703	2,304
National Environmental Policy Act (NEPA) Compliance			
# Issue a draft environmental impact statement (EIS) on disposition of U-233	5,094	1,915	3,300
Total, Operation and Maintenance	99,332	116,372	129,766

Explanation of Funding Changes from FY 1999 to FY 2000

FY 2000 vs. FY 1999 (\$000)

Future Storage

The increase is due to the start of operations at the upgraded storage facility at Pantex for surplus pit materials +3,370

Disposition

The increase is due to the start of U-233 disposition activities and procurement of lead test assembly equipment for the MOX fuel approach . . . +9,038

Technical Integration, Support & Associated Technologies

The net decrease is due to a reduction in support services activities moved to Program Direction in accordance with Congressional direction -399

NEPA Compliance

The increase is for environmental analyses associated with the disposition of U233, partially offset by a reduction in support services outreach activities moved to Program Direction in accordance with Congressional direction . . . +1,385

Total Funding Change, Operation and Maintenance +13,394

Russian Plutonium Disposition

Mission Supporting Goals and Objectives

In the aftermath of the Cold War, significant quantities of weapons-usable fissile materials have become surplus to national defense needs both in the United States and Russia. The Presidents of the United States and the Russian Federation affirm the intention of each country to remove by stages approximately 50 mt of plutonium from their nuclear programs, and to transform this material so that it can never be used in nuclear weapons. Both sides have agreed to develop strategies for the management and disposition of plutonium which will be described in a bilateral agreement currently being negotiated.

The Department of Energy's (DOE) Office of Fissile Materials Disposition is responsible for funding initial expenditures in the Russian Federation to implement a United States/Russian accord for the disposition of Russian excess plutonium. The \$200M provided in FY 1999 represents initial funding required to provide United States assistance to Russia to begin implementing a plutonium disposition accord.

The U.S objective is to negotiate an accord specifying the technological approach and the facilities to be constructed in Russia in the initial phase of United States/Russia cooperation, which would have an annual capacity of two tons of plutonium per year. The two governments would further agree to a concept for a subsequent phase of cooperation that would increase the rate of plutonium disposition in Russia to 5 mt per year or more.

Detailed strategies will be defined in the accord. A detailed budget justification and obligation plan will be submitted to Congress once strategies are defined as negotiations progress. Obligation of these funds is contingent upon a signed accord and Congressional approval of the budget justification (in preparation). These funds will be expended in the Russian Federation over a 2-3 year period following completion of the accord. Beyond that, the Administration plans to seek financing for a portion of this program from the international community, both the private and public sector. If, however, the program requires additional future appropriations, the Administration is committed to funding adequate resources in the normal budget process.

The Department's work will directly facilitate progress with Russia in the safe, secure, transparent disposition of surplus Russian plutonium in a manner that precludes its reuse in nuclear weapons.

Funding Schedule

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	\$ Change	% Change
Russian Plutonium Disposition	0	200,000	0	-200,000	-100%
Total, Russian Plutonium Disposition	0	200,000	0	-200,000	-100%

Detailed Program Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000
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Russian Plutonium Disposition

Implement a U.S./Russian accord for disposition of excess weapons plutonium. Initial funds are primarily for design and to begin construction of Russian disposition facilities to be specified in the accord. The U.S. and Russia have not yet agreed on rates, techniques, and facilities for plutonium disposition, but discussions include a plutonium conversion facility and a MOX fuel fabrication facility. These funds will be expended over a 2-3 year period following completion of the accord

	0	200,000	0
Total, Russian Plutonium Disposition	0	200,000	0

Explanation of Funding Changes from FY 1999 to FY 2000

FY 2000 vs. FY 1999 (\$000)

Russian Plutonium Disposition

The decrease is due to a one-time emergency appropriation of \$200,000,000 in FY 1999 for Russian plutonium disposition activities

	-200,000
Total Funding Change, Russian Plutonium Disposition	-200,000

Fissile Materials Disposition Program Direction

Mission Supporting Goals and Objectives

Program direction provides overall management, oversight, staffing, and administrative support necessary to carry out the mission of the Fissile Materials Disposition Program. Operations are conducted in an efficient and streamlined manner consistent with National Performance Review objectives. Program direction has been grouped into four categories:

Salaries and Benefits provides for Federal personnel compensation to include SES and other awards, overtime, lump sum leave payments, transit subsidy costs, and employer's contribution to employees' benefits.

Travel includes domestic and foreign trips necessary to conduct business in carrying out the mission of the program. International travel is frequent in that Fissile Materials Disposition program officials work closely with Russian and other G-7 scientists and government officials on plutonium disposition issues.

Support Services include program analyses and office operations functions which result in improving the effectiveness, efficiency, and economy of management and general administrative services. Activities also include outreach and project scheduling.

Other Related Expenses include employee training; interpreter services; subscriptions; building occupancy; telecommunications; supplies; copiers; postage; printing and graphics; payroll outsourcing; and other miscellaneous expenses associated with office operations.

Funding Schedule

(dollars in thousands, whole FTEs)

	FY 1998	FY 1999	FY 2000	\$ Change	% Change
Salaries and Benefits	3,132	3,334	4,884	1,550	46.5%
Travel	240	300	300	0	0.0%
Support Services	232	232	1,223	991	427.2%
Other Related Expenses	741	722	936	214	29.6%
Total, Program Direction	4,345	4,588	7,343	2,755	60.0%
Full Time Equivalents ^a					
Headquarters	25	28	28	0	0.0%
Field	2	4	11	+7	21.0%
Total, Full Time Equivalents	27	32	39	+7	21.0%

^aFTEs above FY 1998 request 25 (+2) and FY 1999 request (+7) of 25 were funded from prior balances

Detailed Program Direction Justification

(dollars in thousands)

FY 1998	FY 1999	FY 2000
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Salaries and Benefits

Federal Staff provide management oversight and technical support for the safe, secure, environmentally sound future storage of all weapons-usable fissile materials and the disposition of fissile materials declared surplus to national defense needs. The increase is due to +14 FTEs over the FY 1999 funding request for 25 FTEs. Eleven of the +14 FTEs are in the field for oversight and project management of plutonium disposition facility activities . . .

	3,132	3,334	4,884
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Travel

Funding supports domestic and foreign trips required to provide management oversight and technical support to the program, and ensure cooperation and collaboration with Russia and other nations on the disposition of plutonium

	240	300	300
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Support Services

Funding supports office operations functions designed to improve overall effectiveness. Support Services reflects an increase for activities moved from program funding in accordance with Congressional direction

	232	232	1,223
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Other Related Expenses

Supports employee training, office automation support and activities funded by the Working Capital Fund. The increase is due to an FTE increase of +14 and allowable inflation for Working Capital Fund activities and other office operations

	741	722	936
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Total, Program Direction

	4,345	4,588	7,343
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Explanation of Funding Changes from FY 1999 to FY 2000

FY 2000 vs.
FY 1999
(\$000)

Salaries and Benefits

The increase is for +14 FTEs over FY 1999 base funding for 25 FTEs (+7 FTEs were funded in FY 1999 with prior year balances). Of the +14, +11 FTEs are in the field for oversight and project management of design of three plutonium disposition facilities. Three FTEs are in Headquarters to support Russian activities. Salary adjustments in accordance with allowable inflation factors are also included. +1,550

Support Services

The increase includes support services activities moved from program funding in accordance with Congressional direction. Activities include outreach and project scheduling activities +991

Other Related Expenses

The increase is directly related to the FTE increase and will cover space, AOSS equipment and other miscellaneous costs +214

Total Funding Change, Program Direction +2,755

Support Services

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	\$ Change	% Change
Technical Support Services					
Outreach ^a	0	0	350	350	100.0%
Total, Technical Support Services	0	0	350	350	100.0%
Management Support Services					
Project Scheduling/Program Support ^b	0	0	500	500	100.0%
ADP Support	90	95	100	5	5.3%
Administrative Support Services	142	137	273	136	99.3%
Total, Management Support Services	232	232	873	641	276.3%
Total, Support Services	232	232	1,223	991	427.2%

Other Related Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	\$ Change	% Change
Training	23	25	25	0	0.0%
Working Capital Fund	513	544	744	200	36.8%
Other	205	153	167	14	9.2%
Total, Other Related Expenses	741	722	936	214	29.6%

^aOutreach activities moved from program funding in accordance with Congressional direction.

^bProject scheduling activities moved from program funding in accordance with Congressional direction

Capital Operating Expenses & Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 1998	FY 1999	FY 2000	\$ Change	% Change
Capital Equipment	2,940	3,680	10,350	6,670	181.3%
Total, Capital Operating Expense	2,940	3,680	10,350	6,670	181.3%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 1998	FY 1999	FY 2000	Unappropriated Balance
99-D-141 Pit Disassembly & Conversion Facility	346,192	0	0	20,000	28,751	297,441
00-D-142 Immobilization & Associated Processing Facility	547,000	0	0	0	21,765	525,235
99-D-143 Mixed Oxide Fuel (MOX) Fuel Fabrication Facility	383,186	0	0	28,000	12,375	342,811
Total, Construction		0	0	48,000	62,891	1,165,487

Detailed Breakouts

(dollars in thousands)

	Previous Approp.	FY 1998 Approp.	FY 1999 Approp.	FY 2000 Request
Other Project Costs Exceeding \$3 Million				
1. Pit Disassembly & Conversion Facility .		24,000	17,790	14,930
2. Immobilization & Associated Processing Facility		30,000	15,000	15,000
3. MOX Fuel Fabrication Facility		9,000	6,870	5,100
Total		63,000	39,660	35,030

00-D-142, Immobilization & Associated Processing Facility - Title I & II Design, Various Locations (SRS or Hanford)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost (\$000)	Total Project Cost (\$000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request (<i>A-E and technical design only</i>)	N/A	N/A	N/A	N/A	N/A	N/A
FY 2000 Budget Request (<i>Preliminary Estimate</i>)	1Q 2000	2Q 2002	1Q 2002	1Q 2005	a	a

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
2000	21,765	21,765	15,330
2001	26,171	26,171	32,500
2002	20,000	20,000	20,106

3. Project Description, Justification and Scope

In the aftermath of the Cold War, significant quantities of weapons-usable plutonium have become surplus to national defense needs both in the United States and Russia. The Department issued a Record of Decision (ROD) on the Storage and Disposition of Surplus Weapons-Usable Fissile Materials in January 1997. This decision calls for DOE to pursue a hybrid approach for plutonium disposition that allows for immobilization of surplus weapons plutonium in ceramic form and burning of some of the surplus plutonium as mixed oxide fuel (MOX) in existing domestic reactors. The immobilization process that the Department plans to use is the can-in-canister approach in which cans of plutonium immobilized with ceramic material would be arrayed within large canisters into which intensely radioactive high-level waste would be poured. The resulting large, heavy, radioactive waste canisters increase the proliferation resistance of the immobilized plutonium. The waste canisters containing the immobilized weapons plutonium would ultimately be disposed of in a geologic repository.

^aPreliminary cost estimates for the Immobilization and Associated Processing Facility are based upon conceptual estimates. The preliminary estimates are: Total Estimated Cost (TEC) – approximately \$547,000,000 and Total Project Cost (TPC) – approximately \$828,000,000. These estimates are used for the purpose of requesting design funding only. Future construction funding will be based upon Title I cost estimates. The Administration will not construct new facilities for disposition of U.S. plutonium unless there is significant progress on plans for plutonium disposition in Russia.

The Immobilization and Associated Processing Facility will contain all the systems required for: (1) Plutonium Conversion: receiving stabilized non-pit plutonium and converting the material to an acceptable oxide feed form; (2) Initial Immobilization: blending the plutonium oxide feed with precursor materials and solidifying the resultant product into ceramic forms, and placing the ceramic forms into small cans; and (3) High Level Waste (HLW) Immobilization: placement of the small cans into a larger canisters which is filled with borosilicate glass containing HLW and sealed. In the Programmatic Environmental Impact Statement (PEIS), DOE narrowed the field of candidate disposition sites for the Immobilization and Associated Processing Facility to Savannah River and Hanford. Both sites have an existing or planned HLW immobilization infrastructure as well as general support infrastructure in place such as a fire department, security protection forces, and water and sewage treatment plants. In a Notice of Intent to prepare the site specific EIS, DOE identified the Savannah River Site as the preferred site for the Immobilization and Associated Processing Facility. A final decision on where to locate the facility is scheduled for the spring of 1999 in the ROD following the issuance of an Environmental Impact Statement.

The Immobilization and Associated Processing Facility is a complex consisting of a hardened building that will contain the plutonium processes in a safe and secure manner and conventional buildings and structures that will house support personnel, systems and equipment. The seismically hardened new construction will require approximately 150,000 square feet, and house the following key systems: oxide fuel feed preparation; metal fuel feed preparation; grinding; material unpacking and sorting; metal conversion to oxide; impure oxide feed preparation; materials characterization; materials control and accountability; in-process storage; feed batching; ceramic feed preparation; pellet characterization; sintering; recycle; can loading; can characterization; can storage; canister loading and assembly; and the canister transport system. In addition, conventional building space requiring approximately 50,000 square feet to house office space, change rooms, and utilities will be constructed. The existing site infrastructure containing the analytical laboratory and the Actinide Packaging and Storage Facility (originally planned for completion before construction of the Immobilization facility) of approximately 30,000 square feet will be used for sample analysis and storage of select incoming materials.^a

The Department plans on immobilizing non-pit surplus plutonium which is not suitable for use in mixed oxide fuel without extensive purification, but reserves the option to immobilize the entire 50mt of declared surplus. Because of the time required to prepare some materials for immobilization, ten years is the estimated time to immobilize up to 50mt after which the facility will be decontaminated and decommissioned over a three to four-year period. The facility is not expected to be NRC licensed and will begin operations in FY 2006.

This budget request precedes upcoming site selection decisions that will define the scope of the Immobilization and Associated Processing Facility. As a result, funds requested for facility design are based on DOE's can-in-canister approach utilizing the existing HLW and the Defense Waste Processing

^aEM Project 97-D-450, Actinide Packaging and Storage Facility (APSF), will be reevaluated and may not be constructed and therefore will not be available to provide necessary receipt and storage functions required for the immobilization facility. The preliminary estimates for the immobilization facility do not include a minimum of 10,000 sq. ft for these functions should APSF not be constructed.

Facility (DWPF) with existing general support infrastructure. The Title I funding request will not prejudice the final decision, rather, it would help assure that construction funding is available to support prompt FY 2000 implementation of Title I design following the ROD in the spring of 1999.

Note that current construction cost estimates are preliminary and will be revised and final baselines established after completion of Title I design.. The final baseline will be used to measure performance.

4. Details of Cost Estimate

		(dollars in thousands)	
		Current Estimate	Previous Estimate
Design Phase			
Preliminary and Final Design costs, (Design, Drawings, and Specifications)		46,327	0
Design management costs @ 8% of above costs		3,996	0
Total, design phase		50,323	0
Contingencies at approximately 35% of above costs			
Design phase		17,613	0
Total Agency Requirement (Design Only)		67,936	0

5. Method of Performance

Method of performance will not vary by location. It is expected that a cost plus fixed fee contract will be the most appropriate and cost beneficial for the design work. It is anticipated that the construction procurement will be a fixed price contract awarded on the basis of competitive bidding.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Design Cost						
Design	0	0	0	21,765	46,171	67,936
Plant Engineering & Design (PE&D) .	0	0	0	0	0	0
Operating expense funded equipment	0	0	0	0	0	0
<hr/>						
Total Design Costs (Federal and Non-Federal)	0	0	0	21,765	46,171	67,936
Other Project Costs						
R&D necessary to complete project .	0	0	0	0	0	0
Conceptual design costs	0	0	0	0	0	0
Decontamination and Decommissioning (D&D)	0	0	0	0	0	0
NEPA documentation costs	0	0	0	0	0	0
Other project-related costs	0	0	0	0	0	0
<hr/>						
Total Other Project Costs	0	0	0	0	0	0
<hr/>						
Total Agency Requirement (Design only) .	0	0	0	21,765	46,171	67,936
<hr/>						

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	a	N/A

^aRelated annual costs will be defined during the Title I design effort and reflected in the FY 2002 budget request.

99-D-141, Pit Disassembly and Conversion Facility - Title I & II Design, Various Locations (SRS, Pantex, Hanford, or Idaho)

(Changes from FY 1999 Congressional budget Request are denoted with a vertical line [|] in the left margin)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost (\$000)	Total Project Cost (\$000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request (<i>A-E and technical design only</i>)	1Q 1999	3Q 2001	N/A	N/A	N/A	N/A
FY 2000 Budget Request (<i>Preliminary Estimate</i>)	2Q 1999	4Q 2001	2Q 2001 ^a	4Q 2004	b	b

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design & Long Lead Equipment			
1999	20,000	20,000	12,000
2000	28,751	28,751	28,000
2001	20,000	20,000	23,751
2002	0	0	5,000

3. Project Description, Justification and Scope

In the aftermath of the Cold War, significant quantities of weapons-usable plutonium have become surplus to national defense needs both in the United States and Russia. The Department issued a Record of Decision (ROD) on the Storage and Disposition of Surplus Weapons-Usable Fissile Materials in January 1997. This decision calls for DOE to pursue a hybrid approach for plutonium disposition that allows for immobilization of surplus weapons plutonium in ceramic matrix and burning of some of the surplus plutonium as mixed oxide fuel (MOX) in existing domestic reactors. In order to implement the hybrid approach, surplus classified nuclear weapons-components (pits) must first be disassembled and the resulting plutonium converted to an unclassified oxide powder form. No such facilities currently exist in

^aSite preparation will begin in 2Q FY 2001

^bPreliminary cost estimates for the Pit Disassembly and Conversion Facility are based upon conceptual estimates. The preliminary estimates are: Total Estimated Cost (TEC) -- approximately \$346,000,000 and Total Project Cost (TPC) -- approximately \$586,000,000. These estimates are used for the purpose of requesting design and long lead equipment funding only. Future construction funding will be based upon Title I cost estimates. The Administration will not construct new facilities for disposition of U.S. plutonium unless there is significant progress on plans for plutonium disposition in Russia.

the United States. A Pit Disassembly and Conversion Facility will provide the U.S. with the capability to transform classified plutonium weapons pits to an unclassified oxide form suitable for disposition and international inspection.

The Pit Disassembly and Conversion Facility is a complex consisting of a hardened building that will contain the plutonium processes in a safe and secure manner and conventional buildings and structures that will house support personnel, systems and equipment. The plutonium processing building will be a material access area, require approximately 150,000 square feet, and house the following key systems: pit shipment, receiving, assay and storage; pit plutonium metal extraction and conversion to oxide; and plutonium oxide packaging, assay, storage and shipment. Also included are facilities for recovery, decontamination, and declassification of other special nuclear material and non-special nuclear material resulting from pit disassembly. In addition, there are facilities to accommodate IAEA safeguards for specific portions of the processes and facility. The conventional buildings and structures, requiring approximately 50,000 square feet, will house offices, change rooms, an analytical chemistry laboratory, a central control station, waste treatment, packaging, storage and shipment systems. The facility will have the capacity to process 3.5 metric tons of surplus plutonium per year.

The Pit Disassembly and Conversion Facility project consists of: design and construction of the buildings and structures, design, procurement, installation, testing and start-up of equipment to disassemble pits and convert the plutonium from pits to oxide form, as well as associated supporting equipment, components and systems. The facility will not be NRC licensed and will be operated for a ten year period beginning in FY 2005 and then decontaminated and decommissioned over a three to four-year period. Four sites (Hanford, Idaho National Engineering and Environmental Laboratory, Pantex, and Savannah River) are being considered for the full-scale Pit Disassembly and Conversion Facility. In December 1998 the DOE identified Savannah River Site as the preferred location to build the Pit Disassembly and Conversion Facility. A final decision on where to locate the facility is scheduled for the spring of 1999 in the ROD following the issuance of an Environmental Impact Statement

This budget request precedes upcoming site selection decisions that will define the scope of the Pit Disassembly and Conversion Facility. As a result, funds requested for Title I and II facility design are based on a conceptual design for a new facility with established general support infrastructure. The Title I & II funding request will not prejudice the final ROD, but helps assure that construction funding is available to support prompt implementation of Title I design following the ROD in the spring of 1999 and continue design in FY 2000.

Note that current construction cost estimates are preliminary and will be revised and final baselines established after completion of Title I design. The final baseline will be used to measure performance.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs, (Design, Drawings, and Specifications)	33,383	33,383
Design management costs @ 10% of above costs	3,908	3,908
Total, design phase	37,291	37,291
Contingencies at approximately 27% of above costs		
Design phase	10,105	10,105
Long lead equipment ^a	21,355	21,355
Total Agency Requirement (Design and Long Lead Equipment)	68,751	68,751

5. Method of Performance

Method of performance will not vary by location. It is expected that a cost plus fixed fee contract will be the most appropriate and cost beneficial for the design work. It is anticipated that the construction procurement will be a fixed price contract awarded on the basis of competitive bidding.

^aEquipment included in the long lead items are: robotic cranes and track mounted robots in the shipping and receiving system, vault doors in the storage system, material control and accountability computer system, the californium shufflers, and equipment for the waste assay system.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Design & Long Lead Equipment Cost						
Design	0	0	20,000	17,396	10,000	47,396
Plant Engineering & Design (PE&D) .	0	0	0	0	0	0
Operating expense funded equipment	0	0	0	0	0	0
<hr/>						
Total Design Costs (Federal and Non-Federal)	0	0	20,000	17,396	10,000	47,396
Other Project Costs						
R&D necessary to complete project .	0	0	0	0	0	0
Conceptual design costs	0	0	0	0	0	0
Decontamination and Decommissioning (D&D)	0	0	0	0	0	0
NEPA documentation costs	0	0	0	0	0	0
Other project-related costs	0	0	0	0	0	0
<hr/>						
Total Other Project Costs	0	0	0	0	0	0
<hr/>						
Long Lead Equipment	0	0	0	11,355	10,000	21,355
<hr/>						
Total Agency Requirement (Design & Long Lead Equipment)	0	0	20,000	28,751	20,000	68,751

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	a	N/A

^aRelated annual costs will be defined during the Title I design effort and reflected in the FY 2001 budget request.

99-D-143, Mixed Oxide Fuel Fabrication Facility - Title I & II Design, Various Locations (SRS, Pantex, Hanford, or Idaho)

(Changes from FY 1999 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost (\$000)	Total Project Cost (\$000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request (<i>A-E and technical design only</i>)	1Q 1999	4Q 2001	N/A	N/A	N/A	N/A
FY 2000 Budget Request (<i>Preliminary Estimate</i>)	2Q 1999	4Q 2001	1Q 2002	4Q 2005	a	a

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design			
1999	28,000	28,000	15,000
2000	12,375	12,375	20,700
2001	10,000	10,000	14,675

3. Project Description, Justification and Scope

In the aftermath of the Cold War, significant quantities of weapons-usable plutonium have become surplus to national defense needs both in the United States and Russia. The Department issued a Record of Decision (ROD) on the Storage and Disposition of Surplus Weapons-Usable Fissile Materials in January 1997. This decision calls for DOE to pursue a hybrid approach for plutonium disposition that allows for immobilization of surplus weapons plutonium in ceramic form and burning of some of the surplus plutonium as mixed oxide fuel (MOX) in existing domestic reactors. A Mixed Oxide (MOX) Fuel Fabrication Facility will provide the U.S. with the capability to convert specification plutonium dioxide derived from surplus weapons grade plutonium stocks to MOX fuel suitable for use as a fuel source in U.S. commercial nuclear reactors, with subsequent disposal of the spent fuel to be carried out in accordance with the Nuclear Waste Policy Act.

^aPreliminary cost estimates for the Mixed Oxide Fuel Fabrication Facility are based upon conceptual estimates. The preliminary estimates are: Total Estimated Cost (TEC) -- approximately \$383,000,000 and Total Project Cost (TPC) -- approximately \$575,000,000. These estimates are used for the purpose of requesting design funding only. Future construction funding will be based upon Title I cost estimates. The Administration will not construct new facilities for disposition of U.S. plutonium unless there is significant progress on plans for plutonium disposition in Russia

The MOX Fuel Fabrication Facility will contain all the systems required for: receiving plutonium oxide from the Pit Disassembly and Conversion Facility, processing and blending of fuels materials, fabrication of fuel pellets, loading pellets into rods, assembly of completed fuel bundles and shipment to commercial reactors for irradiation. The facility will meet current commercial standards for nuclear fuel manufacturing utilizing the extensive experience base of European fabrication of MOX fuel. The facility will be licensed by the Nuclear Regulatory Commission and operated by a private sector consortium for the Department. Four sites (Hanford, Idaho National Engineering and Environmental Laboratory, Pantex, and Savannah River) are being considered for the MOX Fuel Fabrication Facility. Several proposed sites have general support infrastructure in place such as a fire department, security protection forces, and water and sewage treatment plants. In June 1998 the DOE announced the Savannah River Site as the preferred location to build the MOX Fuel Fabrication Facility. A final decision on where to locate the facility is scheduled for the spring of 1999 in the ROD following the issuance of an Environmental Impact Statement.

The MOX Fuel Fabrication Facility will require approximately 120,000 sq. ft of hardened building which will contain the following systems: plutonium oxide and oxide receiving and storage; MOX powder preparation; pelletizing; sintering; pellet grinding and inspection; fuel rod loading and rework; fuel rod inspection and storage, fuel bundle assembly; clean scrap recovery, processing and recycle; analytical laboratory, contaminated waste, and interim storage vaults. In addition, approximately 55,000 sq. ft. of conventional structures are required adjacent to the fuel fabrication structure to house offices, change rooms, operator training and process demonstration, mechanical shops, utility building, warehouse, and entry portals. Accountability systems essential for use by the IAEA will be in place for the purpose of international safeguards. This facility will be NRC licensed and will be operational for a ten- to fifteen-year period beginning in FY 2007, after which the facility will be decontaminated and decommissioned over a three to four year period.

This budget request precedes upcoming site selection and procurement decisions that will define the scope of the MOX Fuel Fabrication Facility. As a result, funds requested for facility design are based on conceptual design estimates for a new facility with existing site support infrastructure. Irradiation will take place in existing U.S. light water commercial nuclear reactors. The Title I & II funding request will not prejudice the final ROD, but helps assure that construction funding is available to support prompt implementation of preliminary design following the ROD in the spring of 1999 and continue design in FY 2000.

The Department is currently engaged in processes to select a consortium and a site for the MOX Fuel Fabrication Facility. Both decisions could affect the cost of the facility. Note that current construction cost estimates are preliminary and will be revised and final baselines established after completion of Title I design. The final baseline will be used to measure performance.

4. Details of Cost Estimate

(dollars in thousands)		
	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs, (Design, Drawings, and Specifications)	37,803	37,803
Design management costs @ 9% of above costs	3,908	3,908
Total, design phase	41,711	41,711
Contingencies at approximately 21% of above costs		
. Design phase	8,664	8,664
Total Agency Requirement (Design Only)	50,375	50,375

5. Method of Performance

The method of performance will not vary by location. A Request for Proposals was issued by the Chicago Operations Office for the procurement of a consortium to provide fuel fabrication and irradiation of MOX fuel (teaming of MOX fuel fabricator and reactor irradiation service providers). Design, construction, licensing and operation of a MOX Fuel Fabrication Facility, reactor modifications, MOX fuel design and qualification will be accomplished by the selected consortium. Costs associated with design, licensing, construction and startup of the MOX Fuel Fabrication Facility and design, licensing and retrofitting reactors to burn MOX fuel will be reflected in the final contract price. The procurement calls for a base contract with three options. The base contract covers the design and licensing of the MOX Fuel Fabrication Facility, fuel qualification program and reactor license modifications. Sequential contract options cover construction, operations and facility deactivation. It is expected that an incentive contract with the consortium will be the most appropriate and cost beneficial for the design and construction work. The construction would be through fixed price subcontracts to the extent practical, with a cost-type contract for construction management services. The MOX Fuel Fabrication Facility will be Government-owned but operated by the contractor consortium.

It is expected that during the operational phase of the consortium contract, facility operational costs will be offset by the value of the MOX fuel which will displace the low-enriched uranium (LEU) that the utilities would have otherwise purchased. The value of DOE's share of these fuel savings, less the facility operational costs, may provide a positive revenue stream to the government on a life cycle cost basis.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1998	FY 1999	FY 2000	Outyears	Total
Design Cost						
Design	0	0	28,000	12,375	10,000	50,375
Plant Engineering & Design (PE&D) .	0	0	0	0	0	0
Operating expense funded equipment	0	0	0	0	0	0
Total Design Costs (Federal and Non-Federal)	0	0	28,000	12,375	10,000	50,375
Other Project Costs						
R&D necessary to complete project .	0	0	0	0	0	0
Conceptual design costs	0	0	0	0	0	0
Decontamination and Decommissioning (D&D)	0	0	0	0	0	0
NEPA documentation costs	0	0	0	0	0	0
Other project related costs	0	0	0	0	0	0
Total Other Project Costs	0	0	0	0	0	0
Total Agency Requirement (Design only)	0	0	28,000	12,375	10,000	50,375

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	a	

^aRelated annual costs will be defined during the Title I design effort and reflected in the FY 2002 budget request.