

**Joint Statement of  
Rose E. Gottemoeller  
Assistant Secretary for Nonproliferation and National Security  
and  
Laura S. H. Holgate  
Director, Office of Fissile Materials Disposition  
FY 2001 Fissile Materials Disposition Budget Request  
Senate Armed Services Committee  
Strategic Subcommittee  
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**INTRODUCTION**

Mr. Chairman and members of the Committee, we are pleased to appear before you to discuss the FY 2001 budget request for the fissile materials disposition activities of the Department of Energy. Before I address our budget request, I would like to advise you that on March 1, 2000, the Office of the Assistant Secretary for Nonproliferation and National Security will be re-designated as the Office of the Deputy Administrator for Defense Nuclear Nonproliferation. The Office of Fissile Materials Disposition will be incorporated within this Office. The Assistant Deputy Administrator for Fissile Materials Disposition will also serve as the Special Secretarial Negotiator for Plutonium Disposition recognizing the continuing high level visibility of this important nonproliferation mission.

The Office of Fissile Materials Disposition is responsible for disposing of inventories of surplus U.S. weapons-usable plutonium and highly enriched uranium as well as providing technical support for and ultimately implementation of efforts to obtain reciprocal disposition of surplus Russian plutonium. These disposition activities, along with other efforts to dismantle weapons delivery systems, secure nuclear materials, and prevent the spread of nuclear weapons knowledge, are part of the United States government's strategy to reduce the global danger from weapons of mass destruction.

We have made significant progress this past year. We transferred quantities of surplus highly enriched uranium to the United States Enrichment Corporation for down-blending and peaceful use as commercial reactor fuel. We entered into contracts with the private sector for the design of the two key plutonium disposition facilities to disassemble and convert surplus plutonium pits to oxide and to fabricate mixed oxide fuel. We continued to demonstrate our capability to disassemble various types of nuclear weapons pits at the Los Alamos prototype ARIES facility. And, most importantly, this past January, the Department of Energy issued a Record of Decision to construct and operate three new plutonium disposition facilities at the Savannah River Site in South Carolina. Under this decision, the Department will immobilize approximately 17 metric tons of plutonium and use up to 33 metric tons of plutonium as mixed oxide (MOX) fuel for irradiation in existing domestic, commercial reactors.

On the international front, as part of the President's Expanded Threat Reduction Initiative, we have continued to conduct a number of technology demonstrations of key plutonium disposition

technologies in partnership with Russia. These demonstrations will enable the Russians to accelerate efforts to design and construct plutonium disposition facilities. We have conducted extensive negotiations with Russia over the past year on a bilateral plutonium disposition agreement. Implementation of this agreement is essential to enable surplus plutonium disposition to proceed in both countries and is a key objective of U.S. nonproliferation efforts. Following eleven rounds of formal negotiations, I am pleased to report that the United States and Russia are very close to completing this agreement. Both sides are pushing hard to have this agreement available for signature early this spring.

The FY 2001 budget request for U.S. and Russian disposition activities is \$223 million, an increase of \$22 million over the FY 2000 comparable amount. The increase will enable us to begin Title I design of a facility to immobilize surplus non-pit plutonium; incorporate aqueous processing in the design for the mixed oxide fuel fabrication facility; fund MOX lead test assembly activities and advanced gas reactor and reactor fuel qualification work in Russia; and hire additional Federal staff necessary to oversee these fissile material disposition activities.

## **U.S. PLUTONIUM DISPOSITION**

### **Pit Disassembly and Conversion**

The United States has declared approximately 50 metric tons of plutonium as surplus to national defense needs. Approximately one half of this amount is in the form of classified nuclear weapons components called pits. Before weapons plutonium from pits can be disposed of, it must first be converted from a weapon component to an unclassified oxide form suitable for disposition and international inspection. We plan to use the Advanced Recovery and Integrated Extraction System (ARIES), a low-waste, modular pyro-chemical process, to convert the pits to plutonium oxide.

In November 1998, the Department began operation of an integrated pit disassembly and conversion prototype system using the ARIES process at Los Alamos National Laboratory. This facility will demonstrate the capability to safely disassemble the various pit types comprising the surplus inventory. The Department has continually operated this system since 1998, and plans to continue production mode testing through 2001, at which time the disassembly of all surplus pit types in the U.S. inventory will have been demonstrated. This demonstration will provide important information for designing and operating a full-scale pit disassembly and conversion facility, as well as for training facility personnel.

In August 1999, the Department signed a contract with Raytheon Engineers & Constructors, Inc. for the design of the full-scale pit disassembly and conversion facility to be located at the Savannah River Site. Title I design activities commenced upon contract award and will continue through 2000.

The FY 2001 budget request for pit disassembly and conversion activities is \$40.4 million. The portion of this request for technology development activities is \$20.4 million. This funding will allow us to continue production-mode testing of the integrated prototype system at Los Alamos. The remainder of the request, \$20 million, is being sought to begin Title II design of the pit disassembly and conversion facility, and to initiate procurement of long-lead equipment for the full-scale facility. The long-lead equipment procurement needs to be initiated in 2001 in order to obtain necessary equipment design information to support the facility design, and to ensure that the equipment is available to support the facility construction schedule. Contingent on signature of the bilateral agreement with Russia on plutonium disposition, as well as successful demonstration of the prototype, a full-scale facility, capable of processing thousands of pits per year, is planned to be operational at Savannah River in 2006.

### **Mixed Oxide Fuel Fabrication and Irradiation Services**

A key element of the hybrid disposition strategy involves irradiating mixed oxide (MOX) fuel in existing, domestic reactors. In March 1999, the Department of Energy awarded a contract to the consortium team of Duke Engineering & Services, COGEMA, and Stone & Webster to provide MOX fuel fabrication and irradiation services. Subcontractors to the team include Duke Power Company and Virginia Power Company, who will provide reactor facilities (in North Carolina, South Carolina, and Virginia) to irradiate the MOX fuel. Title I design work on the MOX fuel fabrication facility, as well as efforts to begin the necessary reactor modifications, commenced upon contract award. We expect the consortium to complete Title I design of the facility in September 2000, which will enable submission of a license application to the Nuclear Regulatory Commission for construction of the MOX facility

The Department of Energy has irradiated MOX test fuel pins fabricated from weapons plutonium in the Advanced Test Reactor in Idaho. Periodically the test fuel pins have been removed from the Advanced Test Reactor and are undergoing post-irradiation examination at the Oak Ridge National Laboratory.

The FY 2001 budget request for MOX activities is \$60.0 million. The portion of this request for reactor based technology development activities is \$45.0 million. This funding will allow us to continue to design and qualify MOX fuel, support reactor license modification activities, procure lead MOX fuel test assembly equipment, and modify facilities for lead MOX fuel test assembly fabrication at the Los Alamos National Laboratory. The remainder of the request, \$15.0 million, is being sought to initiate Title II design of the MOX fuel fabrication facility. Contingent on signature of the bilateral agreement on plutonium disposition, as well as successful completion of design, construction, and licensing efforts, a full-scale MOX fuel fabrication facility is planned to be operational at Savannah River in 2007.

## **Immobilization**

Approximately one-third of the surplus U.S. plutonium is in the form of impure metal, oxides and reactor fuel, which are unsuitable for MOX use without extensive purification. To dispose of this material, we plan on using a *Ac-in-canister* approach for immobilization. Under this approach, this plutonium would be converted to oxide, immobilized with ceramic material, and placed in sealed steel cans, which would then be arrayed within large canisters. The canisters containing the cans of immobilized plutonium would then be filled with vitrified high-level radioactive waste. The heavy canisters of vitrified high-level radioactive waste provide a barrier that increases the proliferation resistance. Subsequently, the canisters would be disposed of in a planned geologic repository, pursuant to the Nuclear Waste Policy Act.

While the United States has experience with immobilizing high-level wastes, the technological aspects of how to immobilize weapons plutonium on an industrial scale need to be resolved. The Department of Energy is developing processes at the Lawrence Livermore National Laboratory for converting non-pit plutonium into oxide and mixing the oxide with ceramic material. The Department is also developing at Savannah River and at Clemson University test configurations for placing cans, which will contain immobilized plutonium, inside high-level waste canisters.

In August 1999, the Department of Energy announced that it would delay the start of the design of the immobilization facility from 2000 to 2001. This schedule adjustment will enable design and construction of the immobilization facility to proceed in parallel with revised schedules for providing high-level radioactive waste as a radiation barrier at the Defense Waste Processing Facility. Consequently, funding for the initial design of the immobilization facility is now included in the FY 2001 budget request.

The FY 2001 budget request for immobilization activities is \$33.3 million. The portion of this request for technology development activities is \$30.3 million. This funding will allow us to continue the testing and verification of processes for formulating plutonium into ceramic materials, develop can configurations within the high-level waste canisters, and assess the impact of impurities in the surplus plutonium forms. The remainder of the request, \$3.0 million, is being sought to begin Title I design of the immobilization facility. We expect to award a contract to a private sector architect-engineering firm to begin design of the facility. Contingent on signature of the bilateral agreement on plutonium disposition, as well as successful development and refinement of the immobilization process, a full-scale immobilization facility is planned to be operational at Savannah River in 2008.

## **U.S. URANIUM DISPOSITION**

The program will continue to dispose of as much as possible of the U.S. highly enriched uranium, which is excess to defense needs, by down-blending it with other uranium to make low enriched uranium, which is commercially usable as power reactor fuel. This approach advances U.S.

nonproliferation goals, reduces storage and security costs, and provides revenues to the Treasury. The remaining surplus highly enriched uranium which is unsuitable for commercial use will be disposed of as waste.

To date, about 174 metric tons of highly enriched uranium have been declared excess to national security needs. Because of the various forms of highly enriched uranium and the varying availability dates from weapons dismantlement and site cleanup operations, down blending will take place over an estimated 15-to-20 year time period.

The Department shipped 7 metric tons of highly enriched uranium to the United States Enrichment Corporation for down blending in 1999 and will ship up to an additional 4 metric tons to the United States Enrichment Corporation through the end of 2000. An additional 33-38 metric tons of off-specification highly enriched uranium material, not saleable on the open market because it contains a higher percentage of U-236 than normal reactor fuel, is expected to be down-blended and transferred to the Tennessee Valley Authority (TVA) for use in its reactors between 2002 and 2007. To support this effort, lead test assemblies fabricated from off-specification highly enriched uranium are currently undergoing testing in TVA's Sequoyah reactor.

Recent vulnerability assessments and Defense Nuclear Facility Safety Board technical assessments have identified environmental, safety and health vulnerabilities associated with the Department of Energy's current U-233 inventory, located at the Oak Ridge National Laboratory and the Idaho National Environmental and Engineering Laboratory. The Department is currently determining a path forward for the disposition of this material.

The portion of the FY 2001 budget for U.S. uranium disposition activities is \$3.4 million. This funding will allow us to continue to facilitate and dispose of surplus highly enriched uranium by shipping 9 metric tons to the United States Enrichment Corporation in 2001, down-blending off-specification highly enriched uranium and irradiating that material in TVA reactors (\$38 million for irradiation of off-specification material in TVA reactors is funded in the Department's Environmental Management budget in FY 2001), initiating preparations for down-blending additional lots of highly enriched uranium, and continuing to determine the path forward for the future disposition of U-233.

## **SUPPORTING ACTIVITIES**

We are reducing the number of U.S. sites where surplus plutonium is stored. In August 1998, the Department of Energy issued an amended Record of Decision to remove all surplus non-pit plutonium from Rocky Flats by 2002. This effort directly supports the Department's June 1998 Accelerated Closure Pilot Project that calls for closing the Rocky Flats site by 2006. In 2000, we will begin to transfer surplus non-pit plutonium from Rocky Flats to Savannah River.

Surplus plutonium pits from Rocky Flats and Savannah River have been moved to Pantex for storage, along with other surplus pits residing at Pantex, pending disposition. Beginning in 2001, the responsibility for funding the storage of approximately 21 metric tons of surplus plutonium at Pantex and 2 metric tons of surplus plutonium at Los Alamos National Laboratory will be transferred to the Office of Fissile Materials Disposition from the Office of Defense Programs. Costs for operations associated with storage of approximately 85 metric tons of surplus highly enriched uranium at Oak Ridge's Y-12 Plant will also be transferred to the Office of Fissile Materials Disposition from the Office of Defense Programs beginning in FY 2001.

The portion of the FY 2001 budget for these supporting activities is \$35.2 million. This funding will allow us to continue design of a shipping container for surplus pits from Pantex to Savannah River Site, prepare follow-up environmental documents, and fund the costs of operations associated with the storage of surplus plutonium residing at Pantex and Los Alamos and surplus highly enriched uranium at Y-12.

### **WORK WITH RUSSIA**

Our work with Russia is aimed at attaining reciprocal Russian strategies, actions and outcomes for the disposition of Russia's excess plutonium. In July 1998, the U.S. and Russian Governments signed an agreement on scientific and technical cooperation to govern our joint activities in plutonium disposition. Since then, the U.S. and Russia have conducted studies and pilot-scale tests and demonstrations of a host of technologies needed to dispose of surplus weapon-grade plutonium. This work will confirm the viability of certain technologies that might be used for disposition of surplus Russian plutonium, subsequent to a plutonium disposition agreement between the United States and Russia.

Last fall, the United States and Russia agreed on a plutonium disposition roadmap, or logic flow, and an associated nominal schedule for the Russian program. This schedule would allow Russia to achieve the December 2007 start date envisioned in our bilateral plutonium disposition agreement. The early parts of this roadmap focus on technology development in the areas of plutonium conversion and nondestructive assay, irradiating MOX fuel in reactors, and immobilization. Key elements of this work include:

- \$ Assisting Russia to design and build a demonstration facility for converting weapons-origin plutonium metal to an oxide form suitable for use in MOX fuel and for international inspection.
- \$ Developing a MOX fuel fabrication process that would be compatible with surplus weapons-grade plutonium, testing the resulting fuel, and qualifying it for use in a VVER-1000 and BN-600 reactors.

- \$ Along with Japan, assisting Russia to assess the feasibility of converting Russia's BN-600 reactor, a fast-neutron reactor, into a net burner of plutonium.
- \$ Working with Russian institutes and private industry to develop gas turbine, modular helium reactor technology as an option to supplement Russia's existing reactor capacity to dispose of surplus plutonium.
- \$ Assisting Russia in developing glass and ceramic technologies suitable for immobilizing plutonium-containing materials at Russian sites.

Last month, the Department of Energy safely and successfully shipped test MOX fuel pins to Canada for future testing with similar MOX fuel pins from Russia in a Canadian research reactor at Chalk River. Irradiating MOX fuel in Canadian nuclear reactors is one of several options being examined to expand Russia's capacity to dispose of surplus weapons plutonium.

Collectively, this cooperative work with Russia supports President Clinton's Expanded Threat Reduction Initiative to reduce the global danger from weapons of mass destruction. We continue to conduct a number of technology demonstrations of key plutonium disposition technologies in Russia because we believe the development of these technologies will enable the Russians to accelerate efforts to dispose of their surplus plutonium upon signature of the bilateral plutonium disposition agreement.

Our total FY 2001 budget for this cooperative work with Russia is \$40 million. This request includes \$10 million for continuation of the gas reactor technology development. This amount will be spent on gas reactor development only if international partners provide similar funds to continue the research and development for the nuclear fuel and power conversion system for this program. If international support is not forthcoming, the \$10 million will be used to support other elements of the Russian plutonium disposition program. The remaining request of \$30 million will allow us to assist Russia to begin facility upgrades for a demonstration-scale system test facility for conversion of Russian plutonium, complete final design of equipment for the manufacture of Russian MOX lead test fuel assemblies, continue Russian reactor analysis and licensing activities, and continue initial development of a large-scale test system for immobilization, and provide oversight of work performed in Russia.

In addition to the funds for this cooperative work with Russia, Congress provided \$200 million in a FY 1999 emergency supplemental appropriation for Russian plutonium disposition. This year, we will select a contractor to begin implementing projects to be supported by these funds in Russia.

## **BILATERAL PLUTONIUM DISPOSITION AGREEMENT**

Along with technology development, we have conducted extensive negotiations with Russia over the past year on a bilateral plutonium disposition agreement to dispose of 68 (34 U.S. plus 34 Russian) metric tons of weapon-grade plutonium withdrawn from nuclear weapon programs. Negotiations have been led on the U.S. side by the Department of State with key negotiation and technical support provided by the Department of Energy. The Russian side has been led by the Ministry of Atomic Energy with support provided by the Ministry of Foreign Affairs. Conclusion of this agreement is essential to enable surplus plutonium disposition to proceed in both countries and is a key objective of U.S. nonproliferation efforts. Key provisions of the agreement include:

**Material covered.** The Presidents= summit statement called for the disposition, in stages, of up to 50 metric tons of surplus plutonium. The bilateral agreement will commit the sides to dispose of the first 34 metric tons of weapon-grade plutonium in each country. Should additional material be declared excess in the future, the agreement allows the two sides to dispose of it in accordance with the terms of this agreement.

**Disposition techniques.** The agreement allows for disposition either by irradiating the plutonium as MOX fuel in nuclear reactors or by immobilizing the plutonium in glass or ceramic form surrounded by vitrified high-level radioactive waste. The United States will use a combination of both technologies to dispose of our surplus plutonium. Russia plans to dispose of almost all of its plutonium by irradiating the plutonium as fuel in reactors, but may immobilize small amounts that are unsuitable for use in reactors.

**Disposition rates.** The two countries plan to begin operation of industrial-scale disposition facilities not later than December 2007 in order to dispose of at least two metric tons-per-year of weapon-grade plutonium. Subsequently, a plan would be developed to seek to identify additional reactor capacity inside and/or outside Russia to permit at least a doubling of the disposition rates in both countries.

**Financing.** Russia has made clear that proceeding with plutonium disposition is dependent on assistance from the United States and other nations. The \$200 million provided by the U.S. Congress in FY 1999 will assist Russia in jump-starting the effort needed for plutonium disposition. Preliminary estimates indicate construction of plutonium conversion and MOX fabrication facilities and modification of Russian nuclear reactors will cost in excess of one billion dollars. Russia will need to contribute some resources, and the United States government is working with members of the international community to finance the remainder of this program. In the past year, representatives from the U.S. government have met with government and industry officials from France, Germany, England, and Japan to encourage provision of additional financial and technical assistance.



**Inspection, monitoring and nonproliferation conditions.** The agreement will include provisions for monitoring and inspection activities to confirm that the facilities are being dedicated to disposition of this excess weapon plutonium, that the disposition rates are being met, and that the disposed plutonium meets certain agreed standards. Both parties intend to work towards allowing certain bilateral inspection and monitoring rights to be satisfied by equivalent IAEA verification measures, to the extent practicable.

## **PROGRAM DIRECTION**

Program Direction provides the overall Federal management, oversight, staffing, and administrative support necessary to carry out the Fissile Materials Disposition Program. The portion of the FY 2001 budget for Program Direction is \$9.9 million and represents an increase of \$2.6 million over FY 2000. This increase will provide for eight additional full-time equivalent staff over the FY 2000 level for field oversight and project management for the design of three U.S. disposition facilities and gas reactor activities, and for headquarters support of the Russian program. The increase also includes office support costs for 16 Field full time equivalent positions. The \$9.9 million level for Program Direction represents a modest 4.4% of the total Fissile Materials Disposition Program budget request.

## **CONCLUSION**

This is an important year for the U.S. program as well as for work in Russia. We have decisions and systems in place, and upon signature of the bilateral agreement with Russia, we will move ahead promptly to actually construct the facilities and to actually dispose of surplus U.S. and Russian plutonium. The U.S. commitment to this program sends a clear message to Russia and the rest of the world that we consider the disposition of surplus fissile materials to be one of our highest national priorities. We believe the time is right to seize this momentum and finish this important job to reduce the global danger from the proliferation of weapons of mass destruction.