Defense Nuclear Nonproliferation

Proposed Appropriation Language

For Department of Energy expenses, including the purchase, construction and acquisition of plant and capital equipment and other incidental expenses necessary for atomic energy defense, Defense Nuclear Nonproliferation activities, in carrying out the purposes of the Department of Energy Organization Act (42 U.S.C. 7101 et seq.), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion, [$874,196,000] *$773,700,000*, to remain available until expended: *Provided*, that not to exceed $7,000 may be used for official reception and representation expenses for national security and nonproliferation (including transparency) activities in fiscal year [2001] 2002. (Energy and Water Development Appropriations Act, 20012, as enacted by section 1(a)(2) of P.L. 106-377.)

Explanation of Change

Changes in appropriation language relate only to the amount of the request.

Defense Nuclear Nonproliferation

Executive Budget Summary

The National Nuclear Security Administration's (NNSA) Office of Defense Nuclear Nonproliferation (NN) requests $773,700,000 for Fiscal Year (FY) 2002, a decrease of $100,710,000 from the FY 2001 level. The FY 2002 request supports nonproliferation programs that address the danger that hostile nations or terrorist groups may acquire weapons of mass destruction or weapons-usable material, dual-use production technology or weapons of mass destruction expertise.

A comparison of the FY 2001 and FY 2002 funding level is shown in Figure 1. A funding profile is shown in Table 1 and funding by site in Table 3.

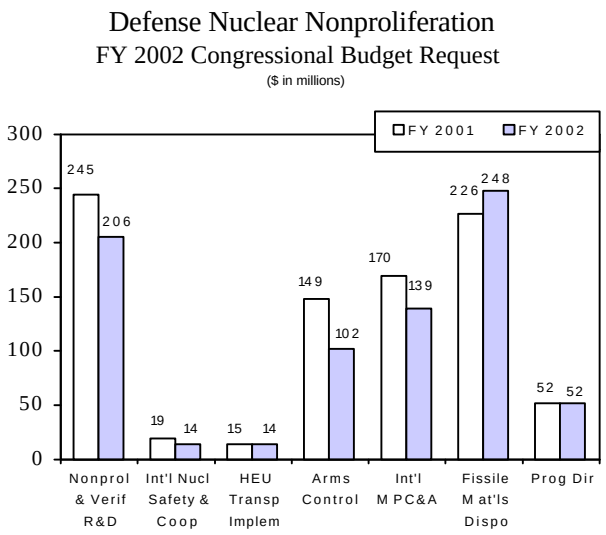


Figure 1

The Administration's review of Russian nonproliferation programs will determine the future scope and direction of these activities to meet urgent national security challenges.

Post Cold War Threat

The threat of a massive nuclear attack launched by the Soviet Union has been replaced by a world in which threats come from rogue states bent on acquiring weapons of mass destruction and terrorism – threats as unconventional as they are unpredictable. The Soviet Union amassed vast stockpiles of plutonium and HEU, the essential material for nuclear weapons. Acquiring these nuclear materials is the primary obstacle for terrorist organizations and proliferant nations seeking to develop nuclear weapons capabilities. The Soviet-era security system, which focused on preventing outsider threats and relied heavily on the use of military guards, closed cities, and the constant surveillance of personnel by state security forces such as the KGB, has been severely weakened due to political and economic upheavals since the breakup of the Soviet Union. These unsecured stockpiles of former Soviet nuclear material pose a direct threat to U.S. national security.

Our Mission — Threat Reduction

The goals of the Office of Defense Nuclear Nonproliferation are:

- Provide for International Nuclear Safety
- Detect the Proliferation of Weapons of Mass Destruction
- Prevent the Spread of Materials, Technology, and Expertise
- Eliminate Inventories of Surplus Fissile Material Usable for Nuclear Weapons

These goals are implemented in FY 2002 in the following major programs:

- Nonproliferation and Verification Research and Development
- International Nuclear Safety and Cooperation
- HEU Transparency Implementation
- Arms Control and Nonproliferation
- International Materials Protection, Control, and Accounting
- Fissile Materials Disposition
- Program Direction

Nonproliferation and Verification Research and Development (R&D)

Our nation also needs a clear strategy to confront the threats of the 21st century -- threats that are more widespread and less certain. They range from terrorists who threaten with bombs to tyrants in rogue nations intent upon developing weapons of mass destruction.

President George W. Bush

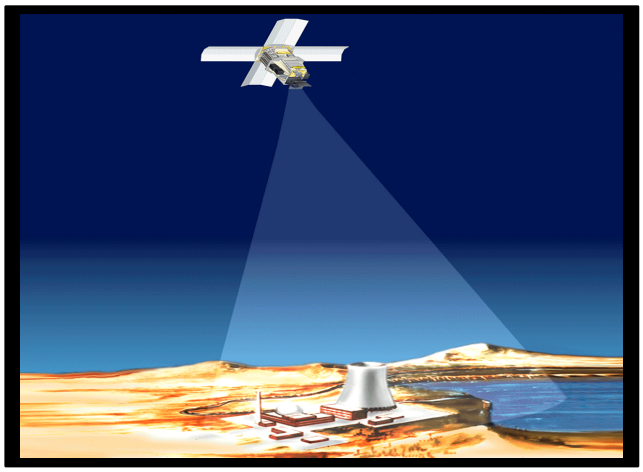
To meet this challenge this program conducts applied research, development, testing, and evaluation to produce technologies that lead to strengthening the U.S. response to current and projected threats to national security and world peace posed by the proliferation of weapons of mass destruction and the diversion of special nuclear material. Activities focus on development, design, and construction of prototypes; production of operational sensor systems needed for proliferation detection; nuclear explosion monitoring; deterrence of nuclear proliferation; and response to domestic threats from chemical and biological agents.

In FY 2002 this program will continue to leverage its considerable nuclear nonproliferation R&D base to address important objectives which include: detection of proliferation activities worldwide; ground-based and satellite-based nuclear explosion monitoring; countering nuclear smuggling and terrorism; nuclear warhead dismantlement initiatives; and applying NNSA's and DOE's resident chemical and biological science expertise to support U.S. preparation for and response to the use of chemical and biological agents.

The Nonproliferation Research and Development Program enhances U.S. national security through needs-driven research and engineering resulting in prototype demonstrations and resultant detection systems. The program maintains close ties and partnerships with stakeholders and system users to eliminate redundant research programs, minimize risk, and maximize customer satisfaction with the goal of transitioning technologies to user agencies such as the Department of Defense. In addition, the program continues to support commercialization of technologies.

The four strategies that contribute to the program are:

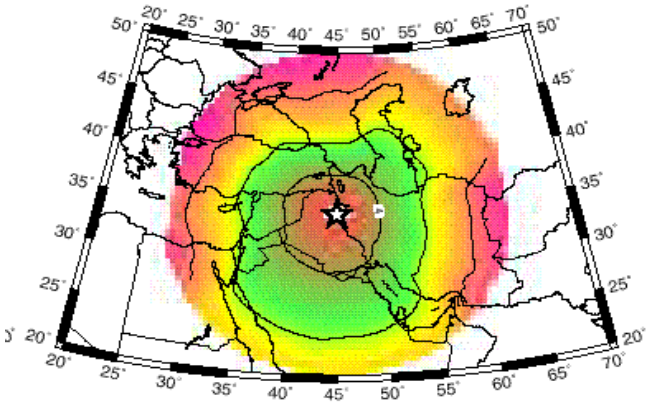
- *Proliferation Detection* R&D activities are focused on developing and demonstrating technologies needed to remotely detect the early stages of a proliferant nation's nuclear weapons program as shown in Figure 2.



Detection of Nuclear Proliferation

Figure 2

- *Nuclear Explosion Monitoring* R&D activities focus on two areas: (1) delivery of nuclear test monitoring satellite sensors while continuing to develop improved satellite sensors for the next generation systems to detect nuclear detonations in the atmosphere and in space and (2) development of regional-based seismic monitoring methods to detect very low yield events that might arise from a proliferant nation's efforts as shown in Figure 3.
-



Regional Seismic Monitoring

Figure 3

- *Deterring Proliferation* R&D activities involve developing and demonstrating innovative sampling and analysis technologies needed to improve the detection and tracking of foreign special nuclear materials, and the timely analysis to detect the early stages of a proliferant nation's nuclear weapons program or non-compliance with international treaties and agreements. The program focuses on handheld and unattended sensor systems.
- *Chemical and Biological National Security* R&D activities capitalize on existing DOE technical strengths in developing capabilities that can have a major impact on civilian preparation and response to chemical and biological terrorism incidents as depicted in Figure 4. Technology development initiatives are designed to identify and mature key enabling technologies suitable for integration into operational systems in three to five years.

Simulated Chemical Release in Metro

Figure 4

FY 2002 highlights include: (1) continue to develop technologies urgently needed by domestic emergency personnel in response to the threat of terrorism, (2) support remote effluent and physical detection and enabling technologies, and (3) support radiation and nuclear materials detection, micro technologies, and satellite and ground-based nuclear explosion monitoring. A decrease in

ground-based systems shifts funds to satellite-based systems to enable accelerated U.S. Air Force delivery schedule.

International Nuclear Safety and Cooperation

The 1986 disaster at the Chornobyl nuclear power plant, which contributed to the fall of the Soviet Union through public health, political, economic, and environmental destabilization, revealed many flaws in the Soviet approach to nuclear safety. International efforts to address these safety concerns resulted as a matter of national security.

There are 66 operating nuclear powered reactors at 21 sites in eight former Soviet block countries. These reactors, some of which have serious design defects, produce a significant portion of the electric energy in politically and economically unstable countries. Operator training, safety procedures, and safety and regulatory infrastructure for these plants still fall far short of equivalent international standards, which are designated at a seven level (Figure 5). Equipment shortages are commonplace and nuclear professionals suffer from low or erratic pay. These conditions pose risks for reactor accidents of global magnitude.

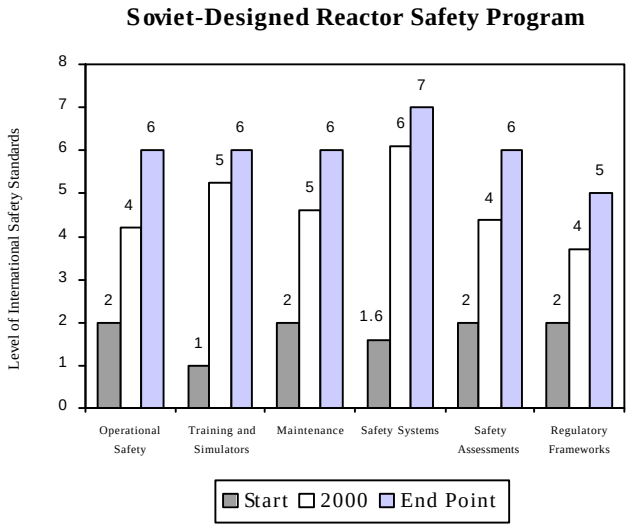


Figure 5

International and U.S. efforts, which are implemented by the International Nuclear Safety and Cooperation program, include installation and upgrade of safety equipment, development of improved safety procedures, training operators, conducting safety assessments, encouraging the shut down of the least safe plants, and supporting the establishment of sustainable, national nuclear safety cultures in the host countries.

FY 2002 highlights are (1) completion of one full-scope training simulator each in Russia, Ukraine, and Slovakia, and (2) conduct operational safety improvements at plants in Russia and Ukraine.

HEU Transparency Implementation

The Highly Enriched Uranium Transparency Implementation Program (HEU TIP) is responsible for monitoring the implementation of the 1993 HEU Purchase Agreement between the U.S. and the Russian Federation. During a 20-year period, the United States Enrichment Corporation (USEC), acting as the U.S. executive agent, will purchase low-enriched uranium (LEU) derived from at least 500 metric tons (MT) of HEU from dismantled Russian nuclear weapons — enough to build approximately 20,000 nuclear devices. Conversion of the HEU components into LEU is performed in four Russian uranium processing facilities, located in closed cities with restricted access. The program has developed and negotiated with the Russian Federation a transparency program that provides the U.S. with assurance that the terms of the Purchase Agreement are being met. The transparency program uses on-site monitoring teams, portable non-destructive assay instruments, and permanently installed monitoring equipment to acquire the requisite data and information to assure the nuclear nonproliferation objectives of the Agreement are being achieved. The Agreement also requires that the U.S. support comparable Russian monitoring of certain U.S.

facilities. As shown in Figure 6, a total of 111.3 MT of HEU have been converted to LEU from 1995 through December, 2000, and delivered to USEC as the result of this Purchase Agreement. In return, the Russian Federation has received a total of $2.025 billion.

In FY 2001 and subsequent years, the HEU TIP program will continue to monitor the conversion and processing of 30 MT per year of HEU to LEU. Conversion quantities for the next five years should be negotiated by late CY 2001 between USEC and the Ministry of Atomic Energy (MinAtom).

FY 2002 highlights include the following: the program will continue collection and analysis of monitoring and other data to help provide overall confidence that the Russians are converting HEU from dismantled nuclear weapons into LEU. A schedule for conversion and delivery is shown in Figure 6.

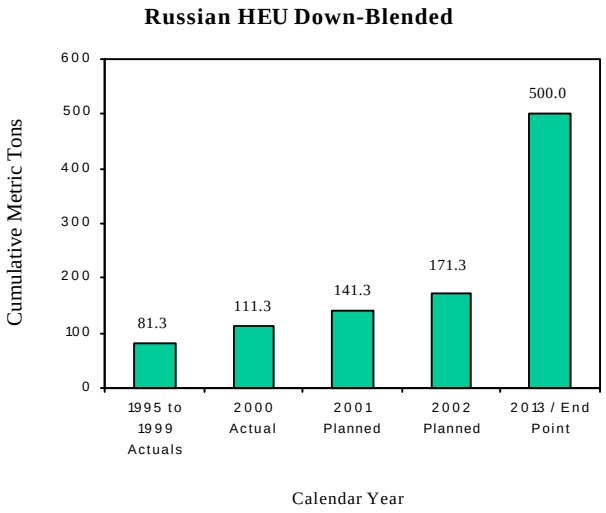


Figure 6

Arms Control and Nonproliferation

The mission of the Office of Arms Control and Nonproliferation is to provide technical and policy expertise and leadership for NNSA and the Department in interagency, bilateral and multilateral fora involved in nonproliferation and international security matters. The program's goal is to detect, prevent and reverse the threat posed by the proliferation of weapons of mass destruction (WMD) by integrating NNSA and Departmental assets, including those of the National Laboratories, and bringing them to bear on nonproliferation and related international security issues. The five key program objectives are to (1) secure nuclear materials, technology and expertise; (2) limit the production and use of weapons-usable fissile materials; (3) promote transparent nuclear reductions; (4) strengthen nonproliferation regimes; and (5) control sensitive exports. The major functional areas of the program include: Policy and Analysis; Reduced Enrichment Research and Test Reactor (RERTR); International Safeguards; Export Control Operations; New Independent States (NIS) Nonproliferation; International Security; and Treaties and Agreements.

Policy and Analysis

The Policy and Analysis function provides policy and technical expertise and analytical support to nonproliferation treaty and agreement policy formulation, negotiation, and implementation. It also supports regional and international security initiatives. Assistance is provided to the Department of State for increased contact with states of proliferation concern in order to explore motives driving proliferation aspirations. DOE technical resources are engaged in training, confidence-building measures, implementation and verification of treaties, cooperative monitoring, and application of technology to facilitate proliferation prevention and reversal of nuclear weapons buildup. Resources are applied to negotiate and implement global and regional nonproliferation treaties and to analyze nuclear

fuel cycles in an effort to minimize use of those that can destabilize international security and threaten regional stability. Analysis is executed for U.S./Russian nuclear weapon dismantlement and fissile material disposition; the development and refinement of procedures for confirming stockpiles of materials removed from weapons; and exploration of alternative cost-effective dismantlement, verification, and chain of custody measures. In addition, analysis is performed on securing HEU in the Former Soviet Union (FSU), deterring regional proliferation threats and related policy options, and evaluating the effects of warhead monitoring regimes. Implementation of the U.S./Russian agreement for exchange of technical information on nuclear warhead safety and support of projects for continued employment of former Soviet weapons scientists in non-weapon activities is also supported.

Reduced Enriched Research and Test Reactor (RERTR)

The RERTR function supports development of LEU fuels to further LEU conversion of research and test reactors; expedited return of U.S. origin research reactor spent fuel from overseas; and development of targets and chemical processes for producing molybdenum-99 using LEU. Included within this program is the Russian Research Reactor Spent Fuel Acceptance program, which will reduce nuclear proliferation threats posed by HEU fuel at former Soviet-designed research reactors outside Russia. Countries where Soviet research reactors are located include Serbia, Romania, North Korea, Bulgaria, Ukraine, and Libya. Significant risk reduction will be realized by removing fresh and spent fuel and converting or shutting down these sites around the world.

International Safeguards

The International Safeguards function provides policy and technical leadership and funds efforts to strengthen the nuclear nonproliferation regime, particularly with respect to global nuclear material security. These efforts improve the International Atomic Energy Agency's (IAEA) ability to detect clandestine nuclear activities and safeguard declared nuclear material. New approaches, such as environmental sampling, remote monitoring, and information management tools are addressed. Policy and technical support is provided to NNSA program offices and sites for the implementation of IAEA inspection of U.S. excess material at DOE sites under bilateral and trilateral (with Russia) arrangements. Verification measures are developed, in coordination with the international Policy and Analysis activity and the NNSA Office of Research and Development, for implementing the U.S.-North Korea (DPRK) Agreed Framework. The application of nuclear technology for peaceful purposes is promoted through bilateral "Sister Laboratory" arrangements and IAEA technical assistance programs. NNSA objectives in Non-Proliferation Treaty (NPT) activities are advanced by preparing for and participating in working-level meetings, international consultations, and PrepCom meetings leading to the Year 2005 Review Conference (RevCon). Agreements for safeguards cooperation are negotiated and implemented for strengthening the nonproliferation regime through improved material protection, control, accountancy; transparency; and the transfer of technologies to other countries, regions, and international organizations. The technologies to be transferred include strengthened safeguards measures for the adoption of the IAEA Additional Protocol for regional organizations and nation states, such as Argentina, Australia, Brazil, the Brazilian-Argentine Agency for Nuclear Material Control and Accountancy (ABACC), EURATOM, France, Japan, South Africa, and South Korea. The physical protection program ensures that all countries possessing U.S.-origin nuclear materials are adequately protecting them against theft, sabotage, and nuclear smuggling. International Safeguards manages and operates the International Tracking and Analysis (ITA) system which tracks and analyzes foreign nuclear activity to satisfy

statutory requirements and international obligations and support U.S. nonproliferation policy.

Export Control Operations

The Export Control Operations function advances U.S. nonproliferation objectives by developing and implementing policies, regulations, and procedures to halt the spread of WMD and their related technologies; promoting and extending multilateral and bilateral nuclear supply arrangements in support of U.S. nonproliferation policy; controlling the export of WMD equipment, materials, and technologies, as mandated by law and in accordance with national security objectives; and providing leadership and training for NNSA, the DOE Complex, U.S. Government agencies and the international nonproliferation community. Through the use of unique technical expertise and training, this function will expand the Second Line of Defense program to detect and deter the illicit trafficking of nuclear materials and key equipment. Performance will be measured by continuing bilateral and regional export control initiatives and cooperative agreements to develop the necessary infrastructure to ensure control over nuclear and nuclear-related dual-use equipment, material, and technology; engaging Russian and NIS Customs organizations in radiation detection, interdiction, and identification activities; administering, for the Department, the controls on the transfer of nuclear technology and assistance under 10 CFR Part 810; reviewing and providing recommendations to the Nuclear Regulatory Commission (NRC) and the Departments of Commerce and State on dual-use and munitions export licenses; representing DOE in all interagency fora (e.g., the Advisory Committee on Export Policy and the Interagency Working Group on Nonproliferation and Export Controls) in support of mandated licensing policy responsibilities; ensuring the viability of the Proliferation Information Network System (PINS) to support the DOE export license processing system; continuing development of analytical tools which support implementation of DOE's export licensing review responsibilities under the Nuclear Nonproliferation Act (NNPA); and serving as the principal U.S. technical agency in negotiating controls over nuclear and nuclear-related dual-use materials, equipment, and technologies, especially within the Nuclear Suppliers Group (NSG) and the NPT Exporter's Committee (Zangger Committee). Export control operations also advance U.S. national security and nonproliferation priorities by providing specialized expertise to impede the spread of technologies related to weapons of mass destruction.

New Independent States Nonproliferation

This subprogram encompasses both the Initiatives for Proliferation Prevention (IPP) efforts and the Nuclear Cities Initiative (NCI). IPP was designed to reduce the global nuclear danger of proliferation of technologies and expertise through focused, cooperative projects involving the ten major DOE laboratories and science and engineering institutes in Russia, Ukraine, Kazakhstan and Belarus. Some of these projects involve cost-sharing with U.S. industry. Major initiatives include preventing "brain drain" by engaging former Soviet weapons scientists, engineers, and technicians in non-weapons-related projects; motivating participation in proliferation prevention activities; facilitating continued U.S. access to NIS facilities through technical engagement with personnel; and establishing self-sustaining commercial ventures that will assure an exit strategy for the U.S. government. Cooperative, cost-sharing projects are aimed at establishing direct partnerships that will provide long-term commercial employment of key former Soviet weapons scientists, engineers, and technicians.

NCI, a complementary sister program to IPP, works only in the closed MinAtom nuclear cities, to support and ensure weapons complex reduction. Established under a Government-to-Government Agreement in September of 1998, the program focuses on job creation, economic diversification and infrastructure development in

the municipal areas of these cities. To supplement IPP, it provides a coordinated high-level engagement with closed city municipal leaders; a planning process, involving institute and city leaders, with milestones toward meeting job creation goals for down-sizing the weapons complex; and seeks to create a broad-based business-friendly infrastructure through such measures as the International Development Centers.

International Security

International Security supports the implementation of security commitments made by the USG regarding Russia, the NIS, and the DPRK. Specific efforts are to implement a nuclear spent fuel maintenance plan by continuing technical dialogue with the DPRK. Spent fuel activities in the DPRK include arresting the corrosion of the spent fuel from the 5 MW research reactor in Nyongbyon, North Korea and safely storing spent fuel prior to its ultimate disposition in accordance with the 1994 U.S.-DPRK Agreed Framework. This subprogram also ensures safe, secure storage of spent nuclear fuel at the BN-350 reactor in Aktau, Kazakhstan. Spent fuel activities in Kazakhstan support the urgent security and storage requirements of plutonium-bearing spent fuel located at the reactor. The objective of this activity is to complete canning of spent fuel rods in the pool and to secure approximately three tons of weapon-grade plutonium under IAEA safeguards.

Treaties and Agreements

The Treaties and Agreements subprogram supports implementation of bilateral or multilateral, Presidentially-directed or Congressionally-mandated nonproliferation and international security initiatives, agreements and treaties. In addition, it provides for unexpected, unplanned responses to requirements of an immediate nature based on unanticipated U.S. national security needs, as well as preparations to meet new transparency or verification requirements arising out of ongoing activities that are consistent with U.S. national policy and security requirements without compromising proliferation sensitive information.

FY 2002 highlights are: (1) continue to cooperate with MINATOM, commercial entities, and local and state governments to create civilian ventures in one of Russia's ten closed nuclear cities; (2) continue to facilitate and promote employment and economic development opportunities for displaced nuclear weapons scientists and engineers who were part of the Russian nuclear weapons complex; (3) provide assistance to Kazakhstan to monitor and prepare for long-term security and storage requirements for plutonium-bearing spent fuel located at the Aktau Breeder Reactor at a reduced level; (4) provide technical assistance to North Korea to minimize corrosion of spent nuclear fuel cans at Nyongbyon; (5) develop and fabricate techniques for research and test reactor fuels for use in research reactors; (6) support fast-track negotiations on plutonium separation technologies, globalization of the U.S. nuclear industries, and expand second line of defense which seeks to help the Russian Federation State customs Committee detect and deter illicit trafficking of nuclear materials at borders; and (7) support nonproliferation agreement policy formulation and negotiation and regional security focusing on South Asia, Northeast Asia and the Middle East.

International Materials Protection, Control, and Accounting

This program reduces the threat to the U.S. national security posed by unsecured Russian weapons and weapons-usable material. Currently, DOE has identified 95 sites containing about 850 MT of weapons-usable material which may require security upgrades. These sites are grouped into three categories, 53 Navy Complex sites, 11 MinAtom complex sites and 31 Civilian Complex sites (18 in Russia and 13 in the Newly Independent States). To date, the MPC&A

program has completed state-wide upgrades at 37 of 95 sites and installed rapid or comprehensive security upgrades at facilities containing approximately 400 metric tons of weapons-usable material. Program work is carried out through an interlocking set of activities including securing at risk material, reducing stocks of material by consolidating it into fewer buildings and converting excess HEU into less proliferation attractive LEU. This program also is implementing an exit strategy whose purpose is to foster Russian development of indigenous capabilities and commitments to protect its own sensitive material in the long term. The program provides assessment and tracking of nuclear smuggling and nuclear threat cases and enhances international nuclear emergency early warning, preparation and response capabilities.

The installation of security upgrades occurs in a phased approach. Rapid upgrades include items such as baseline item inventories, locks, delay blocks, steel cages, limiting access, and hardening windows. Comprehensive upgrades include rapid upgrades plus item such as detection systems, closed-circuit television monitoring and assessment systems, material measurement equipment and computerized accounting systems.

Navy Complex

DOE has currently identified 53 Navy sites containing approximately 315 MT of weapons-usable material which may require security upgrades. These sites include 42 Russian Naval nuclear warhead sites and 11 sites containing fresh, damaged or slightly irradiated HEU fuel.

In FY 2002 comprehensive upgrades will be completed at an additional six warhead and two fuel sites increasing the total number of sites with completed upgrades to 21 of 53. Upgrades will be complete at the majority of sites where warheads are stored on a permanent basis. Figure 7 shows the upgrades and material at the Navy sites.

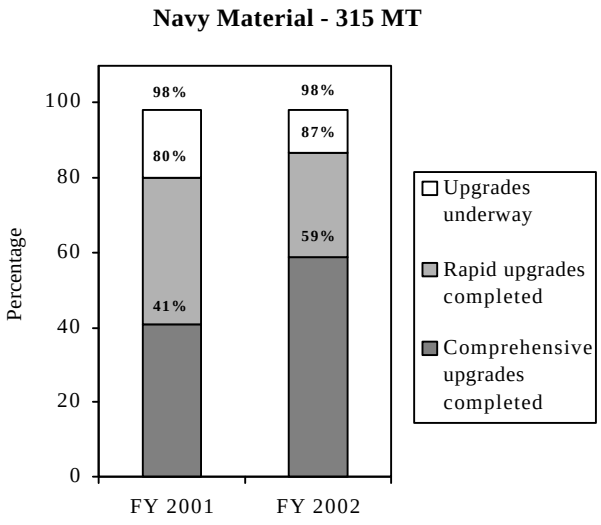


Figure 7

The FY 2002 funding will support completing rapid upgrades on an additional 7% of weapons-usable material and comprehensive upgrades on an additional 18% weapons-usable material.

MinAtom Weapons Complex

The MinAtom Weapons Complex consists of 11 sites, which account for approximately 500 MT of nuclear material. The strategy of this joint program is to identify material and provide protection against internal and external threats. Upgrades are implemented by focusing on improved security near the material. After the upgrades are completed, sustainability efforts are put in place to ensure the long-term effectiveness of the upgrades. Figure 8 shows the upgrades and material at the MinAtom Complex. ***In FY 2002*** comprehensive upgrades will be completed at the initial two of eleven sites (Krasnoyarsk-45 and Sverdlovsk-44).

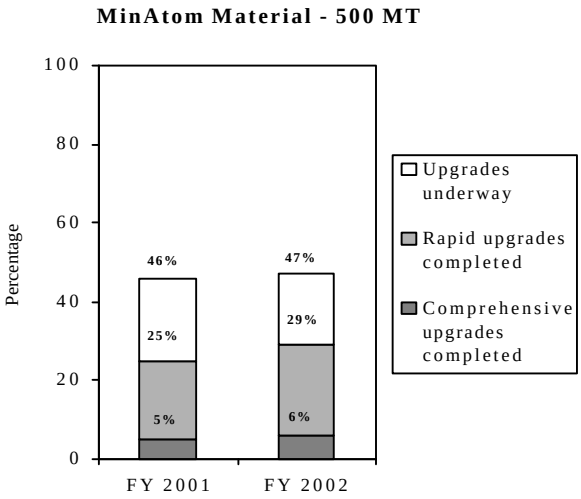


Figure 8

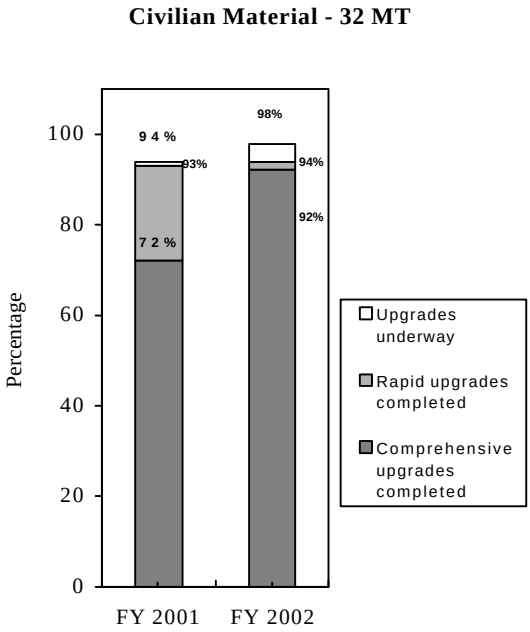


Figure 9

In FY 2002 rapid upgrades will completed on an additional 4% of weapons-usable material and comprehensive upgrades will be completed on an additional 1% or weapons-usable material.

Civilian Sites

The Civilian Complex consists of 31 sites (18 Russian and 13 Newly Independent States) containing approximately 32 MT of weapons-usable nuclear material. This program will complete upgrades at the remaining Russian sites. Sustainability support will be provided at the Russian sites where upgrades are completed. In FY 1998, responsibility for sustainability support at the 13 NIS sites where upgrades were completed was transferred to NNSA's International Safeguard Division.

This program also consolidates HEU and plutonium in fewer sites, reducing the number of potential theft targets. In addition, HEU is converted to LEU, which reduces its attractiveness to would-be proliferators. By 2010, approximately 27 MT of HEU will be converted to LEU and 60 buildings will be cleared of all nuclear material. Figure 9 summarizes the upgrades completed and underway at the civilian sites.

In FY 2002 comprehensive upgrades will be completed at the Lytkarino, Luch and Novosibirsk sites bringing the total number of completed sites to 27.

In FY 2002 rapid upgrades will be completed on an additional 1% of weapons-usable material and comprehensive upgrades will be completed on an additional 20% of weapons-usable material. The FY 2002 increase will also support conversion of an additional 1.8 MT of HEU (an increase from 1.2 MT in FY 2001) increasing the total HEU converted to 4.0 MT.

Figures 10 and 11 summarize the total sites identified for possible upgrades and the amount of material estimated to be contained at these sites respectively.

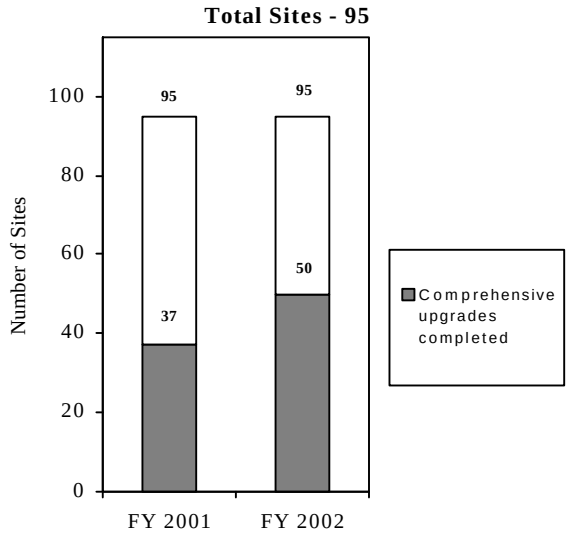


Figure 10

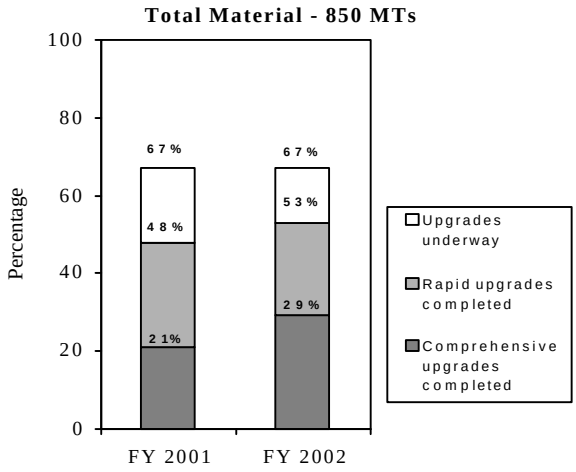


Figure 11

In FY 2002 rapid upgrades will be completed on an additional 5% of weapons-usable material and comprehensive upgrades will be completed on an additional 8% of weapons-usable material.

International Emergency Cooperation

U.S. emergency cooperation programs are designed to improve international nuclear crisis management efforts. DOE has increased the effectiveness of international emergency early warning and notification systems by enhancing voice and video communication connections between DOE Headquarters and MinAtom's Situation and Crisis Center. Efforts have also focused on developing emergency procedures, plans, and training programs with Russia's MinAtom, the government of Ukraine, other foreign governments, and international organizations (such as the IAEA, NEA, EU, and the Arctic Council). The program has also been responsible for the rapid assessment and database tracking of approximately 70 cases of nuclear smuggling each year, and for providing a one-hour initial assessment and a four-hour final assessment of any nuclear threat.

Currently, the program is working with the government of Ukraine in establishing their Offsite Crisis and Training Center. The Center will provide a uniform platform for a coordinated Ukrainian response to any nuclear emergency.

DOE's program continues to promote cooperation with various foreign governments to assist in improving their emergency management procedures. This has resulted in the extension of invitations to DOE managers to evaluate the programs and training exercises of other foreign governments.

Fissile Materials Disposition

The Office of Fissile Materials Disposition (OFMD) is responsible for disposing of inventories of surplus, U.S. weapons-usable plutonium and HEU, as well as providing technical support for, and implementation of, efforts to obtain reciprocal disposition of surplus Russian plutonium. These disposition activities are part of the U.S. government's strategy to reduce the global danger from weapons of mass destruction.

U.S. Surplus Plutonium Disposition

In September 2000 the U.S. and Russia signed the U.S.-Russia Plutonium Management and Disposition Agreement which commits each country to dispose of 34 metric tons (MT) of weapon-grade plutonium (68 MT total). For U.S. surplus weapon-grade plutonium, the Department plans to its meet this commitment by implementing a hybrid strategy which relies on two technologies: irradiation and immobilization. The former will dispose of up to 33 MT of surplus weapon-grade plutonium by converting surplus plutonium to MOX fuel and irradiating it in existing domestic commercial nuclear reactors. The latter, immobilization, will dispose of approximately 13 MT of surplus weapons-usable plutonium by mixing it in a ceramic and then surrounding it with vitrified radioactive high-level waste. This dual strategy (Figure 12) requires the design and construction of three key U.S. plutonium disposition facilities for pit disassembly and conversion, MOX fuel fabrication, and immobilization.

In FY 2002 the program will continue some limited production mode testing and technology demonstrations and the design of the Pit Disassembly and Conversion Facility at a very reduced rate. The program will also complete the design of the Mixed Oxide (MOX) Fuel Fabrication Facility. The Immobilization program remains an integral component of the Fissile Materials Disposition program. However, to reduce the budget year funding requirements and to reduce projected future-year peak requirements, work on immobilization is being

U.S. Surplus Plutonium Disposition Paths

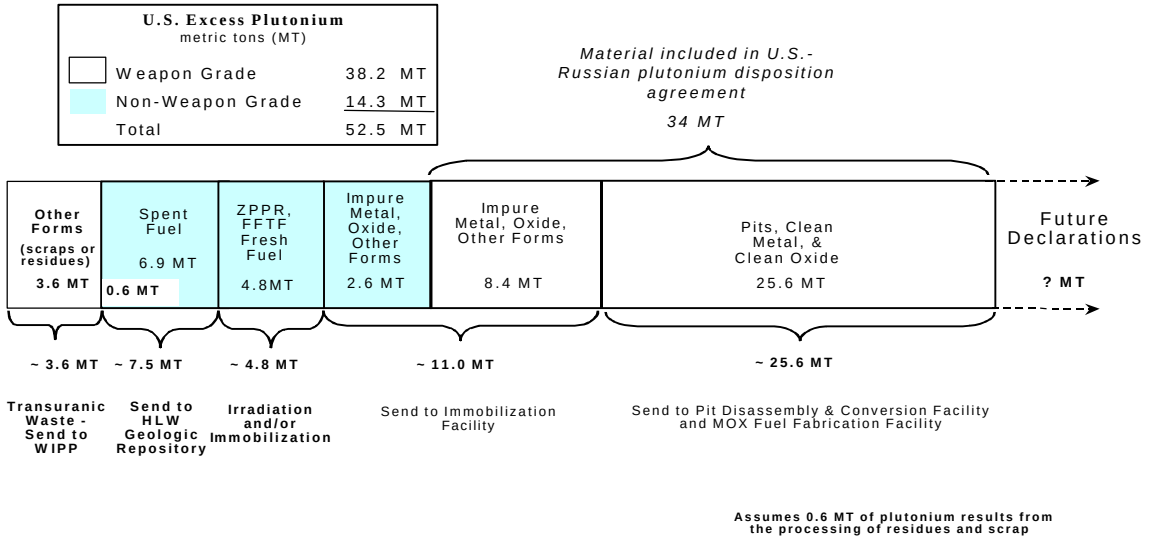


Figure 12

suspended and will be resumed when the MOX fuel fabrication and pit disassembly and conversion facilities have been completed. This program will continue to maintain the minimum requirements of the U.S.-Russia Plutonium Management and Disposition Agreement, but a delay of some of the specified milestones will be required.

U.S. Surplus Highly Enriched Uranium Disposition

A July 1996 Record of Decision calls for eliminating the proliferation threat of stockpiles of HEU, where practical, by down-blending the material for sale as low-enriched uranium (LEU) and using it, over time, as commercial nuclear reactor fuel to recover its economic value.

Current plans continue transferring 50 MT of surplus HEU from the Y-12 Plant to the United States Enrichment Corporation, Inc. (USEC) through FY 2005. This material will be down-blended to LEU fuel which will eventually be sold to commercial utilities. The program will transfer an additional 33 MT of off-specification HEU to the Tennessee Valley Authority (TVA) between FY 2003 and 2007 for down-blending and use in TVA reactor. Planning for the disposition of additional quantities of surplus HEU is on-going. Figure 13 shows the uranium disposition paths.

In FY 2002 the program will continue to ship surplus HEU from the Y-12 Plant to USEC and continue capital improvements at the Savannah River Site to support the down-blending of off-specification HEU. The FY 2002 funding mainly supports increased efforts associated with the Off-Specification HEU Blend Down project.

Supporting Activities

In FY 2002 the program will continue to store surplus plutonium and HEU and continue designing a new plutonium pit shipping container.

Russian Surplus Plutonium Disposition

The U.S.-Russia Plutonium Management and Disposition Agreement specifies the goals, schedules, monitoring principles, and conditions, including irreversibility, for each side's disposition program. With the agreement in place, both the U.S. and Russia will proceed

U.S. Surplus Highly Enriched Uranium Disposition Paths

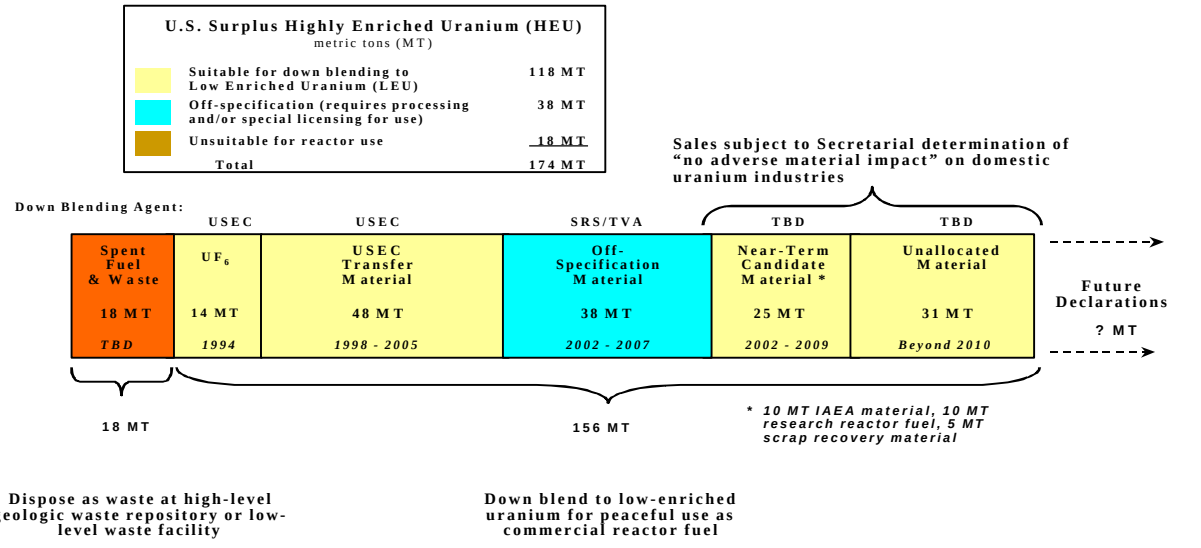


Figure 13

with roughly parallel programs to dispose of surplus weapon-grade plutonium in each country. The program has prepared a detailed budget justification, included in this budget request, to support the use of portions of the $200,000,000 appropriated in FY 1999 (FY 2001, $15 million; FY 2002 $42 million) for the Russian Surplus Plutonium Disposition Program.

DOE has been cooperating with Russian to lay the technical groundwork for the Russian surplus plutonium disposition program. Efforts include technology development in the areas of plutonium conversion and nondestructive assay, and irradiation of MOX fuel in fast and thermal reactors. In addition, DOE is working with Russian institutes and private industry to develop gas turbine-modular helium reactor (GT-MHR) technology as an option to supplement Russia's existing reactor capacity to dispose of surplus weapon-grade plutonium.

In FY 2002 the program will continue the design of an industrial-scale plutonium conversion and MOX facilities, continue VVER-1000/BN-600 reactor work, and assist Russia in developing licensing regulations. Other FY 2002 efforts include continuing the design of the GT-MHR. Many of these activities are funded by prior-year balances.

Program Direction

The Defense Nuclear Nonproliferation workforce is comprised of 233 Federal full-time equivalents (FTEs) at Headquarters, 34 FTEs in the field, and 10 FTEs and 15 Foreign Service Nationals (FSNs) in five international offices. The Headquarters workforce provides leadership and oversight, establishes and implements national policy, integrates activities across sites, conducts analyses, develops strategies, negotiates international agreements, and maintains internal controls to ensure the public trust.

Field Offices

Program-specific staff are also located at the Chicago, Oakland, and Nevada Operations Offices as well as the Savannah River Sites Office (SRS). Field personnel provide the following support:

Chicago: Project management support for the MOX fuel program and contract management support for the Pit Disassembly and Conversion Facility design contract, and assistance in procuring design services for the Immobilization Facility.

Oakland: Lead for development of gas reactor technology in Russia for plutonium disposition.

SRS: Designated NN site for the U.S. surplus plutonium disposition mission and HEU disposition program. This site also provides technical support to various nonproliferation activities.

International Offices

The program also supports staff in international offices in five countries:

Moscow: Focal point for DOE activities in Russia. Liaison activities are provided by federal staff and Foreign Service Nationals (FSNs) involving technical issues with Russian institutions and U.S. embassy support.

Paris/Tokyo/Kiev: Focal point for all DOE activities in France, Japan, and the Ukraine by providing support to travelers while in country and ensuring international safety.

Vienna: Focal point for all DOE activities in Austria involving International Atomic Energy Agency (IAEA) functions and the Mission program at the U.S. embassy.

The FY 2002 staffing level will remain at the FY 2001 level pending the Administration's review of Russian nonproliferation programs. Adjustments may be necessary based on the recent NNSA reorganization. Table 2 reflects headquarters, field, and international staffing for FY 2000 through 2002.

Measuring Performance

The Defense Nuclear Nonproliferation budget is performanced based. Table 4 reflects performance measures to meet the Government Performance Reform Act (GPRA).

Future-Years Nuclear Security Program

Five-year budget estimates are required for Defense Nuclear Nonproliferation by section 3253 of the National Defense Authorization Act for Fiscal Year 2000 (P.L. 106-65) as amended. The National Nuclear Security Administration's final Future-Years Nuclear Security program for FY 2002 through 2007 is currently undergoing review and will be submitted to congress after completion of the President's strategic review of national security-related activities.

For more information about Defense Nuclear Nonproliferation, visit our website (www.nn.doe.gov).

Table 1

Funding Profile

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Defense Nuclear Nonproliferation					
Operations and Maintenance					
Nonproliferation and Verification Research and Development	206,842	227,552	170,296	-57,256	-25.2%
Nonproliferation and International Security Center	6,000	16,963	35,806	18,843	111.1%
Total, R&D	212,842	244,515	206,102	-38,413	-15.7%
International Nuclear Safety and Cooperation	14,272	19,401	13,800	-5,601	-28.9%
Highly Enriched Uranium (HEU) Transparency Implementation	14,813	14,592	13,950	-642	-4.4%
Arms Control	109,439	148,588	101,500	-47,088	-31.7%
International Materials Protection, Control, and Accounting	138,735	169,707	138,800	-30,907	-18.2%
U.S .Fissile Materials Disposition	128,998	116,863	130,089	13,226	11.3%
Russian Plutonium Disposition	29,945	54,507	57,000	2,493	4.6%
Construction					
Pit Disassembly and Conversion Facility	18,751	19,956	16,000	-3,956	-19.8%
Immobilization and Associated Processing Facility	——	2,993	——	-2,993	-100.0%
MOX Fuel Fabrication Facility	12,375	25,943	63,000	37,057	142.8%
HEU Off-Spec Blend -Down Project	——	20,886	24,000	3,114	14.9%
Total, Construction	31,126	69,778	103,000	33,222	47.6%
Total, Fissile Materials	190,069	241,148	290,089	48,941	20.3%
Program Direction	41,302	51,459	51,459	0	0.0%
Soviet-designed Reactor Safety Program	40,500				
Total, Defense Nuclear Nonproliferation	761,972	889,410	815,700	-73,710	-8.3%
Prior Year Balances	-300	-15,526	-42,000	-26,474	
Total, Defense Nuclear Nonproliferation	761,672	873,884	773,700	-100,184	-11.5%

Table 2

Federal Staffing Estimates

(whole FTEs)

	FY 2000	FY 2001	FY2002
Chicago Operations Office	6	8	8
Nevada Operations Office	1	2	2
Oakland Operations Office	1	11	11
Savannah River Operations Office	4	13	13
Total, Field	12	34	34
International Offices			
Moscow	2	4	4
Vienna	2	2	2
Tokyo	1	1	1
Kiev	1	2	2
Paris	1	1	1
Total, International Offices	7	10	10
Headquarters	143	233	233
Total Defense Nuclear Nonproliferation	162	277	277

Table 3

Funding by Site

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
ALBUQUERQUE OPERATIONS OFFICE			
Albuquerque Operations Office			
Arms Control and Nonproliferation	310	310	310
International Material Protection, Control & Accounting	5,435	3,039	3,204
Fissile Materials Disposition	320	0	1,483
Subtotal, Albuquerque Operations Office	6,065	3,349	4,997
Los Alamos National Laboratory			
Nonproliferation and Verification R&D	54,604	58,966	46,533
Nonproliferation and National Security Center	6,000	16,963	35,806
HEU Transparency Implementation	1,400	1,200	1,400
Arms Control and Nonproliferation	15,861	27,082	19,953
International Material Protection, Control & Accounting	6,855	4,924	4,190
Fissile Materials Disposition	36,732	22,048	18,960
Total, Los Alamos National Laboratory	121,452	131,183	126,842
Sandia National Laboratory			
Nonproliferation and Verification R&D	68,500	66,771	64,235
HEU Transparency Implementation	1,910	2,000	1,665
Arms Control and Nonproliferation	15,496	20,812	16,289
International Material Protection, Control & Accounting	52,392	51,989	37,447
Fissile Material Disposition	1,090	800	1,400
Total, Sandia National Laboratory	139,388	142,372	121,036

	(dollars in thousands)		
	FY 2000	FY 2001	FY 2002
Pantex Plant			
Arms Control and Nonproliferation	1,002	30	30
International Material Protection, Control & Accounting	294	470	558
Fissile Material Disposition	10,800	5,250	8,257
Total, Pantex Plant	12,096	5,750	8,845
Kansas City Plant			
Arms Control and Nonproliferation	940	3,270	3,000
National Renewable Energy Laboratory			
Arms Control and Nonproliferation	3,062	2,510	2,140
Total, Albuquerque Operations Office	283,003	288,434	266,860
CHICAGO OPERATIONS OFFICE			
Chicago Operations Office			
Program Direction	850	1,077	1,134
Fissile Materials Disposition			
Pit Disassembly and Conversion Facility	17,396	13,300	15,200
MOX Fuel Fabrication & Irradiation (DCS)	13,900	19,258	40,050
MOX Fuel Fabrication Facility	12,375	25,943	63,000
Total, Fissile Materials Disposition	43,671	58,501	118,250
Subtotal, Chicago Operations Office	44,521	59,578	119,384
Argonne National Laboratory			
Nonproliferation and Verification R&D	3,135	2,431	1,374
International Nuclear Safety and Cooperation	4,300	4,600	4,600
HEU Transparency Implementation	755	700	800
Arms Control and Nonproliferation	10,451	15,277	10,614
International Material Protection, Control & Accounting	1,616	1,631	1,527
Fissile Materials Disposition	1,622	867	0
Total, Argonne National Laboratory	21,879	25,506	18,915

	(dollars in thousands)		
	FY 2000	FY 2001	FY 2002
Brookhaven National Laboratory			
Nonproliferation and Verification R&D	936	673	229
International Nuclear Safety and Cooperation	500	500	500
HEU Transparency Implementation	40	27	25
Arms Control and Nonproliferation	4,835	2,240	1,902
International Material Protection, Control & Accounting	17,627	25,435	27,493
Total, Brookhaven National Laboratory	23,938	28,875	30,149
New Brunswick Laboratory			
HEU Transparency Implementation	450	450	450
Arms Control and Nonproliferation	104	0	0
International Material Protection, Control & Accounting	37	79	70
Total, New Brunswick Laboratory	591	529	520
Total, Chicago Operations Office	90,929	114,488	168,968
IDAHO OPERATIONS OFFICE			
Idaho Operations Office			
Idaho National Engineering & Environmental Laboratory			
Nonproliferation and Verification R&D	1,659	1,441	1,371
International Nuclear Safety and Cooperation	500	900	900
Arms Control and Nonproliferation	700	1,104	1,103
International Material Protection, Control & Accounting	88	15	12
Fissile Material Disposition	380	0	0
Total, Idaho National Engineering & Energy Laboratory	3,327	3,460	3,386
Total, Idaho Operations Office	3,327	3,460	3,386
NATIONAL ENERGY TECH LABORATORY (NETL)			
National Energy Technology Laboratory			
Fissile Materials Disposition	3,900	2,420	3,110

	(dollars in thousands)		
	FY 2000	FY 2001	FY 2002
NEVADA OPERATIONS OFFICE			
Nevada Operations Office			
Program Direction	86	216	227
Arms Control and Nonproliferation	175	197	155
International Material Protection, Control & Accounting	0	739	410
Fissile Materials Disposition	755	299	0
Subtotal, Nevada Operations Office	1,016	1,451	792
Hazmat Spill Center			
Nonproliferation and Verification R&D	2,320	2,271	2,271
Remote Sensing Laboratory			
Nonproliferation and Verification R&D	755	1,475	332
HEU Transparency Implementation	438	375	375
International Material Protection, Control & Accounting	588	422	233
Total, Remote Sensing Laboratory	1,781	2,272	940
Total, Nevada Operations Office	5,117	5,994	4,003
OAKLAND OPERATIONS OFFICE			
Oakland Operations Office			
Program Direction	256	309	1,502
HEU Transparency Implementation	800	750	600
Arms Control and Nonproliferation	16,386	11,147	3,069
Fissile Materials Disposition	7,252	9,722	750
Subtotal, Oakland Operations Office	24,694	21,928	5,921
Lawrence Berkeley National Laboratory			
Nonproliferation and Verification R&D	1,913	2,524	1,904
Arms Control and Nuclear Nonproliferation	2,528	1,254	1,251
Total, Lawrence Berkeley National Laboratory	4,441	3,778	3,155

	(dollars in thousands)		
	FY 2000	FY 2001	FY 2002
Lawrence Livermore National Laboratory			
Nonproliferation and Verification R&D	39,640	42,553	24,645
HEU Transparency Implementation	5,800	6,000	5,800
Arms Control and Nonproliferation	12,081	22,444	13,605
International Material Protection, Control & Accounting	23,601	40,916	24,862
Fissile Materials Disposition	22,863	12,357	2,500
Total, Lawrence Livermore National Laboratory	103,985	124,270	71,412
Atomic Energy of Canada, Ltd.			
Fissile Materials Disposition	2,100	615	1,000
Total, Oakland Operations Office	135,220	150,591	81,488
OAK RIDGE OPERATIONS OFFICE			
Oak Ridge Operations Office			
Oak Ridge Operations Office	0	392	315
Y-12 Plant			
Nonproliferation and Verification R&D	550	450	400
International Material Protection, Control & Accounting	20,908	26,416	22,120
Fissile Materials Disposition	22,310	9,968	21,350
HEU Transparency Implementation	3,030	3,000	2,770
Total, Y-12 Plant	46,798	39,834	46,640
Portsmouth			
HEU Transparency Implementation	160	60	35
Oak Ridge National Laboratory			
Nonproliferation and Verification R&D	6,536	7,326	5,253
Arms Control and Nonproliferation	8,949	10,242	7,648
Fissile Materials Disposition	9,138	17,279	7,750
Total, Oak Ridge National Laboratory	24,623	34,847	20,651
Total, Oak Ridge Operations Office	71,581	75,133	67,641
R**ICHLAND OPERATIONS OFFICE**			
Pacific Northwest National Laboratory			

	(dollars in thousands)		
	FY 2000	FY 2001	FY 2002
Nonproliferation and Verification R&D	17,415	18,582	13,076
International Nuclear Safety and Cooperation	47,672	13,101	7,500
HEU Transparency Implementation	30	30	30
Arms Control and Nonproliferation	10,924	13,012	8,500
International Material Protection, Control & Accounting	8,716	12,921	16,054
Fissile Materials Disposition	2,808	11,440	3,500
Total, Pacific Northwest National Laboratory	87,565	69,086	48,660
Total, Richland Operations Office	87,565	69,086	48,660
RUSSIAN FEDERATION	4,168	16,650	42,000
SAVANNAH RIVER OPERATIONS OFFICE			
Savannah River Operations Office			
Program Direction	460	1,469	1,537
Arms Control and Nonproliferation	3,720	5,605	4,546
International Material Protection, Control & Accounting	406	161	195
Fissile Materials Disposition	30	271	0
Subtotal, Savannah River Operations Office	4,616	7,506	6,278
Westinghouse Electric			
Nonproliferation and Verification R&D	2,107	2,147	2,123
Fissile Material Disposition	16,989	47,381	46,250
Subtotal, Westinghouse Electric	19,096	49,528	48,373
Total, Savannah River Operations Office	23,712	57,034	54,651
WASHINGTON HEADQUARTERS			
Washington Headquarters			
Program Direction	39,650	48,388	47,059
International Nuclear Safety and Cooperation	800	300	300
Fissile Materials Disposition	3,141	24,354	5,740

	(dollars in thousands)		
	FY 2000	FY 2001	FY 2002
Total, Washington Headquarters	43,591	73,042	53,099
ALL OTHER SITES			
Nonproliferation and Verification R&D	6,772	19,942	6,550
International Nuclear Safety and Cooperation	1,000	0	110
Arms Control and Nonproliferation	1,915	12,052	7,385
International Material Protection, Control & Accounting	172	158	0
Fissile Materials Disposition	0	926	7,789
Total, All Other Sites	9,859	33,078	21,834
Total, Defense Nuclear Nonproliferation	761,972	889,410	815,700
AID Funding	-40,500		
Total, Defense Nuclear Nonproliferation	721,472	889,410	815,700
Prior Year Balances	-300	-15,526	-42,000
Total, Defense Nuclear Nonproliferation	721,172	873,884	773,700

Table 4

FY 2002 Annual Performance Plan

Program	FY 2001 Target (Revised Final)	FY 2002 Proposed Target
Nonproliferation Verification R&D	▸ Test and evaluate a real-time field analytical sampling system; complete a joint plan on technology development for domestic defense (NS4-1)	▸ Complete the selection of candidate technologies to detect fissile material at distances greater than ten meters (NS4-1)
	▸ Demonstrate and evaluate the proliferation detection capabilities of the Multispectral Thermal Imager (MTI) small satellite launched in FY 2000 (NS4-1)	▸ Conduct one flight test of a new airborne radar and two flight tests of LIDAR technology for measuring obscured or concealed nonproliferation activities (NS4-1)
	▸ Begin physical construction of the Nonproliferation and International Security Center (NISC) at LANL (NS4-1)	▸ Complete physical construction for the NISC at LANL (NS4-1)
	▸ Conduct Critical Design Review for three new generation nuclear explosion monitoring sensors that are proposed for future satellite deployment (NS4-1)	▸ Deliver to the U.S. National Data Center an operational database to improve ground-based nuclear explosion monitoring, with calibration data sets for Asia, the Middle East, North Africa and the Former Soviet Union (NS4-1)
	▸ Demonstrate systems to protect key infrastructure and special events from chemical and biological attacks (NS4-1)	▸ Deploy prototype biological agent detection system, currently under development, for enhanced public health response at special events (event to be determined) (NS4-1)
International Nuclear Safety	▸ Complete full-scope simulators for Ukraine's Rive nuclear plant unit 3 and South Ukraine nuclear plant unit 1 (NS4-2)	▸ Complete two full-scope simulators for nuclear power plants in Russia and Ukraine (Kalinin unit 2 and Zaporizhzhya unit 1), and 1 full-scope simulator upgrade in Slovakia (for Bohunice) (NS4-2)
	▸ Complete safety parameter display systems for Ukraine's South Ukraine nuclear plant unit 3, and Zaporizhzhya nuclear plant units 2 and 4 (NS4-2)	▸ Complete two safety parameter display systems for nuclear power plants in Ukraine (Zaporizhzhya units 1 and 6) and one in Russia (Novovoronezh unit 5) and one in Lithuania (Ignalina Unit 2) (NS4-2)
	▸ Complete probabilistic risk assessment of Ukraine's South Ukraine unit 1 and Rive unit 1 nuclear plants, and at Russia's Novovoronezk unit 3, and Leningrad unit 2 nuclear plants (NS4-2)	▸ Complete in-depth safety assessment of three plants in Ukraine (South Ukraine, Rive, and Zaporizhzhya) and at one plant in Russia (Leningrad Unite 2) (NS4-2)
	▸ Complete implementation of symptom-based emergency operating instructions at the Ignalina plant in Lithuania (NS4-2)	▸ Complete configuration management project at one pilot plant Russia (Novovoronezh NPP). This project coordinates plant drawings with operational procedures and safety analyses to eliminate safety problems related to less rigorous controls (NS4-2)

Program	FY 2001 Target (Revised Final)	FY 2002 Proposed Target
	▸ Complete fire protection system upgrades at the Kazakhstan BN-350 nuclear plant (NS4-2)	▸ Complete three joint projects between the U.S. and Russia International Nuclear Safety Centers related to : (1) the application of the RELAP 5 safety analysis computer code to Soviet-designed reactors; (2) the use of severe accident management guidelines; and (3) the sharing of Soviet-designed reactor safety analysis results with safety centers in Russia, Ukraine, Lithuania and Armenia (NS4-2)
	▸ Complete projects at the International Chornobyl Center to characterize the condition of spent nuclear fuel at Ukrainian power plants and to evaluate safe options for spent fuel management. Complete plans and safety analyses for the shutdown and deactivation of Chornobyl units 1, 2 and 3 (NS4-2)	▸ Complete decontamination of in-plant sodium at Kazakhstan's BN-350 reactor in preparation for final draining and decommissioning (NS4-2)
	▸ Complete nuclear service water spray pond cooling system at Armenia nuclear plant. This system cools safety-related components and resolves seismic concerns (NS4-2)	
	▸ Complete construction of heat plant to support long-term decommissioning of the Chornobyl reactors (NS4-2)	
HEU Transparency Implementation	▸ Monitor the conversion of 30 metric tons of HEU from dismantled Russian nuclear weapons into LEU for purchase by USEC (NS4-5)	▸ Monitor the conversion of 30 metric tons of HEU from dismantled Russian nuclear weapons into LEU for purchase by USEC (NS4-5)
	▸ Conduct up to 24 special monitoring visits to the four Russian nuclear processing facilities (NS4-5)	▸ Conduct up to 18 of 24 allowed special monitoring visits to the four Russian nuclear processing facilities (NS4-5)
	▸ Install permanent monitoring equipment at the Zelenogorsk blending facility (NS4-5)	▸ Initiate technical discussions with Seversk on Blend-Down Monitoring System (BDMS) modifications leading to equipment installation in 2003 (NS4-5)
		▸ Conduct negotiations to open Permanent Presence Office at Seversk processing facility (NS4-5)
	▸ Conduct annual inventory of natural uranium feed returned to Russia (NS4-5)	▸ Conduct annual inventory of natural uranium feed inventory in Russia (NS4-5)

Program	FY 2001 Target (Revised Final)	FY 2002 Proposed Target
Arms Control and Nonproliferation	▸ Engage approximately 2,000 scientists, engineers and technicians at nuclear institutes in the NIS, and approximately 800 scientists, engineers and technicians at NIS chemical/biological institutes in 40 projects to provide long-term commercial employment (NS4-3)	▸ Engage approximately 2,000 scientists, engineers and technicians at nuclear institutes in the NIS, and approximately 800 scientists, engineers and technicians at NIS chemical/biological institutes in 40 projects to provide long-term commercial employment (NS4-3)
	▸ Complete Trilateral Initiative Model Verification Agreement consultations and begin the joint development of a second generation attribute verification system and integrated monitoring system in Russia(NS4-3)	▸ Support negotiation of the Trilateral Initiative model agreement for IAEA verification of excess defense material in the U.S. and Russia; complete fabrication, testing, and certification of an attribute verification system, in Russia, supporting the schedule for IAEA verification of excess materials at the Mayak Fissile Material Storage Facility (NS4-3)
	▸ Continue to sustain previously provided MPC&A systems in the NIS/Baltics (NS4-3)	▸ Expand efforts in the NIS/Baltics to meet IAEA requirements and to sustain a system that provides for nuclear material safeguards and security (NS4-3)
	▸ Implement nine bilateral agreements for safeguards cooperation and seven “sister lab” arrangements for peaceful nuclear applications; enter into two new safeguards cooperation agreements (NS4-3)	▸ Implement the bilateral agreements for safeguards cooperation and seven “sister lab” arrangements for peaceful nuclear applications; enter into one new safeguards cooperation agreement (NS4-3)
Materials Protection, Control and Emergency Cooperation	▸ Continue consolidation of weapons usable material into fewer buildings and fewer sites in Russia. Convert an additional 1.2 metric tons of weapon-grade highly enriched uranium to non-weapons grade low enriched uranium, increasing the total amount converted to 2.2 metric tons thereby improving security and reducing overall cost	▸ Continue consolidation of weapons usable material into fewer buildings and fewer sites in Russia. Convert an additional 1.8 metric tons of weapon-grade highly enriched uranium to non-weapons grade low enriched uranium, increasing the total amount converted to 4.0 metric tons thereby improving security and reducing overall cost
	▸ Continue to install MPC&A upgrades for approximately 850 MT of nuclear material located at 95 sites in Russia, including Navy, MinAtom Weapons Complex, and Civilian sites. Continue MPC&A upgrades on approximately 67% of the weapons-usable nuclear material. Complete comprehensive upgrades on approximately 21% of that nuclear material (NS4-4)	▸ Continue to install MPC&A upgrades for approximately 850 MT of nuclear material located at 95 sites in Russia, including Navy, MinAtom Weapons Complex, and Civilian sites. Continue MPC&A upgrades on approximately 67% of the weapons-usable nuclear material. Complete comprehensive upgrades on approximately 29% of that nuclear material (NS4-4)

Program	FY 2001 Target (Revised Final)	FY 2002 Proposed Target
	▸ Continue sustainability initiative to ensure continued security of weapons-usable material at sites where comprehensive MPC&A upgrades are complete. This effort shall include the establishment/continuation of training procedures and full operational testing (NS4-4)	▸ Continue sustainability initiative to ensure conti8nued security of weapons-usable material at sites where comprehensive MPC&A upgrades are complete. This effort shall include the establishment/ continuation of training procedures and full operational testing (NS4-4)
Fissile Materials Disposition	▸ Initiate Title II design of the MOX Fuel Fabrication Facility (NS4-6)	▸ Complete Title II (detailed) design for the MOX Fuel Fabrication Facility
	▸ Continue the design of the Pit disassembly and Conversion Facility at a reduced rate (NS4-6)	▸ Continue the design of the Pit Disassembly and conversion facility at a reduced rate (NS4-6)
	▸ Suspend immobilization activities and document results (NS4-6)	▸ Complete suspension of immobilization activities (NS4-6)
	▸ Initiate study to examine alternatives aimed at reducing costs in the U.S. and Russia and making greater use of existing facilities and equipment (NS4-6)	▸ Complete study of alternatives (NS4-6)

Funding Commitments Related to International Agreements

Title	Commitment	Budget Line Item
Agreement between the U.S. and Russian Federation concerning operational safety enhancements, risk reduction measures, and nuclear safety regulation for civilian nuclear facilities in the Russian Federation. Similar agreement exists with Ukraine.	Support safety upgrades of Soviet-designed nuclear power plants in Russia and Ukraine	International Nuclear Safety and Cooperation
Agreement between the U.S. and Russia concerning Cooperation Regarding Plutonium production Reactors	Support agreement to cease Russian plutonium production. DOE efforts are in the areas of nuclear safety, nuclear regulatory, and related technical issues.	International Nuclear Safety & Cooperation
Implementing Arrangement between the U.S. DOE and the Ministry of Energy, Industry and Trade of the Republic of Kazakhstan concerning the Decommissioning of the BN-350 Reactor	Irreversible shutdown of Kazakhstan's BN-350 fast-breeder reactor	International Nuclear Safety & Cooperation
Agreement between the U.S. and Russia concerning the Disposition of HEU Extracted from Dismantled Nuclear Weapons	Disposition of 500MT of HEU, over 20 years ,derived from dismantled Russian nuclear weapons. HEU is converted to LEU and sold to USEC. Agreement provides for transparency measures executed by DOE.	HEU Transparency Implementation
Agreement between the U.S. DOE and the Ministry of the Russian Federation for Atomic Energy concerning the transfer of source material to the Russian Federation	Annual inventory of natural uranium feedstock returned to the Russian Federation as part of the HEU purchase agreement	HEU Transparency Implementation
Agreement between the U.S. and Russia on the Nuclear Cities Initiative	Creates a framework for cooperation in facilitating civilian production that will provide new jobs for weapons of mass destruction displaced workers.	Arms Control and Nonproliferation
U.S. Policy on Improving Nuclear Material Security in Russia and the Other Newly Independent States	Continued cooperation between the U.S. and Russia in the physical protection, control and accounting of nuclear materials.	International Material Protection, Control and Accounting
Agreement between the United States of America and the Russian Federation concerning the safe and secure transportation, storage and destruction of weapons and the prevention of weapons proliferation.	Continued cooperation between the United States and Russia in the physical protection control and accounting of nuclear materials.	International Material Protection, Control and Accounting
Agreement between the Government of the United States of America and the Government of the Russian Federation regarding cooperation in the area of nuclear material physical protection, control and accounting.		

Title	Commitment	Budget Line Item
Agreement between the U.S. and USEC for Transfer of natural Uranium and Highly Enriched Uranium (HEU) and for Blend-Down of HEU	Disposition of 50 mt of surplus HEU via USEC	U.S. Uranium Disposition
Agreement between DOE and TVA for the Off-Specification Fuel Project	Disposition 34 mt of surplus HEU via burning in TVA reactors	U.S. Uranium Disposition
Agreement between the U.S. and Russia on Scientific and Technical Cooperation in the Management of Plutonium That Has Been Withdrawn From Nuclear Military Programs	Small tests and demonstrations to study technologies to be used for the disposition of surplus plutonium	Russian Surplus Fissile Materials Disposition
Agreement Between The Government Of The Russian Federation And The Government Of The United States Of America Concerning The Management And Disposition Of Plutonium Designated As No Longer Required For Defense Purposes And Related Cooperation (U.S.-Russia Plutonium Management and Disposition Agreement)	Disposition 34 mt of surplus plutonium in the U.S. and Russia according to schedule in agreement	U.S. Fissile Materials Disposition Russian Surplus Fissile Materials Disposition

Nonproliferation and Verification Research and Development

Program Mission

The National Nuclear Security Administration's (NNSA) Nonproliferation and Verification Research and Development (R&D) Program conducts applied research, development, testing, and evaluation—and leverages the work of others—to produce technologies that lead to prototype demonstrations and resultant detection systems, strengthening the United States response to current and projected threats to national security and world peace posed by the proliferation of nuclear, chemical, and biological weapons and diversion of special nuclear material. Developed technologies are made available to a wide range of government users including the Department of Defense and the Intelligence community. R&D activities are divided into five program areas: proliferation detection, nuclear explosion monitoring, deterring proliferation, chemical and biological national security, and supporting activities.

Program Goal

The Nonproliferation and Verification R&D Program goal is to enhance U.S. national security through needs-driven R&D. The emphasis is on developing the requisite technologies to detect and deter nuclear proliferation, to meet U.S. nuclear explosion monitoring goals, and to develop and demonstrate chemical and biological detection and related technologies to enable us to better prepare for and respond to domestic chemical and biological attacks.

Program Objectives

- Develop and demonstrate technologies needed to remotely detect the early stages of a proliferant nation's nuclear weapons program.
- Develop, demonstrate, and deliver technologies to detect, locate, identify, and characterize nuclear explosions underground, underwater, in the atmosphere, and in space. Delivery of these R&D products to U.S. monitoring agencies will enhance the U.S. nuclear explosion monitoring capability.
- Develop and improve national capability to identify the origins of nuclear materials, to monitor global fissile material production, to monitor Russian nuclear warhead dismantlement and cooperative threat reduction programs; to counter nuclear smuggling; and to enhance international safeguards.
- Develop, demonstrate, and deliver in partnership with the Department of Defense (DoD) and other agencies, technologies and systems that dramatically improve our ability to detect the proliferation or use of chemical and biological agents, and to minimize the consequences of potential use of chemical or biological agents.
- Transition advanced technical capabilities to other government agencies.

Performance Measures

Proliferation Detection

Remote Effluent Detection

- Conduct flight experiments of a prototype unmanned aerial vehicle based lidar system.

Remote Physical Detection and Enabling Technologies

- Use experimental data from the Multispectral Thermal Imager (MTI) satellite to assess nonproliferation remote sensing technology.
- Validate that the MTI can achieve the technical goals set forth at the outset of the program for radiometric accuracy.
- Conduct one flight test of a new airborne radar and two flight tests of LIDAR technology for measuring obscured or concealed nonproliferation activities.

Nuclear Explosion Monitoring

Satellite-Based Systems

- Start satellite sensor/payload integration for the first operational nuclear explosion detection payloads for the Global Positioning System (GPS) Block IIF satellites.

Ground-Based Systems

- Install Release 5.0 of the NNSA Knowledge Base at the U.S. nuclear explosion monitoring National Data Center (NDC), which is an operational data base that will be accessed by automated processing systems and human analysts to improve ground-based nuclear explosion monitoring and verification confidence. Release 5.0 will add regional datasets substantially complete on the broad regions of Asia and 50% of the former Soviet Union.
- Improve two-dimensional seismic magnitude, distance, and amplitude correction (MDAC) surfaces with improved earthquake modeling (apparent stress derived from coda measurements) and frequency-dependent attenuation maps;
- Improve seismic discrimination between earthquakes and explosions by using Regularized Discrimination Analysis (RDA) parameters to be used at the U.S. NDC.
- Improve the reliability of analyses to distinguish natural events and industrial activity from nuclear explosions.

Deterring Proliferation

Radiation Detection

- Complete the selection of candidate technologies to detect fissile material at distances greater than ten meters.
- Complete selection of technologies to confirm and monitor the non-reversible dismantlement of nuclear weapons and removal of special nuclear materials from the nuclear weapons cycle while protecting sensitive weapons design information.

Continue the initiative with other federal agencies to demonstrate an integrated surveillance technologies for counter nuclear smuggling applications, for cooperative threat reduction programs, application to foreign nuclear facilities.

Nuclear Material Analysis

Transfer improved nuclear materials analytical laboratory and field analysis capabilities to other U.S. government agencies.

Micro Technologies

Demonstrate new techniques for detection of chemical and nuclear signatures associated with proliferation activities.

Chemical and Biological National Security

Technology Development Initiatives

Make available the modified engineering prototype hand-held chemical agent detector to several using agencies for the field testing.

Field test an autonomous pathogen detection system (APDS-II) that integrates two independent detection methods.

Demonstrate coupled regional and building-scale prediction models, and analysis.

Domestic Demonstration and Application Programs

Deploy a prototype biological agent detection system for enhanced public health response at special events.

Plan for integrated demonstration of detector-enabled response system at a major U.S. airport.

Supporting Activities

HAZMAT SpillCenter

Conduct 35 weeks of preparation and testing at HAZMAT Spill Center.

Nonproliferation and International Security Center

Complete physical construction.

Significant Accomplishments and Program Shifts

Proliferation Detection

Remote Effluent Detection

Completed trade study by NNSA Laboratories that determined technological approach to develop an advanced hybrid sensor for nonproliferation and counterproliferation missions.

Continued the development of analyst tools to fully exploit hyperspectral imaging for effluent detection.

Remote Physical Detection and Enabling Technologies

Launched the multispectral thermal imager small research satellite that will be used to demonstrate and evaluate space-based multispectral and thermal imaging technology for nonproliferation, treaty monitoring, and other National Security and civilian applications.

Developed conceptual design for airborne SAR system to detect a certain class of difficult proliferation observables.

Developed SAR algorithms for proliferation detection and treaty monitoring purposes, and provided other USG organizations with algorithms for their use.

Nuclear Explosion Monitoring

Satellite-Based Systems

Achieved successful operation of two new NNSA satellite-based nuclear detonation sensors first launched by the U.S. Air Force in January 2001 on-board a GPS satellite.

Ground-Based Systems

Delivered update of the NNSA Knowledge Base to the U.S. nuclear explosion monitoring National Data Center in July, 2000, for evaluation which contains the first regional seismic processing software including information on 32 of 50 International Monitoring System stations. The Middle East and Lop Nor data sets are substantially complete for existing data with this delivery.

Developed one-dimensional MDAC and kriged amplitude correction surfaces for stations in the Knowledge Base. Transferred set of individual and multivariate seismic discriminants and calibration data to the U.S. NDC.

Published integration process for migrating research results to operational systems and Contributor's Guide to the Knowledge Base.

Completed international demonstration of radioxenon regional monitoring hardware and software.

Delivered advanced prototype versions of software tools allowing visualization of the Knowledge Base and automated updating of calibration information including: discrimination, Knowledge Base calibration integration, progress assessment, surface wave calibration, coda magnitude, and the Geographical Information System Framework.

Deterring ProliferationRadiation Detection

Completed vulnerability assessments and provided recommendations for improvements in monitoring systems proposed for Strategic Arms Reduction Treaty (START) III and other related arms control treaties and agreements.

Completed an interagency mission needs study to counter the threat from proliferation. Initiated research into long range stand-off detection technologies for special nuclear materials and for shielded Highly Enriched Uranium.

Joined with NNSA emergency response programs to improve their detection and diagnostic tool kit

Nuclear Materials Analysis

Developed laboratory and handheld analytical methods to enhance NNSA capabilities to assess foreign nuclear weapon programs and to monitor global nuclear proliferation.

Completed a pre-production prototype analytical system to improve the timeliness of US capabilities to monitor global nuclear proliferation and nuclear testing.

Micro Technologies

Patented a sensitive sensor polymer to detect organophosphor compounds which is now under evaluation for licensing.

Demonstrated a 100-fold increase in detection sensitivity for a vapor preconcentrator to improve chemical microsensors.

Developed a microcalorimetric spectrometer (micro-CalSpec) which serves as a multi-parameter sensor platform has been and can be tuned to respond to chemicals, radiation, acoustic signatures and magnetic fields.

Validated the use of the unattended Advanced Surveillance Technology for tracking fissile materials during a full field test at LANL by detecting an emergency situation at the National High Magnetic Flux Laboratory. Separately, the system was tested against shipments to the Waste Isolation Pilot Plant.

Chemical and Biological National Security

Technology Development Initiatives

- Demonstrated and tested an initial lab prototype of a chemical and biological weapon detector.

Domestic Demonstration and Application Programs

- Completed the architecture development to protect a special event from biological attack.
- Conducted smoke and tracer gas experiments in subway and airport facilities as part of development of an integrated chemical agent detection and response system.

Supporting Activities

HAZMAT SpillCenter

- Conducted 30 weeks of preparation and testing at HAZMAT Spill Center.

Nonproliferation and International Security Center

- Completed design in preparation of beginning physical construction in the third quarter of FY 2001.

Funding Profile

(dollars in thousands)

	FY 2000[a] Comparable Appropriation	FY 2001 Original Appropriation	FY 2001[b] Adjustments	FY 2001 Comparable Appropriation	FY 2002 Request
Nonproliferation and Verification R&D					
Proliferation Detection	62,948	66,533	-1,390	65,143	40,143
Nuclear Explosion Monitoring	70,673	75,330	-3,271	72,059	67,059
Deterring Proliferation	30,835	42,467	-3,294	39,173	29,882
Chemical and Biological National Security	36,682	42,210	-1,983	40,227	28,227
Supporting Activities	5,704	9,450	1,500	10,950	4,985
Subtotal, Nonproliferation and Verification R&D	206,842	235,990	-8,438	227,552	170,296
Construction	6,000	17,000	-37	16,963	35,806
Subtotal, Nonproliferation and Verification R&D	212,842	252,990	-8,475	244,515	206,102
Use of Prior-Year Balances	0	-72	0	-72	0
Total, Nonproliferation and Verification R&D	212,842	252,918	-8,475	244,443	206,102

Public Law Authorization:

Public Law 95-91, “Department of Energy Organization Act”

Public Law 106-398, “National Defense Authorization Act FY 2001"

[a] Excludes $4,659,000 which has been transferred to the SBIR program and $280,000 which has been transferred to the STTR program.

[b] The adjustment includes the government-wide recission of .22%, safeguards and security transfers, and the transfer of the HAZMAT Spill Center. The HAZMAT is being transferred from the Office of Security and Emergency Operations (SO) to the Office of Defense Nuclear Nonproliferation (NN). HAZMAT was funded at $1,500,000 by SO in both FY 2000 and FY 2001.

Funding by Site

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	54,604	58,966	46,533	-12,433	-21.1%
Nonproliferation and International Security Center	6,000	16,963	35,806	18,843	111.1%
Sandia National Laboratory	68,500	66,771	64,235	-2,536	-3.8%
Total, Albuquerque Operations Office	129,104	142,700	146,574	3,874	2.7%
Chicago Operations Office					
Argonne National Laboratory	3,135	2,431	1,374	-1,057	-43.5%
Brookhaven National Laboratory	936	673	229	-444	-66.0%
Total, Chicago Operations Office	4,071	3,104	1,603	-1,501	-48.4%
Idaho Operations Office					
Idaho National Eng. & Env. Laboratory	1,659	1,441	1,371	-70	-4.9%
Total, Idaho Operations Office	1,659	1,441	1,371	-70	-4.9%
Nevada Operations Office					
Hazmat Spill Center	2,320	2,271	2,271	0	0.0%
Remote Sensing Laboratory	755	1,475	332	-1,143	-77.5%
Total, Nevada Operations Office	3,075	3,746	2,603	-1,143	-30.5%
Oakland Operations Office					
Lawrence Berkeley National Laboratory	1,913	2,524	1,904	-620	-24.6%
Lawrence Livermore National Laboratory	39,640	42,553	24,645	-17,908	-42.1%
Total, Oakland Operations Office	41,553	45,077	26,549	-18,528	-41.1%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	6,536	7,326	5,253	-2,073	-28.3%
Oak Ridge Y-12 Plant	550	450	400	-50	-11.1%
Total, Oak Ridge Operations Office	7,086	7,776	5,653	-2,123	-27.3%
Richland Operations Office					
Pacific Northwest Laboratory	17,415	18,582	13,076	-5,506	-29.6%
Savannah River Operations Office					
Savannah River Technology Center	2,107	2,147	2,123	-24	-1.1%
All Other Sites	6,772	19,942	6,550	-13,392	-67.2%
Subtotal, Nonproliferation and Verification R&D	212,842	244,515	206,102	-38,413	-15.7%
Use of Prior-Year Balances	0	-72	0	0	0.0%
Total, Nonproliferation and Verification R&D	212,842	244,443	206,102	-38,413	-15.7%

Site Description

Argonne National Laboratory

Argonne National Laboratory (ANL) plays a key role in the development and implementation of modeling and simulation capabilities to predict the dispersal of chemical and biological agents in subway systems.

Brookhaven National Laboratory

Brookhaven National Laboratory will develop biological foundation and analysis technologies for countering biological terrorism.

HAZMAT Spill Center

Bechtel Nevada operates the HAZMAT Spill Center on the Nevada Test Site to support field testing of effluent detection sensors for the Nonproliferation and Verification R&D program. In addition, Bechtel Nevada provides for facility maintenance, equipment upgrades needed to support sensor testing, and system calibration. The HAZMAT Spill Center also supports user-sponsored spill tests for both government and industry; provides spill test results to Departmental elements, other government agencies, industry and the general public for use in hazards mitigation and emergency responder training programs.

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) will develop detection technologies for arms control applications using accelerator systems.

Lawrence Berkeley National Laboratory

Lawrence Berkeley National Laboratory will be a participant in the interlaboratory effort to develop a room temperature high resolution gamma spectrometer based on cadmium zinc telluride (CZT) materials. LBNL is also a key component of our chem-bio modeling and simulation program to predict the transport of chemical and biological agents inside of buildings.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) will develop specific geographical regional models to improve U.S. technical capability and confidence to locate and identify seismic events to support nuclear explosion monitoring assessments; gamma ray imaging technology for arms control applications; advanced technologies to search and locate special nuclear material used in a threatening manner; and forensics methods for law enforcement which will improve the U.S. capability to investigate the threat of WMD.

LLNL will have a key role in the development of chemical and biological weapons (CBW) transport modeling capabilities for prediction in urban areas and supports our development of DNA diagnostics for forensic analysis. LLNL will conduct research in the areas of miniaturized chemical detectors by using advanced micromachining techniques, novel biochemical transducer mechanisms, and by developing more efficient multi-sensor data processing algorithms.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) will provide the U.S. National Data Center with improved analytic tools and sensors for discriminating small earthquakes and industrial activities from banned nuclear explosions. LANL will continue to develop the next generation electromagnetic pulse and radiation sensors for satellite-based nuclear explosion monitoring systems. The laboratory will investigate remote unattended methods to monitor SNM in long-term storage for arms control and domestic safeguards, including unmanned systems which can strengthen internal safeguards by monitoring fissile materials in support of future arms control negotiations (e.g. START III) and other international safeguards initiatives. LANL will test neural network applications to supply low-cost and simple detection technology for treaty monitoring, regional and bilateral conflict resolution and advanced concepts for counter terrorism response. LANL will continue developing innovative algorithms and specialized processors to process voluminous quantities of remote sensing data into the specific information required by decision makers. LANL has an important role in the development of a biological detection and early warning system. The world-class radiometric calibration facility and expertise developed at LANL, as part of the multispectral thermal imaging small satellite, will be used in ongoing data analysis from the satellite which is now in orbit as well as in other spectral programs.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) will conduct research to support cooperative monitoring requirements for bilateral nonproliferation and arms control initiatives with Russia. ORNL will provide leading-edge research into candidate materials which could replace exiting nuclear detectors used for gamma spectroscopy and neutron detection. ORNL will continue investigation of small portable mass spectroscopy units and the application of micro-fluidics systems for “lab-on-a-chip” concepts. ORNL will continue development of an advanced mass spectrometer for real-time detection and identification of biological pathogens. ORNL will investigate new sensor concepts using microcalorimetry and bio-chemo-optomechanical techniques.

Oak Ridge Y-12 Plant

The Oak Ridge Y-12 Plant will support the development of sampling technology and measurement protocols to improve the application of non-nuclear monitoring technology to detect and track nuclear materials production. To support this nonproliferation mission, Y-12 collaborates with Oak Ridge National Laboratory (ORNL) to develop concepts and prototype advanced analytical systems to be used in cooperative arms control, verification, and proliferation monitoring.

Pacific Northwest National Laboratory

The Pacific Northwest National Laboratory (PNNL) will continue the development of laboratory methods and hand-held detection technologies in support of strategic arms control and National Security applications. The laboratory will support efforts to detect and characterize signatures from nuclear explosion monitoring systems. The laboratory will be a strong participant in the development of advanced forensics methods that are necessary to identify the origin of smuggled nuclear material. PNNL will provide collaborative statistical support to other DOE National Laboratories conducting research and development for the Nuclear Explosion Monitoring program. Areas of research include discrimination algorithms to support geographical regional models; and overall statistical assessments to increase confidence in monitoring systems. PNNL will continue developing a world class library of infrared absorption spectra, to be made available to NNSA and other federal government remote sensing programs.

Remote Sensing Laboratory

The Remote Sensing Laboratory (RSL) provides integration and flight services for unique research sensors that require airborne testing and data collections to further scientific understanding.

Sandia National Laboratories

The Sandia National Laboratories (SNL) will develop, demonstrate, and validate improvements to existing and planned information system technologies to provide capabilities for highly automated, high confidence data processing and analysis in support of nuclear explosion monitoring. SNL will support the U.S. program to detect nuclear detonations from satellites by providing systems engineering, the optical sensors, and the on-orbit processing technologies. In partnership with U.S. Law Enforcement, the laboratory will develop nuclear detection systems to interdict smuggled nuclear materials in transit across U.S. borders. SNL will participate in a multilaboratory effort to develop CZT as a room temperature spectrometer and in a consortium of national labs and academic institutions to develop micro-technologies for detection and analysis of chemicals. SNL will continue development of advanced Synthetic Aperture Radars and analysis methods for mapping and the detection of proliferation events. SNL will continue development of an ultraviolet system for remote detection of effluents. SNL will continue operation of the multispectral thermal imager satellite. SNL will continue developing the “micro

ChemLab" a effort that implements many analytical chemistry functions on a chip. This technology will bring the power of an analytical laboratory down to a hand-held format for application to chemical agent and biological toxin detection. In addition, SNL will continue development of environmentally friendly CBW decontamination foams.

Savannah River Technology Center

The Savannah River Technology Center (SRTC) will provide ground-based monitoring systems to analyze data collected by the multispectral thermal imager satellite in order to validate atmospheric and facility models based on ground-truth information. SRTC will support development of methods to exploit environmental sampling and provide advisory services for testing of new concepts to detect undeclared nuclear reprocessing.

All Other Sites

NNSA Headquarters and DOE Operations Offices including Albuquerque, Chicago, Idaho, and Oakland provide oversight and support for interagency agreements, university grants, small business contracts, and other procurement competitions. In addition the Office of Nonproliferation Research and Engineering has funded projects in a variety of research areas at the Ames Laboratory, the Environmental Measurements Laboratory, the Special Technologies Laboratory, and the Oak Ridge Institute for Science and Education.

Proliferation Detection

Mission Supporting Goals and Objectives

The Proliferation Detection mission is to develop and demonstrate innovative proliferation detection technologies, and advanced data analysis to detect proliferation of weapons of mass destruction worldwide.

The multi-laboratory and joint interagency projects within this activity area are comprised of comprehensive, end-to-end research and development efforts that:

- Examine the nature of proliferation targets to determine remotely observable signatures.
- Conduct modeling to understand the environment's effects on observables and how these effects can be taken into account.
- Develop sensor systems to remotely detect and measure the signature.
- Develop techniques to interpret the data and produce meaningful information.
- Develop interagency technology partnerships to transfer successful technology to users.

These activities are closely coordinated with other government agencies and, continuing in FY 2002, the methodology and experience that have resulted in significant advances in the nuclear proliferation detection mission area, are applied also to the chemical and biological weapons proliferation arena. Many of the sensor systems and base technology designed to detect signatures from nuclear weapons activities can be used to detect signatures from chemical, and potentially, biological weapons activities.

Advanced detection concepts will continue to be explored to ensure future capability. Additionally, establishment of library spectra of chemical signatures will continue as this will be a national asset for all research in this area.

Other significant technology thrusts for proliferation detection include multispectral thermal imaging, synthetic aperture radar (SAR) imaging, and other non-chemical techniques. Work will continue in these areas but with a greater emphasis on new techniques and new proliferation observables.

FY 2002 funding for the multispectral thermal imaging satellite will be used to operate and perform scientific experimentation utilizing the satellite's instruments. The satellite was launched in March 2000 and is expected to remain a viable tool for technology demonstration through FY 2002. During FY 2002, an evaluation will be conducted to determine if the satellite's orbital decay rate and system health warrant an extension of satellite operation into FY 2003. Prior to the satellite's launch, an interagency users group was formed to ensure other agencies of the Government could make use of this satellite for appropriate civil, environment, and defense research. A significant number of these collaborations are underway and will continue in FY 2002.

In FY 2002 there will be an increase in funds applied to synthetic aperture radar (SAR) imaging and other non-chemical techniques for detecting proliferation. Additionally, it is recognized that many of these new techniques require closer collaboration between the scientists who develop new technologies and end

users who must draw conclusions from these technologies. Thus, continuing in FY 2002, additional effort will be placed on improving the access of technology end-users to the technology developers for the purpose of better utilization of advanced detection techniques.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Remote Effluent Detection	37,965	37,442	12,643	-24,799	-66.2%
Remote Physical Detection and Enabling Technologies	24,983	27,701	27,500	-201	-0.7%
Total, Proliferation Detection	62,948	65,143	40,143	-25,000	-38.4%

Detailed Program Justification

(dollars in thousands)

FY 2000	FY 2001	FY 2002

Proliferation Detection

The Proliferation Detection program develops and demonstrates innovative remote sensing technologies needed to improve the detection and analysis of nuclear materials and to detect the early stages of a proliferant nation's nuclear weapons program or non-compliance with international treaties and agreements. The program areas focus on: remote effluent detection and remote physical detection technologies.

Remote Effluent Detection 37,965 37,442 12,643

One of the main proliferation detection technology thrusts continues to be a coordinated effort aimed at the remote detection of effluents. This program includes efforts to understand and quantify the source of observables, the effects of the environment on the possible observables, understand the phenomenology associated with the observables, development of sensor concepts to detect and measure these observables, field tests, demonstrations, and development of exploitation tools to interpret the data.

- Lidar Systems 21,043 20,520 10,721

  Complete and conduct experiments of a prototype unmanned aerial vehicle based lidar system, and initiate a project that utilizes an advanced laser diode technology to implement revolutionary remote sensing techniques. *The FY 2002 decrease of $10,000,000 terminates all other lidar work.*

- Hyperspectral Systems 16,922 16,922 1,922

  Begin a new proliferation detection signatures effort. *The FY 2002 decrease of $15,000,000 results in the termination of the hyperspectral infared imaging system program.*

(dollars in thousands)

FY 2000	FY 2001	FY2002

# Remote Physical Detection and Enabling Technologies . . .	24,983	27,701	27,500

Other significant technology thrusts for proliferation detection include multispectral thermal imaging, synthetic aperture radar (SAR) imaging, advanced wideband radio frequency (RF) signal processing and other non-chemical techniques. Work will continue in these areas but with a greater emphasis on a better understanding of the phenomenology of proliferation observables and new sensor exploitation techniques.

• Multispectral Thermal Imager	13,882	8,747	7,150

FY 2002 may be the last year of funding for the multispectral thermal imager small research satellite which was launched in FY 2000 with an expected useful lifetime of two to three years. Reduced funding reflects the lower costs associated with operating the satellite and conducting science now that all the major hardware development work has been completed. Experimental data will be used to assess nonproliferation remote sensing technology. Satellite sensor data will be analyzed by numerous organizations throughout the Government and academia. During FY 2002, an evaluation will be conducted to determine if the satellite's state of health and it's unique capabilities warrant continued funding in FY 2003. *The FY 2002 decrease of $1,597,000 reflects the reduced funding requirement for satellite operations and ground station maintenance associated with the research satellite.*

• Synthetic Aperture Radar (SAR)	4,476	7,374	7,400

Funding for this area will remain steady so that existing interagency commitments can be completed. This area represents the U.S. Government's premier SAR capability in both hardware and algorithm development.

• Radio Frequency (RF)/Enabling Technologies	6,625	11,580	12,950

Research and development will continue at an exploratory level on several moderately funded efforts to accelerate wideband signal processing and other promising, but less mature, high risk enabling technologies. *The FY 2002 increase of $1,370,000 reflects the acceleration of one specific development project that is crucial to a Government-wide effort in which the schedule is driven by several external factors.*

Total, Proliferation Detection	62,948	65,143	40,143

Nuclear Explosion Monitoring

Mission Supporting Goals and Objectives

The goals of the Nuclear Explosion Monitoring Research and Engineering (NEM R&E) program are to develop and field sensors and algorithms for detecting, locating, identifying, and characterizing nuclear explosions when they occur in the atmosphere, in space, underground, or underwater; address other national requirements; and transition technology and provide operational support for U.S. national nuclear explosion monitoring agencies, primarily the Air Force Technical Applications Center (AFTAC) in partnership with the United States Geological Survey and other government agencies.

The NEM R&E program is one of the NNSA's longest standing nonproliferation initiatives. The concept of a U.S. national capability using satellite-borne nuclear explosion surveillance came about during interagency discussions from 1959 to 1962, leading to deployment of the original satellite-based nuclear explosion detection sensors. During the 40 years of this program, well over one hundred DOE satellite payloads have been launched, using U.S. Air Force and National Aeronautics and Space Administration boosters. The satellite-based portion of this program is shifting focus over the next five years to develop and demonstrate in space a new generation of optical, electromagnetic-pulse, and direct-radiation sensors for GPS Block IIF satellites. These new designs will be especially suitable for monitoring potential nuclear tests conducted by threshold states. The national need for worldwide cognizance of nuclear explosions is now as important as ever in this time of high nuclear proliferation concern.

The ground-based systems part of the NEM R&E program focuses on integration of research products, such as calibration data for seismic, radionuclide, hydroacoustic and infrasound stations, as well as other information products which enable nuclear explosion monitoring agencies to perform their operational missions. The current program builds on a long history of successful deliveries of state-of-the-art research products in all monitoring technologies, such as the award winning ARSA and RASA radionuclide detector systems, a modern infrasound prototype, and Release 4.0 of the Knowledge Base configuring large data sets of monitoring information into useful electronic form for operational use. The Knowledge Base project moves U.S. monitoring capability from teleseismic to regional monitoring to enable detection of very low yield events that might arise from proliferant nation efforts. This research and development program addresses U.S. national security monitoring requirements and is driven by U. S. national security monitoring goals.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Satellite-Based Systems	47,743	48,549	54,549	6,000	12.4%
Ground-Based Systems	22,930	22,510	12,510	-10,000	-44.4%
Ground-Based System - Congressional Direction	0	1,000	0	-1,000	-100.0%
Total, Nuclear Explosion Monitoring,	70,673	72,059	67,059	-5,000	-6.9%

Detailed Program Justification

(dollars in thousands)

FY 2000	FY 2001	FY 2002

Nuclear Explosion Monitoring

The NEM program develops enabling technology, operational hardware and software, and expertise to detect, locate, identify, characterize, and attribute nuclear detonations. This national requirement supporting U.S. nuclear explosion monitoring agencies exists whether or not there is a CTBT. In fact, the absence of the CTBT will place additional burdens on national monitoring systems if needed CTBT stations and/or data are not available.

#	**Satellite-Based Systems**	47,743	48,549	54,549

This program provides satellite sensors for detecting, identifying, locating, and technically characterizing nuclear explosions in the Earth's atmosphere and in near-Earth space. Proliferation detection, treaty monitoring, and military goals are supported. Specific activities include flight instrumentation design, fabrication, and testing. The equipment is used on U.S. Air Force Global Positioning System (GPS) and Defense Support Program (DSP) satellites under the auspices of the Air Force Space and Missile Systems Center and the Air Force Space Command. In addition, this program includes the weapons phenomenology work required to define the mission technical parameters; instrument development work necessary to respond to changing mission requirements, technological opportunity, or current system technical obsolescence; and on-orbit validation experiments, when required for technical risk reduction. *The FY 2002 increase of $6,000,000 is the result of new attrition rate projections for the on-orbit GPS satellites that have forced the U.S. Air Force to accelerate its schedules of planned launch dates for the Block IIF GPS satellites. That necessitates much earlier than originally planned satellite acquisitions, and these in turn require much earlier than originally planned deliveries of the NNSA nuclear explosion monitoring payloads to the satellite integrating contractor. The increase is needed to assure the new delivery schedule is met.*

#	**Ground-Based Systems**	22,930	22,510	12,510

This program will transfer, in systematic automated data processing software releases, enhanced regional data evaluation and explosion identification capabilities, including calibration data, to the U.S. National Data Center (NDC) at the Air Force Technical Application Center. The NNSA will provide the NDC with operational support for its seismic, radionuclide, hydroacoustic, and infrasound sensor systems to enable the NDC to perform its nuclear explosion monitoring mission. *The FY 2002 decrease of $10,000,000 to the ground-based program will shift funds to the satellite-based program to enable the NNSA to meet accelerated U.S. Air Force delivery schedules. This decrease to the ground-based program will defer significant work such as regional seismic calibration and incorporation of new ground truth into information products to be transferred to U.S. NDC operations. In FY 2001, twenty-five percent of the ground-based monitoring program funds were successfully competed through a peer-review process, however due to funding constraints, new ground-based research opportunities will not be available in FY 2002 and thus the competition will be suspended in FY 2002.*

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
# Ground-Based Systems - Congressional Direction	0	1,000	0

Funded equipment acquisition for the Incorporated Research Institutions for Seismology (IRIS) PASSCAL Instrument Center. The NNSA provided funding to the National Science Foundation (NSF) which administers the IRIS-PASSCAL Instrument Center to purchase equipment for the PASSCAL Instrument Center. *The FY 2002 decrease of $1,000,000 to the ground-based systems program will shift funds to the satellite-based program to enable the NNSA to meet accelerated U.S. Air Force delivery schedules. The FY 2002 decrease reflects the successful completion of the purchase of seismic instrumentation in support of National Science Foundation program requirements.*

Total, Nuclear Explosion Monitoring	70,673	72,059	67,059

Deterring Proliferation

Mission Supporting Goals and Objectives

The goal in this program area is to develop enabling technologies to inhibit nuclear materials diversion in nonproliferation, counter terrorism, and arms reduction applications. Specific objectives include development of improved radiation detection technologies, advanced field and laboratory nuclear materials analysis methods, and micro technologies for detection and analysis.

In FY 2002, the activities will focus on the development of technologies to support the monitoring of global nonproliferation activities, both cooperative and the needs of the intelligence community, and to counter nuclear smuggling and terrorism threats. Developed systems will enhance the U.S. capability to conduct wide area searches, remotely monitor the storage of nuclear material placed under safeguards or under bilateral agreements with Russia, develop analysis tools to detect proliferation activities associated with WMD production, and develop a new generation of cost-effective detection systems based on microtechnologies.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Radiation Detection	12,343	13,400	10,000	-3,400	-25.4%
Nuclear Material Analysis	10,135	15,073	10,000	-5,073	-33.7%
Micro Technologies	8,357	10,700	9,882	-818	-7.6%
Total, Deterring Proliferation	30,835	39,173	29,882	-9,291	-23.7%

Detailed Program Justification

(dollars in thousands)

FY 2000	FY 2001	FY2002

Deterring Proliferation

The Deterring Proliferation program develops and demonstrates innovative sampling and analysis technologies needed to improve the detection and tracking of foreign special nuclear materials and the timely analysis to detect the early stages of a proliferant nation’s nuclear weapons program or non-compliance with international treaties and agreements. The program areas focuses on: handheld and unattended sensor systems.

#	**Radiation Detection**	12,343	13,400	10,000

Develop innovative concepts to increase range sensitivity, resolution, fieldability, and simplify nuclear sensor system operations and the interpretation of data. A major goal is to develop systems that are capable of rapid analysis of nuclear weapons materials with high confidence and

(dollars in thousands)

FY 2000	FY 2001	FY2002

minimal operational complexity. Research is continuing on improving room temperature detectors, data processing algorithms to locate special nuclear material at long ranges, and hardware and software information barriers to protect sensitive weapons information for potential use by international organizations and/or for treaties and international agreements. *The FY 2002 decrease of $3,400,000 will reduce the research into cadnium zinc telluride which is the leading edge material for room temperate operations. This reduction will impact the growing partnership with industry and slow commercialization of systems for wide application in weapon monitoring, arms control, and safeguards. The Radiation Detection Panel will be terminated. This panel serves as a technical working group evaluating applications of radiation sensors.*

#	**Nuclear Materials Analysis**	10,135	15,073	10,000

Develop advanced field and laboratory capabilities for global sampling and analysis of effluents from poliferation-related activities associated with nuclear weapon production and to identify the origins of nuclear material. Develop an integrated collection system with automated in-field analysis capability for possible remote, unattended operation. Develop novel approaches for sensing and discriminating chemicals from industrial processes associated with nuclear material production. *The FY 2000 decrease of $5,073,000 will result in the termination of support to law enforcement under the joint agreements with the Department of Justice and Treasury. There will also be a curtailment of developing operational tools for real time nuclear analysis systems of particular noble gases.*

#	**Micro Technologies**	8,357	10,700	9,882

Develop technologies which will enable the miniaturization of detection and analysis systems that can be readily deployed with a human operator or can be operated remotely and/or unattended in support of national technical monitoring and cooperative confidence building. Develop and demonstrate prototype miniature chemical, and “smart” networks which will reduce false alarms and enhance the probability of detecting activities of concern. *The FY 2002 decrease of $818,000 will reduce basic research to develop working concepts based upon micro technology. As a result, the program will focus on applications of existing commerically available detectors and controllers and university products. Also, there will be greater emphasis on integrated systems for unattended monitoring.*

Total, Deterring Proliferation	30,835	39,173	29,882

Chemical and Biological National Security

Mission Supporting Goals and Objectives

The mission of the NNSA's Chemical and Biological National Security Program (CBNP) is to develop, demonstrate and deliver technologies and systems that will lead to major improvements in the U.S. capability to prepare for and respond to chemical or biological attacks. The specific objectives of the CBNP are:

- # Develop and demonstrate chemical and biological detection, identification, and warning systems for use domestically for high-risk areas or conditions.
- # Develop and demonstrate hand-portable chemical and biological detectors to provide real-time detection to increase situational awareness during crises.
- # Develop and demonstrate modeling and simulation capabilities to enable the accurate prediction of the effects from chemical and biological attacks in urban areas to guide preparation and response efforts.
- # Develop and demonstrate chemical and biological decontamination and restoration techniques for use in civilian settings.
- # Provide the underpinning biological information necessary for biological detection that will support analyses for attribution and event reconstruction purposes, and will aid other agencies in the development of medical and public health countermeasures.

NNSA Role and Interagency Context.

The NNSA has taken on the challenge of responding to the threat of chemical and biological attacks against civilians due to: (1) the urgency of addressing this threat and existing vulnerabilities, and (2) the vast capabilities resident at the DOE and NNSA national laboratories. Specific goals in FY 2002 include completion of the second phase of demonstration of systems to protect key infrastructure and special events from chemical and biological attacks, and continued testing of new chemical and biological detectors.

DOE, and now the NNSA, and the National Laboratories have a long history in nuclear nonproliferation and national security. Further, the Laboratories have extensive expertise in the chemical and biological sciences as a result of major investments in programs such as the Human Genome Project and the Microbial Genome Project. This expertise, and related capabilities in microfabrication, computer modeling, decontamination technologies, and system integration form the basis for NNSA's role in addressing chemical and biological weapon threats.

Other federal agencies such as the Departments of Defense, Justice, and Health and Human Services, are focused on improving preparation and response to the potential use of chemical or biological agents. The CBNP is designed to complement these programs while relying on the unique capabilities of the NNSA and DOE laboratories. To avoid duplication of effort, the CBNP interacts with related efforts by other agencies through a number of formal and informal coordination mechanisms. For example, to coordinate

with the Department of Defense, a Chemical and Biological Defense R&D Focus Group (formed under the Counterproliferation Program Review Committee) is developing a joint R&D roadmap. The goal of this effort is to identify links between R&D efforts sponsored by the two Departments and applications to the different missions (civilian versus battlefield) served by the NNSA and DoD programs. The CBNP is differentiated from related efforts by focusing on the development of robust capabilities in a systems context specifically targeted at the domestic threat, and the program seeks to provide major capability advances in the three to five year time frame.

CBNP Content, Structure, and Processes

The NNSA CBNP is primarily focused on the development of systems for detection, identification, and warning of a chemical or biological attack due to the central role of these functions in an overall response system. The program has adopted short-term and long-term approaches. The short-term effort is built around Domestic Demonstration and Applications Programs (DDAPs), featuring technology currently or soon to be available. Longer-term R&D leading to enhanced capability is undertaken within Technology Development Initiatives.

The DDAPs address specific applications and involve close interaction with Federal and local planners and responders. The goal of these programs is to demonstrate a complete system, integrating technologies developed by NNSA as well others, and in turn provide guidance to the R&D efforts. Development of system architectures is central to the DDAPs concept; architectures consider the role of infrastructure, operations, and technology in responding to the threat, and guide the integration of multiple technologies into an overall system.

Two DDAPs, both emphasizing detection, identification, and early warning, are currently underway. The first is the Biologic Aerosol Sentry and Information System (BASIS). The objective of this biological early warning DDAP is to produce a portable system for protecting special events or for deployment to a major city during high alert conditions. Pending a successful demonstration in mid- FY 2001, this system will be deployed in support of a major special event in FY 2002. The second program is the Program for Response Options and Technology Enhancements for Chem/Bio Terrorism (PROTECT). The objective of this civilian infrastructure protection DDAP is the fielding of technologies and analysis tools to support protection of “at risk” facilities. A pilot study focuses on the subway system of a major metropolitan area. Lessons learned from this project will be utilized to adapt and install operational integrated sensor networks in other subway systems, as well as key facilities such as airports, arenas and high-rise buildings.

The Technology Development Initiatives are research and development activities that are planned to develop high-payoff enabling technologies suitable for initial use in three to five years. Currently, development is underway in four areas: detection, modeling and prediction, decontamination, and biological foundations. The main emphasis is on biological detection and the underpinning research performed in the biological foundations area.

The Chemical and Biological Detection Initiative develops a suite of detection systems that will significantly improve chemical and biological detection capabilities in urban environments for Federal, state and local responders. This work builds upon DOE advances in laser technology, capabilities in microfabrication, and work in the development of DNA-based diagnostics. Key efforts include the

development of an autonomous biological agent detector, a hand-held chemical agent and biotoxin detector, a multi-functional biochip and a low-cost chemical agent “badge”. The techniques differ in their level of technical maturity, application area, development risks and benefits, comprising a balanced detection portfolio. Recent highlights include: integration of key miniaturized components, including lasers and separations columns into hand-held prototypes of chemical and biological toxin detectors; Live chemical agent testing of the chemical and biological toxin detector; and delivery of six hand-held biological detectors to first response personnel for “beta testing”.

The goal of the Modeling and Prediction Initiative is the accurate prediction of chemical and biological agent dispersal during the multitude of release scenarios that might occur in an urban environment. This is essential for the protection of human life and for the effective operation of emergency response teams. This effort builds upon substantial investments by DOE and the National Laboratories in high-performance computing. Initiative elements include models for air flow and transport within building interiors and subways, models for flow around buildings, and the linking of these models to form an integrated, multi-scale computational capability. Together, advancements in these areas will enable accurate predictions of the extent and impact of a chemical or biological terrorism incident. Recent highlights include: initiation of model validation experiments using historical data as well as new experiments; and incorporation of additional physical processes into interior and subway models to improve accuracy.

The Decontamination Initiative develops rapid, effective, and safe (non-toxic and non-corrosive) decontamination technologies for a range of chemically and biologically contaminated surfaces. Additionally, standards are sought for sampling and analysis methods to ensure compliance with acceptable civilian cleanup criteria. This work builds upon DOE expertise in understanding fundamental biology and chemistry and advanced diagnostic instrumentation. Current efforts focus on methods that are minimally corrosive and yet effective for decontamination and include: development of improved reagents and delivery systems (e.g., gels and foams); advanced decontamination techniques, such as low temperature plasmas; and a study to address the environmental issues associated with urban decontamination. Recent highlights include: development and live-agent testing of a decontamination foam effective against all classes of chemical agents as well as high-priority biological agents; and use of newly-developed foams and gels in field tests of building decontamination.

The Biological Foundations Initiative develops molecular biology-based capabilities to support efforts in advanced detection, attribution, and medical countermeasures. Detailed study of both biological agents and ambient background microbiological populations, at the DNA and structural level, will enable rapid, conclusive identification of agents; recognition of bio-engineered features, such as antibiotic resistance; geographic source determination; event reconstruction and attribution; and help other agencies develop vaccines and treatments for both pathogens and toxins. This work builds upon DOE capabilities in DNA sequencing and advanced light sources used in biological structure determination. These efforts are aimed at providing the biological data necessary to underpin advanced detection and forensics capabilities. Recent highlights include: sequencing of B. anthracis and Y. pseudotuberculosis; development of amplified fragment length polymorphism and variable number of tandem repeats techniques to identify and geo-locate the strains of anthrax. Extension of these techniques to other pathogens has begun; completion of high resolution three-dimensional structures of toxins and computer screening of potential

ligand candidates; and initial collection and analysis of air and soil samples to better understand biological backgrounds against which detection must occur.

Funding Schedule

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Technology Development Initiatives	28,793	30,927	20,927	-10,000	-32.3%
Domestic Demonstration and Application Programs	7,889	9,300	7,300	-2,000	-21.5%
Total, Chemical and Biological National Security	36,682	40,227	28,227	-12,000	-29.8%

Detailed Program Justification

(dollars in thousands)

FY 2000	FY 2001	FY 2002

Chemical and Biological National Security

The CBNP program focuses emerging science and technology on the challenging threat of chemical and biological attack against U.S. civilian populations. NNSA is the primary agency focusing on and developing non-medical technical solutions for the domestic preparedness problem.

Technology Development Initiatives 28,793 30,927 20,927

In FY 2002 development of advanced technologies to respond to chemical and biological threats will be continued. Four initiatives are currently supported with the emphasis on biological detection: (1) rapid and low false-alarm chemical and biological detection technologies, (2) predictive chemical and biological plume transport models suitable for planning and response to attacks in urban areas, (3) decontamination and restoration technologies for urban areas, and (4) development of the underpinning biological sciences necessary for biological detection, including detection of engineered organisms and for attribution purposes, and to aid other agencies (e.g. DoD) in the development of medical countermeasures. *The FY 2002 decrease of $10,000,000 will stretch out milestones for modeling of interior structures and transfer of decontamination technologies projects. The decrease will also significantly reduce development of the biological foundations for new detection methodologies and the development of new chemical and biological detectors technologies.*

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
# Domestic Demonstration and Application Programs (DDAPs)	7,889	9,300	7,300

In FY 2002 these programs will rapidly demonstrate the utility of systems for specific applications. Development of system architectures is central to these initiatives; architectures consider the role of infrastructure, operations and technology in responding to the threat, and guide the integration of multiple technologies into an overall system. Two DDAPs, both emphasizing detection and early warning, are currently underway. *The FY 2002 decrease of $2,000,000 will slip milestones for the PROTECT DDAP, and limit FY 2002 activities to planning only.*

Total, Chemical and Biological National Security	28,793	40,227	28,227

Supporting Activities

Mission Supporting Goals and Objectives

Supporting activities includes crosscutting costs of the Office of Nonproliferation Research and Engineering such as the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs, The HAZMAT Spill Center, and the Planning, Outreach, and Publication Activities. It also includes funding to produce reports, studies, meetings, and workshops by external review groups such as the NN Advisory Committee.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
SBIR/STTR	0[a]	5,166	0	-5,166	-100.0%
HAZMAT Spill Center	1,500	1,500	1,500	0	0.0%
Planning, Outreach, and Publication Activities	4,204	4,284	3,485	-799	-18.7%
Total, Supporting Activities	5,704	10,950	4,985	-5,965	-54.5%

Detailed Program Justification

(dollars in thousands)

FY 2000	FY 2001	FY 2002

Supporting Activities

Supporting activities includes crosscutting costs of the Office of Nonproliferation Research and Engineering.

SBIR/STTR 0 5,166 0

Funding for the SBIR and STTR program is 2.65% of the total extramural research and development. *The FY 2002 decrease of $5,166,000 is planned as the Nonproliferation and Verification R&D Program is in the process of requesting an exemption from this activity based on the departmental exemption for atomic energy defense programs.*

[a] Excludes $4,659,000 which has been transferred to the SBIR program and $280,000 which has been transferred to the STTR program.

		(dollars in thousands)		
		FY 2000	FY 2001	FY 2002
#	**HAZMAT Spill Center**	1,500	1,500	1,500
	The HAZMAT Spill Center supports user-sponsored spill tests for both government and industry at the Nevada Test Site; provide spill test results to Departmental elements, other government agencies, industry and the general public for use in hazards mitigation and emergency responder training programs.[a]			
	•HAZMAT Spill Center	1,350	1,342	1,342
	•Congressional Direction to provide technical and marketing support to the HAZMAT Spill Center.	150	158	158
	• University of Wyoming Western Research Institute	100	105	105
	• University of Arkansas	50	53	53
#	**Planning, Outreach, and Publication Activities**	4,204	4,284	3,485
	These activities provide for strategic initiatives such as technology roadmapping, outyear planning, nonproliferation analysis and studies, and provide initial operating funds for the NISC. Publication activities enhance communications between the technologists in the DOE community, policymakers, and the general public through vehicles such as the Arms Control and Nonproliferation Technologies Newsletter. *The FY 2002 decrease of $799,000 will reduce the amount of support for nonproliferation studies and analysis conducted by the program.*			
Total, Supporting Activities		5,704	10,950	4,985

[a] The HAZMAT Spill Center is being transferred from the Office of Security and Emergency Operations (SO) to the Office of Defense Nuclear Nonproliferation (NN). HAZMAT was funded at $1,500,000 by SO in both FY2000 and FY2001.

Explanation of Funding Changes from FY 2001 to FY 2002

	FY 2001 vs. FY 2002 ($000)
# Proliferation Detection	
• Remote Effluent Detection: In FY 2002 the hyperspectral program and much of the lidar program will be terminated due to funding reductions to the overall R&D Program	-24,799
• Remote Physical Detection and Enabling Technologies: In FY 2002, fewer funds will be required for satellite operations and ground station maintenance associated with the MTI research satellite, resulting in an overall reduction in program expenditures (-$1,597,000). However, at the same time, funding increases in Synthetic Aperture Radar (+$26,000) to develop improved collection systems, and in the Radio Frequency and Enabling Technologies program to reflect the acceleration of one specific development project that is crucial to a Government-wide effort in which the schedule is driven by several external factors (+$1,370,000).	-201
Total, Proliferation Detection	-25,000
# Nuclear Explosion Monitoring	
• Satellite-Based Systems: The increase of $6,000,000 is the result of new attrition rate projections for the on-orbit Global Positioning System (GPS) satellites have forced the U.S. Air Force to accelerate its schedules of planned launch dates for the Block IIF GPS satellites. That necessitates much earlier than originally planned satellite acquisitions, and these in turn require much earlier than originally planned deliveries of the NNSA nuclear explosion monitoring payloads to the satellite integrating contractor. The increase is needed to assure the new delivery schedule is met..	6,000
• Ground-Based Systems: The FY 2002 decrease of $10,000,000 to the ground-based program will shift funds to the satellite-based program to enable the NNSA to meet accelerated U.S. Air Force delivery schedules. This decrease to the ground-based program will defer significant work such as regional seismic calibration and incorporation of new ground truth into information products to be transferred to U.S. NDC operations. In FY 2001, twenty-five percent of the ground-based monitoring program funds were successfully competed through a peer-review process, however due to funding constraints, new ground-based research opportunities will not be available in FY 2002 and thus the competition will be suspended in FY 2002.	-10,000

Explanation of Funding Changes from FY 2001 to FY 2002

	FY 2001 vs. FY 2002 ($000)
• Ground-Based Systems - Congressional Direction: The FY 2002 decrease of $1,000,000 to the ground-based systems program will shift funds to the satellite-based program to enable the NNSA to meet accelerated U.S. Air Force delivery schedules. This decrease reflects the successful completion of the purchase of seismic instrumentation in support of National Science Foundation program requirements.	-1,000
Total, Nuclear Explosion Monitoring	-5,000
# Deterring Proliferation	
• Radiation Detection: The FY 2002 decrease of $3,400,000 will reduce the research into cadnium zinc telluride which is the leading edge material for room temperate operations. This reduction will impact the growing partnership with industry and slow commercialization of systems for wide application in weapon monitoring, arms control, and safeguards. The Radiation Detection Panel will be terminated. This panel serves as a technical working group evaluating applications of radiation sensors..	-3,400
• Nuclear Material Analysis: The FY 2002 decrease of $5,073,000 will result in the termination of support to law enforcement under the joint agreements with the Department of Justice and Treasury. There will also be a curtailment of developing operational tools for real time nuclear analysis systems of particular noble gases..	-5,073
• Micro Technologies: The FY 2002 decrease of $818,000 will reduce basic research to develop working concepts based upon micro technology. As a result, the program will focus on applications of existing commerically available detectors and controllers and university products. Also, there will be greater emphasis on integrated systems for unattended monitoring..	-818
Total, Deterring Proliferation	-9,291
# Chemical and Biological National Security	
• Technology Development Initiatives: The FY 2002 decrease of $10,000,000 will stretch out milestones for modeling of interior structures and transfer of decontamination technologies projects. The decrease will also significantly reduce development of the biological foundations for new detection methodologies and the development of new chemical and biological detectors technologies.	-10,000

Explanation of Funding Changes from FY 2001 to FY 2002

	FY 2001 vs. FY 2002 ($000)
• Domestic Demonstration and Application Programs: The FY 2002 decrease of $2,000,000 will slip milestones for the PROTECT DDAP, and limit FY 2002 activities to planning only.	-2,000
Total, Chemical and Biological National Security	-12,000
# Supporting Activities	
• SBIR/STTR: The FY 2002 decrease of $5,166,000 is planned as the Nonproliferation and Verification R&D Program is in the process of requesting an exemption from this activity based on the departmental exemption for atomic energy defense programs.	-5,166
• Planning, Outreach and Publication Activities: The FY 2002 decrease of $799,000 will reduce the amount of support for nonproliferation studies and analysis conducted by the program.	-799
Total, Supporting Activities	-5,965
# Nonproliferation and International Security Center (NISC): FY 2002 increase of $18,843,000 will complete the NISC construction project to affect needed efficiencies in the nonproliferation and international security work program.	18,843
Total Funding Change, Nonproliferation and Verification R&D	-38,413

Capital Operating Expenses and Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Capital Equipment	4,366	6,631	5,636	-995	-15.0%
Total, Capital Operating Expense	4,366	6,631	5,636	-995	-15.0%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior Year Appropriations	FY 2000	FY 2001	FY 2002	Unappropriated Balance
00-D-192, Nonproliferation & International Security Center, LANL	58,769	0	6,000	16,963	35,806	0
Total, Construction	58,769	0	6,000	16,963	35,806	0

00-D-192, Nonproliferation and International Security Center (NISC) Los Alamos National Laboratory,
Los Alamos, New Mexico

(Changes from FY2001 Congressional Budget Request are denoted with a vertical line[l] 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 2000 Budget Request	1Q 2000	4Q 2001	4Q 2001	2Q 2003	58,769	62,656
FY 2001 Budget Request	1Q 2000	4Q 2001	4Q 2001	2Q 2003	58,769	62,656
FY 2002 Budget Request	2Q 2000	3Q 2001	3Q 2001	2Q 2003	58,769	63,020

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
2000	6,000	6,000	2,916
2001	16,963	16,963	11,734
2002	35,806	35,806	28,969
2003	0	0	15,150

3. Project Description, Justification, and Scope

The National Nuclear Security Administration's (NNSA) Office of Defense Nuclear Nonproliferation (NN) and the Department of Energy's (DOE) Office of Intelligence (IN) have the responsibility for major programs to counter threats involving the proliferation of weapons of mass destruction (nuclear, biological, and chemical). NN and IN offices participate in many programs of national interest including controlling nuclear materials in states of the former Soviet Union, verifying the Comprehensive Test Ban Treaty (CTBT), countering nuclear smuggling, safeguarding nuclear materials and weapons and, countering threats involving chemical and biological agents and helping enable the START process to continue downsizing nuclear weapon stockpiles. Los Alamos is an essential supporter of these DOE programs acting through its Threat Reduction Directorate, which is responsible for about 25 percent of the Laboratory's budget.

The Laboratory has consolidated major programs and capabilities in detection research and development (R&D), intelligence, nuclear safeguards and emergency response in an organization called Nonproliferation and International Security Division (NIS). This organization is the Laboratory's prime responder to NN and IN programmatic needs, including approximately $120 million per year in funded effort for DOE plus about $30 million in related work for other federal agencies. Unfortunately, the full potential for this synergistic organization has not been realized because NIS Division is located across the 43-square-mile Los Alamos site. NIS operations are scattered over six Los Alamos technical areas with NIS personnel housed in 47 different structures, many of which are old and substandard. Based on a recent study of a similar R&D organization, the following improvements in NIS Division scientific collaborations and technical communications are projected to result from centralizing NIS personnel in a new NISC building.

- Increases in number of scientific collaborations - Collaboration rate strongly facilitated with quantitative estimate ranging from 10% to 87%.
- Increase in frequency of technical communications - Collaboration increases strongly with proximity and is considered likely to at least double.

In addition, the study provided a preliminary estimate of the following less dramatic but quantifiable productivity improvements in addition to the non-quantifiable but very significant scientific creativity and productivity gains:

- Savings in support-function consolidation - 0.85% of NIS labor budget (about $0.5 million per year).
- Savings of intra-division travel time - 2.0% of NIS labor budget (about $1.2 million per year).

Los Alamos proposes to consolidate this unique national resource physically as well as organizationally near the Laboratory hub by co-locating all NIS activities in new and existing facilities within convenient walking distance in TA-3 (except for the high-security nuclear activities in TA-18/36 which would not be desirable or practical to move). Accomplishing this consolidation will require the construction of a major new facility - the Nonproliferation and International Security Center (NISC). This consolidation will

enhance program synergy and effectiveness by co-location of the NIS nonproliferation, arms control, treaty verification, and intelligence functions near the scientific, technological, and information sources that support these programs.

Los Alamos initiated Preliminary design in FY2000. This schedule is necessary because of several urgent new requirements which DOE-NN and DOE-IN must respond and to which the full capabilities of the national laboratories, especially Los Alamos, must be applied. Specific examples include:

- # Former Soviet Union (FSU), Nuclear Materials Protection, Control, and Accounting (MPC&A) Program B - The threat to U.S. national security from the loss of significant quantities of FSU nuclear material has been reduced but is far from eliminated. Until these vast amounts of material are safeguarded fully, this threat remains grave.
- # Helsinki Agreements - Agreements reached by Presidents Clinton and Yeltsin in Helsinki, including preliminary START III treaty parameters, add significantly to the technical challenges facing NN and IN.
- # Nuclear, Biological, and Chemical (NBC), Proliferation and Terrorism - NN and IN are now responsible for developing and providing detection, assessment, and response technologies across the entire NBC spectrum. Reducing the NBC threat requires timely warning (intelligence) and advanced detection technology (monitoring). Adequate intelligence and monitoring require the application of leading-edge science and technology across a broad spectrum.

Los Alamos recently launched major efforts aimed at countering nuclear, chemical, or biological weapons smuggling and is prepared to launch a major effort in support of the Helsinki Accords to continue the START process. NISC will give an appropriate focus and stature to Los Alamos efforts in nonproliferation, arms control, and national security commensurate with the contributions the Laboratory is making and on an equal footing with the Laboratory's historic nuclear weapons mission.

The NISC facility will be a new structure rising four stories above a one-level basement. A one-story high-bay area and basement will be provided on the east end of the structure. About 465 people will be housed in this 164,000 square foot facility. The fourth floor, housing staff supporting activities of the DOE Office of Intelligence, will be an accredited Sensitive Compartmented Information Facility (SCIF). Access to the SCIF will be limited to one location that will be manned during normal operating hours. The third floor will contain program management and safeguard assessment functions. Recognizing that SCIF related activities have increased or will increase, the third floor will be constructed so that it includes a SCIF and has other areas with SCIF features for future accreditation. Laboratories for physics, electronics, and instrumentation development along with technical workspaces and administrative functions will be distributed throughout the second and first floor, as well as the basement. Conference rooms will be provided on every floor with larger facilities being located on the first floor. A portion of the basement will be devoted to optic laboratories. In addition, the basement will house nuclear safeguard technology activities. These activities will be classified as radiological because of the use of sealed radioactive sources to execute their mission. The basement also will contain vaults to store the sealed sources including special nuclear materials (SNM). Two specially shielded rooms will be included for high radioactive research activities. These "shielded rooms" will require 5-ton bridge cranes. Because of the

classified nature of many of the activities in this facility, the building, with the exception of the high-bay area and machine shop, will be accessible to cleared personnel only.

A structural steel framing system of construction utilizing cost-effective design concepts will be employed to provide maximum open space, flexibility and economy for the upper floors of NISC. Floors will be concrete over metal deck supported by steel beams and girders. A 9-ft. floor-to-ceiling height was selected for the upper floors while the basement, with its heavier industrial occupancy, will be 20 ft, floor to floor. The basement walls will be constructed of reinforced concrete. Passenger and freight elevators service all floors. In addition to these elevators, an industrial type (10-ton) elevator will service the basement from the loading dock outside the high-bay entrance. The high bay also will contain a 10-ton bridge crane to accommodate the loading and unloading of heavy instrumentation. The building will be heated, cooled and ventilated from modular indoor air handling units on each floor. Chilled water will be provided for cooling while heating will be accomplished by hot water. Variable air volume (VAV) air conditioning units will deliver conditioned air to the occupied spaces. Units will provide a minimum amount of outside air at all times. When outdoor ambient conditions are favorable, an economizer cycle will provide "free" cooling with outside air. The same type of system will be included in the high-bay and machine shop, but will be roof mounted. The main building chillers will also be located on the roof of the high-bay structure. Temperature control will be from room thermostats. A complete packaged direct digital control (DDC) automatic temperature control system will be included. Roof drains will be connected to site storm drain system. Roof drains will be de-coupled as they penetrate the roof, fourth floor, and third floor. An automatic wet-pipe fire protection system will be extended throughout the building. The system will be hydraulically designed and conform to NFPA 13 for Ordinary Hazard Group II as a minimum. Plumbing fixtures including electrical water coolers will be selected to provide access to individuals with disabilities. The building will require the installation of a 3-phase outdoor unit substation that will include a walk-in switchboard. Power will run to each electrical room where it will be distributed. Isolation power will be available for sensitive electronic equipment and computer loads. Power will be distributed throughout the building at 480V/277V and 208V/120V. Motors one horsepower or greater will be supplied with power at 480V. Generally, lighting will be fluorescent and powered at 277V. The building will be equipped with communication systems that include telephone, open data communications, and a protected transmission system. The SCIF will require an internal warning light signaling system as well as an intrusion alarming system.

Site improvements will include a new service drive to access the high-bay assembly area and machine shop functions as well as normal deliveries. A concrete walk will provide pedestrian access to the main entrance to the building. Disabled access will be provided by means of a virtually flat concrete walk. Existing surface drainage and new building roof drainage will be conveyed to existing storm drainage systems. Existing asphalt paving will be removed and the site will be re-graded. Access drives and parking areas will receive base course and asphaltic concrete paving. The parking areas will be striped to accommodate approximately 250 cars. Non-paved areas surrounding the building will be landscaped. Landscaping will consist of ground cover and trees similar to those on site. Landscaped areas will be irrigated by an automatic underground system as required.

Water service for both potable and fire protection will consist of an 8-inch pipe connection, approximately 70 feet long, into an existing 10-inch water main that lies adjacent to the site. A new 6-inch sewer line approximately 100 feet long will convey sanitary waste from the new building to an existing manhole. An existing 8-inch steam line with 4-inch condensate line is located across the street from the building site. These lines will be connected to at a steam pit south of the building from which a 4-inch steam and 3-inch condensate will be extended to the building. A 2500-kVA, 13.2KV-480Y/277V, 3-phase outdoor secondary substation, which will include a walk-in switchboard with secondary feeders routed to each of the basement electrical rooms, will be located along the west side of the building in a service enclosure. Power to this secondary substation will be an underground feed from 13.2KV circuit. The primary feeder cable to the new unit substation will be 3-#4/0 15KV shielded, type MV90 conductors approximately 200 ft. in length and run in a concrete encased duct bank to switchgear unit. Two separate feeders will be installed.

NIS will vacate space in all or parts of seven permanent structures at both the TA-35 and TA-3 Technical Areas. In addition, about 21 trailers and transportables, representing about 22,056 square feet will be removed and salvaged.

Related Construction Project - The Office of Defense Programs' Strategic Computing Complex (SCC), a FY2000 Line Item project, is designed to be constructed directly to the north of the proposed NISC project. The construction of the facility is proceeding rapidly. The Laboratory's SCC and NISC teams coordinate, via an interface agreement, the design of facility and site features to ensure compatibility of the two facilities as the designs are developed. In addition, construction execution issues are being addressed, as the same firm will build both facilities.

4. Details of Cost Estimate

	(dollars in thousands) Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design, Drawings, and Specifications)	4,272	4,272
Design Management Costs (0.52% of TEC)	327	327
Project Management Costs (1.37% of TEC)	1,077	1,077
Total Design Costs (9.23% of TEC)	5,676	5,676
Construction Phase		
Improvements to Land	1,880	1,880
Buildings	33,472	33,472
Special Equipment	2,495	2,495
Utilities	505	505
Standard Equipment	22	22
Removal cost less salvage	177	177
Inspection, design and project liaison, testing, checkout and acceptance	1,142	1,142
Construction Management (2.70% of TEC)	1,129	1,129
Project Management (2.41% of TEC)	2,172	2,172
Total, Construction Costs	42,994	42,994
Contingencies		
Design Phase (1.35% of TEC)	838	838
Construction Phase (13.65% of TEC)	9,261	9,261
Total, Contingencies on NISC (14.99% of TEC)	10,099	10,099
Total, Estimated Cost (TEC)	58,769	58,769

5. Method of Performance

The NISC procurement strategy is the result of the study identified in the FY 2000 Construction Project Data Sheet. NISC pursued a single contract for design and construction of the facility. A two-phased (request for qualifications and request for proposals) procurement was employed to select a qualified contractor. The contractor selected is Hensel Phelps Corporation and the firm fixed price contract was placed on February 23, 2000. Preliminary design has been completed and final design is in progress.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 2000	FY 2001	FY 2002	Outyears	Total
Project costs						
Facility costs						
Design	0	5,937	567	0	0	6,504
Construction	0	63	16,396	35,806	0	52,265
Total Line Item TEC	0	6,000	16,963	35,806	0	58,769
Total Facility Costs (Federal and Non-Federal)	0	6,000	16,963	35,806	0	58,769
Other Projects Costs						
Conceptual design costs	1,099	0	0	0	0	1,099
Project execution Plan	104	0	0	0	0	104
NEPA documentation costs	28	0	0	0	0	28
Other ES&H costs	25	44	36	14	45	164
Other project-related costs	546	412	258	235	1,405	2,856
Total other project costs	1,802	456	294	249	1,450	4,251
Total Project Cost (TPC)	1,802	6,456	17,257	36,055	1,450	63,020

7. Related Annual Funding Requirements[1]

(dollars in thousands)

	Current Estimate	Previous Estimate
Annual Facility Maintenance/Repair Costs[2]	1,500	1,500
Utility Costs	150	150
Total related annual funding	1,650	1,650
Total operating cost (operating from FY2003 thru FY2033)	49,500	49,500

[1] Estimated life of project - 30 years

[2] Thirteen staff years that include Facility Management staff, full-time craft persons and purchased services.

8. Design and Construction of Federal Facilities

All DOE facilities are designed and constructed in accordance with applicable Public Laws, Executive Orders, OMB Circulars, Federal Property Management Regulations, and DOE Orders. The total estimated cost of the project includes the cost of measures necessary to assure compliance with Executive Order 12088, "Federal Compliance with Pollution Control Standards"; Section 19 of the Occupational Safety and Health Act of 1970, the provisions of Executive Order 12196, and the related Safety and Health provisions for Federal Employees (CFR Title 29, Chapter XVII, Part 1960); and the Architectural Barriers Act, Public Law 90-480, and implementing instructions in 41 CFR 101-19.6.

The project will be located in an area not subject to flooding determined in accordance with Executive Order 11988.

DOE has reviewed the GSA inventory of federal scientific laboratories and found insufficient space available, as reported by the GSA inventory.

International Nuclear Safety and Cooperation

Program Mission

The mission of the International Nuclear Safety and Cooperation program is to provide for nuclear nonproliferation and national security by improving international nuclear safety and enhancing international nuclear cooperation, in order to reduce the national security and nonproliferation risks associated with nuclear power plants and facilities in the former Soviet Union to prevent another Chornobyl-like catastrophic accident.

The 1986 disaster at the Chornobyl nuclear power plant revealed many flaws in the Soviet approach to nuclear safety. There are 90 nuclear power reactors at 24 nuclear power plants in 9 former Soviet countries. Sixty-six of these reactors are currently operating at 21 sites in 8 countries. These reactors produce significant portions of the electricity in countries facing severe economic conditions. The nuclear power plants have deficiencies in training, safety procedures, and safety infrastructure. Equipment shortages are commonplace and nuclear professionals suffer from low or erratic pay. These conditions, when combined with serious flaws in the designs of the older reactors, particularly the 13 operating RBMK or Chornobyl-type reactors, pose risks of nuclear accidents, which would cause public health, political, economic, and environmental destabilization in these politically sensitive regions. This could adversely affect neighboring countries, American allies, and U.S. military and civilian personnel in the regions. These concerns led to the conclusion that enhancing the safety of Soviet-era nuclear reactors and establishing improved safety infrastructures in the countries that operate them is a vital national security interest.

Western countries are working with these nations to address nuclear safety challenges with a relatively modest investment. Rather than providing billions of dollars to correct all of the problems directly, the safety program helps the host countries structure their nuclear industries to address safety issues, to prevent accidents, and, as their economies improve, to increase their own funding for nuclear safety. The program also provides a modest investment in critical technologies that are immediately needed to assure the safety of the nuclear power plants. The activities address nuclear safety issues which, if not dealt with, could erode public confidence in nuclear energy worldwide.

International efforts between the U.S. and 20 other countries and international organizations engage these nine former Soviet-bloc countries in international nuclear safety and cooperation efforts. U.S. efforts are coordinated between four federal agencies - the Departments of State and Energy, the U.S. Agency for International Development (USAID), and the Nuclear Regulatory Commission. The Department of State (DOS) provides overall foreign policy guidance for U.S. international nuclear safety efforts. Additionally the DOS's New Independent States (NIS) assistance coordination provides supplemental funding to DOE for specific nuclear projects in Armenia, Kazakhstan and Ukraine. DOS funding does not support efforts in Russia, whereas DOE directly funded efforts are appropriated without country-destination restrictions. DOE uses both funding resources to install and upgrade safety equipment, develop improved safety procedures, train operators, conduct safety assessments, encourage the shut down of the least safe plants, and establish a national, sustainable safety culture. The Nuclear Regulatory Commission assists in strengthening the independence and effectiveness of the regulatory authorities in participating countries.

Cooperation also includes participating in activities of the International Atomic Energy Agency (IAEA), the Organization of Economic Cooperation and Development (OECD)/Nuclear Energy Agency and, on a bilateral basis, with nuclear organizations in countries such as Japan and France. In addition to addressing national security needs, these activities provide opportunities for U.S. industry to contribute to our nuclear safety and nonproliferation efforts, and to engage in the economies of the host countries and subsequent business ventures.

Program Goal

The goal is to improve international nuclear safety and reduce the national security and nonproliferation risks associated with foreign nuclear power plants and nuclear facilities, especially those in the former Soviet-Union. The program improves the safety of Soviet-designed nuclear power plants and encourages closure of the most hazardous of these facilities; and assists host countries to develop and implement self-sustaining nuclear safety infrastructure and improvement programs capable of implementing internationally accepted safety practices. Project activities address significant nuclear safety issues primarily in Ukraine, Russia, Armenia, and Kazakhstan and encourage cooperation among these and other participating countries. The U.S. is helping these countries improve their own reactor safety. The host-country experts are doing most of the work to adapt, implement, and maintain the safety improvements.

Program Objectives

- Improve the safety of 66 operating reactors at 21 Soviet-designed nuclear power plant sites by 2006 and assist the 9 host countries in the implementation of self-sustaining nuclear safety programs consistent with internationally accepted safety practices - without encouraging the long term operation of RBMK type plants which are susceptible to Chornobyl-like accidents.

- Support the shutdown of the highest-risk (oldest) Soviet-designed reactors. Address nuclear safety infrastructure issues that hamper the safe operation of nuclear power plants and the handling of nuclear materials.

- Provide leadership in international nuclear safety organizations. Support safety centers to promote international collaboration of nuclear experts to strengthen the nuclear safety culture in the weaker countries.

Performance Measures

Soviet-designed Reactor Safety

Complete full-scope simulators in Russia (Kalinin unit 2) and Ukraine (Zaporizhzhya unit 1), and upgrade full-scope simulator in Slovakia (for Bohunice).

Complete two safety parameter display systems in Ukraine (Zaporizhzhya units 1 and 6), one in Russia (Novovoronezh unit 5), and one in Lithuania (Ignalina unit 2).

Complete in-depth assessments at three plants in Ukraine (South Ukraine, Rivne, and Zaporizhzhya) and at one plant in Russia (Leningrad unit 2).

Complete configuration management project at one pilot plant in Russia (Novovoronezh). This project coordinates plant drawings with operational procedures and safety analyses to eliminate safety problems related to less rigorous controls.

Nuclear Safety Infrastructure Support

Complete decontamination of in-plant sodium at Kazakhstan's BN-350 reactor in preparation for final draining and decommissioning.

Complete three joint projects between the U.S. and Russia International Nuclear Safety Centers related to: (1) the application of RELAP safety analysis computer code to Soviet-designed reactors; (2) the use of severe accident management guidelines; and (3) the sharing of Soviet-designed reactor safety analysis results with safety centers in Russia, Ukraine, Lithuania, and Armenia.

Significant Accomplishments and Program Shifts

Soviet-designed Reactor Safety

Helped host countries to make significant improvements to safety by addressing weaknesses in operational safety, training, maintenance, safety systems, safety assessments, and regulatory and institutional frameworks at 66 operating reactors, and at four Chornobyl reactors and one breeder reactor in Kazakhstan which are no longer active. As a result, these plants are being operated in a safer manner now than they were 10 years ago when the program started.

Facilitated closure of the last remaining operating reactor at the Chornobyl site (unit 3) in December 2000. Several older design plants have closed (Chornobyl units 1 and 2), are in the process of being permanently shutdown (Kazakhstan BN-350), or are scheduled to close (Lithuania's Ignalina unit 1, Bulgaria's Kozloduy units 1-4, and Slovakia's Bohunice units 1 and 2).

- Completed ten full-scope or analytical simulators, including four in FY 2000 (Russia's Kola Unit 4, Balakovo Unit 4, and Bilibino plant; and Ukraine's South Ukraine Unit 3). These simulators are an excellent tool to train operators to handle and prevent accidents, and are required for each reactor in the U.S.

- Completed the installation of fourteen Safety Parameter Display Systems (SPDS), including four in FY 2000. These systems enable control room operators to rapidly assess abnormal conditions and take corrective actions.

- The ten simulators and the fourteen SPDS provided to reactor operators have been enthusiastically received and are heavily used in the plant training programs and reactor operations.

- Transferred improved training methods to training centers in host countries, and over 6,000 personnel received training using this methodology.

- Implemented Emergency Operating Instructions at Novovoronezh and Ignalina nuclear power plants in Russia and Lithuania, respectively.

- Completed probabilistic risk assessments at nuclear power plants in Ukraine (South Ukraine unit 1 and Rivne unit 1) and Russia (Novovoronezh unit 3, Leningrad unit 2, and Kola unit 4) to help identify the weaknesses at these plants.

- Upgraded the automatic control and protection systems at Lithuania's Ignalina units 1 and 2 reactors to resolve significant safety deficiencies.

- Completed major safety upgrades at the Armenia Nuclear Power Plant, including nuclear service water spray pond cooling system, main steam isolation valves, and fire safety upgrades.

Nuclear Safety Infrastructure Support

- The Chornobyl heat plant is planned for completion by June 2001 to provide heat to facilities used for decommissioning the site.

- Established a Ukrainian Center for Nuclear Fuel and Reactor Core Design and collected information to design and test nuclear fuel. This is part of a project to enable alternate vendors (besides Russia) to supply Ukraine with nuclear fuel, which is strategically important since Ukraine produced 43 percent of it's electricity from nuclear power in 1999.

Funding Profile

(dollars in thousands)

	FY 2000 Comparable Appropriation	FY 2001 Original Appropriation	FY 2001[a] Adjustments	FY 2001 Current Appropriation	FY 2002 Request
International Nuclear Safety and Cooperation	54,772	20,000	-599	19,401	13,800
Less DOS/USAID Appropriation Transfers[b]	-40,500	0	0	0	0
Subtotal, International Nuclear Safety and Cooperation	14,272	20,000	-599	19,401	13,800
Use of Prior Year Balances	0	-15	0	-15	0
Total, International Nuclear Safety and Cooperation	14,272	19,985	-599	19,386	13,800

Public Law Authorization:
Public Law 106-398, National Defense Authorization Act for FY 2001

[a] Reflects a government-wide recission of .22% and safeguards and security transfer.

b DOS/USAID amounts for FY 2000 includes funding received for Ukraine, Armenia, and Kazakhstan ($40.5 million). In FY 2001, $7,500,000 has been received to date and an additional $39.0 million is planned. FY 2002 DOS/USAID funds of $35.0 million are tentatively planned.

Funding by Site

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Chicago Operations Office					
Argonne National Laboratory (Illinois/Idaho)	4,300	4,600	4,600	0	0.0%
Brookhaven National Laboratory (New York)	500	500	500	0	0.0%
Total, Chicago Operations Office	4,800	5,100	5,100	0	0.0%
Idaho Operations Office (Idaho)					
Idaho National Engineering and Environmental Laboratory	500	900	900	0	0.0%
Total, Idaho Operations Office	500	900	900	0	0.0%
Richland Operations Office (Washington State)					
Pacific Northwest National Laboratory	47,672	13,101	7,500	-5,601	-42.8%
Total, Richland Operations Office	47,672	13,101	7,500	-5,601	-42.8%
Washington Headquarters (Maryland and Washington DC)	800	300	300	0	0.0%
All Other Sites	1,000	0	0	0	N/A
Subtotal, International Nuclear Safety and Cooperation	54,772	19,401	13,800	-5,601	-28.9%
Less Use of AID Funding	-40,500	0	0	0	N/A
Use of Prior Year Balances		-15			
Total, International Nuclear Safety and Cooperation	14,272	19,386	13,800	-5,601	28.8%

Site Description

Argonne National Laboratory

Argonne National Laboratory (ANL) is one of DOE's multi-program national laboratories. ANL occupies one site in Illinois and one site in Idaho. ANL oversees U.S. support to Kazakhstan for shutdown of the BN-350 breeder reactor, safety analysis project activities and the International Nuclear Safety Center activities.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is one of DOE's multi- program national laboratories. BNL is located on Long Island, New York. BNL oversees simulator development and installation activities.

Idaho National Engineering and Environmental Laboratory

Idaho National Engineering and Environmental Laboratory (INEEL) is one of DOE's multi-program national laboratories. INEEL is located in Idaho. INEEL oversees reactor safety analysis activities.

Pacific Northwest National Laboratory

The Pacific Northwest National Laboratory (PNNL) is one of DOE's multi-program national laboratories. It serves as the lead laboratory for the Soviet-designed reactor safety activities. PNNL provides technical, contracting, and administrative support to the program in the areas of Soviet-designed reactor safety and international cooperation.

International Nuclear Safety and Cooperation

Mission Supporting Goals and Objectives

The International Nuclear Safety and Cooperation program helps host countries to improve the safety of their Soviet-designed nuclear power plants and encourages closure of the most hazardous of these facilities; and assists host countries to implement self-sustaining nuclear safety improvement programs capable of reaching internationally accepted safety practices. The table below lists the nine participating countries, the 24 plant sites, the number of currently operating reactors, 66, and the total reactors, 90.

Country	Plant Name (Number of Operating Reactors of Total Reactors)
Armenia	Armenia Nuclear Power Plant (1 of 2)
Bulgaria	Kozloduy (6 of 6)
Czech Republic	Dukovany (4 of 4), Temelin (2 under construction - not participating in program, except for information sharing.)
Hungary	Paks (4 of 4)
Kazakhstan	Aktau (0 of 1). Plant is shutdown and being decommissioned.
Lithuania	Ignalina (2 of 2)
Russia	Balakovo (4 of 6), Beloyarsk (1 of 4), Bilibino (4 of 4), Kalinin (2 of 4), Kola (4 of 5), Kursk (4 of 4), Leningrad (4 of 4), Novovoronezh (3 of 5), Rostov (1 of 2), Smolensk (3 of 3)
Slovakia	Bohunice (4 of 4), Mochovce (2 of 2)
Ukraine	Chornobyl (0 of 4), Khmelnytskyy (1 of 4), Rivne (3 of 4), South Ukraine (3 of 4), Zaporizhzhya (6 of 6)

DOE's nuclear assistance efforts are supplemented to support broader foreign policy objectives with country-specific funding from the Foreign Operations, Export Financing, and Related Programs Appropriations Act. These resources are coordinated through the Department of State's (DOS) New Independent States (NIS) assistance coordinator, and the Agency for International Development (AID) and are transferred to DOE after coordination with Congress through a formal letter of notification process.

Soviet-designed Reactor Safety

A series of joint U.S./host country projects improve nuclear power plant safety by transferring U.S. technology, equipment, methods and experience in the areas of training and simulators, operating and emergency procedures, safety maintenance, safety system upgrades, fire safety, reactor safety analysis,

physical security, and regulatory improvement. Operator error is a significant factor in nuclear accidents, and the capability of operators is strengthened by many of the projects, including symptom-based emergency operating instructions (EOI's), training, simulators, and safety parameter display systems (SPDS). Eighty-five projects have been completed at individual reactors, with support from U.S. national laboratories and 46 U.S. companies.

Nuclear training centers have been established at the Balakovo site in Russia and the Khmelnytskyy plant in Ukraine. U.S.-trained instructors are providing initial and refresher training to plant workers. Instructors developed and conducted job-specific maintenance and operations courses, along with courses in employee safety and supervisory skills. These instructors will continue to work with U.S. experts to transfer the training methodology and materials to other plants in Russia, Ukraine, and other countries with Soviet-designed reactors.

Full scope or analytical simulator projects have been completed for ten reactors in Russia, Ukraine, and Bulgaria. Projects are in progress at six additional sites. Related activities include: maintenance and support for initial simulator operations; modification of a simulator to include SPDS capability; and provision of simulator training materials.

Management and operational safety is improved by projects to implement modern safety procedures for quality assurance, configuration management, event analysis and reporting, emergency operating instructions, safety maintenance, nondestructive examination, and use of a reliability database to prioritize activities. As part of an operator exchange program, more than 200 staff members from 22 nuclear sites have worked with personnel at 12 U.S. nuclear power plants to study approaches to safety. U.S. specialists transferred skills for developing symptom-based Emergency Operating Instructions (EOIs) to pilot plants in the host countries. EOIs enable control room operators to stabilize a reactor during an abnormal event.

Fire safety and other hardware upgrades have been provided to plants in Armenia, Ukraine, Russia, Lithuania, Kazakhstan and Bulgaria. Russia's Kola and Kursk plants and Bulgaria's Kozloduy plant received backup power systems to supply electricity during emergency shutdowns. Russia's Kursk plant and Novovoronezh plant received mobile pumping units for emergency water supplies. The Kola plant substantially reduced leaks in the radiation confinement system. Major safety equipment upgrades have been completed at the Armenia Nuclear Power Plant including a nuclear service water spray pond cooling system and main steam isolation valves. Upgrades to the reactor control and protection system were completed at Lithuania's Ignalina nuclear plant.

Safety Parameter Display Systems (SPDS) enable control room operators to rapidly assess abnormal conditions and take corrective actions. SPDS projects have been completed at 14 reactors, and are in progress at an additional four reactors.

U.S. and host country experts have defined methodologies for conducting fire hazards analyses, and pilot analyses are under way at Russia's Smolensk plant and Ukraine's Zaporizhzhya plant. After U.S. training, companies in Ukraine and in Russia have manufactured and installed more than 800 fire doors that meet international standards. Fire safety upgrades are planned at additional plants.

Safety analysis activities and safety assessment infrastructure projects are being provided to pilot plants. In-depth safety assessments (ISA) are conducted to determine the most significant risks and set priorities for safety upgrades. ISA projects are in progress at seven plants. Computer analysis codes and methodologies are being developed and transferred to host-country experts to support safety analysis activities. Computers for conducting analyses were provided to plants in Bulgaria, Slovakia, Lithuania, Russia, and Ukraine.

Finally, mechanical and other maintenance and repair processes are addressed to the degree they impact safety. Examples include pipe lathe/weld preparation machines which were provided to the RBMK reactors. Previously, workers cut pipes by hand, increasing the risk of leaks that could lead to a loss-of-coolant accident. Valve-seat resurfacing equipment, vibration monitoring and shaft alignment systems and nondestructive examination equipment also were provided to minimize the chance of equipment failure. A project is in progress to address the important safety issue of intergranular stress corrosion cracking, which can lead to a serious accident.

Nuclear Safety Infrastructure Support

The program provides leadership in coordinating with the International Atomic Energy Agency (IAEA), the European Bank for Reconstruction and Development (EBRD), the Organization for Economic Cooperation and Development's Nuclear Energy Agency (NEA), and the G-7 Nuclear Safety Working Group to ensure that safety issues are identified and resolved using a coordinated approach among donor countries and organizations.

The program supports efforts in countries that are shutting down Soviet-designed reactors. Technical and financial support is being provided to Kazakhstan to irreversibly shut down the BN-350 breeder reactor at Aktau. This reactor poses a serious nonproliferation and environmental threat in a strategically important region. Support is being provided for shutdown planning, sodium coolant management, and decommissioning. This project is being coordinated with the IAEA, Japan, United Kingdom, and the European Union.

At the Chornobyl site, the last operating reactor was shut down in December 2000. A replacement heat plant will be completed by June 2001 to support long-term decommissioning of the Chornobyl reactors. A preliminary decommissioning plan for the Armenia nuclear plant is being prepared to facilitate closure of that plant as soon as practicable. Limited technical support on decommissioning planning is being provided to the Ignalina plant in Lithuania.

International Nuclear Safety Centers were established in the U.S., Russia, and Kazakhstan to sponsor projects to improve information sharing and safety improvements through prompt analysis of potential safety problems. The centers provide a repository of nuclear safety information and maintain a core knowledge base through shared information and leveraged funding through joint projects. Some of the joint projects provide support to the in-depth safety assessment activities discussed above. Nuclear Safety Centers in host countries are designed to be self-sustainable in the long-term, providing centers of excellence and leadership for permanent nuclear safety cultures.

The International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology was established in Slavutych to provide safety and other technical support to the Ukrainian nuclear power industry and international cooperative activities at the Chornobyl site. Joint projects in safety data analysis, spent fuel management, and decommissioning are in progress. The Center is rapidly establishing a reputation as the principal player in the emerging nuclear safety culture in Ukraine. The Center also assists workers at Chornobyl by fostering economic diversification through training and technology transfer, and mitigating the effects of the Chornobyl plant shutdown.

Other activities include coordination with other Federal agencies to address: decommissioning older plants, understanding the effects of the Chornobyl accident, and safety of nuclear power plants, nuclear research reactors, and other nuclear facilities, submarines, and fissile materials.

U.S. support is also fostering a Ukrainian nuclear fuel qualification program to develop the country's ability to qualify VVER-1000 reactor fuel from alternate vendors and which meet safe operating specifications. Projects to address physical security weaknesses have been identified and are being carried out in Ukraine and Armenia.

Longer-term efforts include nuclear safety regulatory and legislative support in order to develop a strong and independent regulatory infrastructure for nuclear facilities. Finally, workshops and student exchanges are supported to the extent they support a safety-based nuclear power culture.

Technical Support Activities

Technical support activities facilitate the organization, execution, and completion of the program's projects. These activities include general programmatic technical support, a logistics support office in Ukraine, quality assurance, contracts administration, general technical information development and communications products and services.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001[a]	FY 2002	$ Change	% Change
Soviet-designed Reactor Safety	30,772	13,301	9,100	-4,201	-31.6%
Nuclear Safety Infrastructure Support	22,000	3,100	2,700	-400	-12.9%
Technical Support Activities	2,000	3,000	2,000	-1,000	-33.3%
Subtotal, International Nuclear Safety and Cooperation	54,772	19,401	13,800	-5,601	-28.9%
Less Use of DOS/USAID Funding [b]	-40,500	0	0	0	0.0%
Use of Prior Year Funds	0	-15	0	15	-100.0%
Total, International Nuclear Safety and Cooperation	14,272	19,386	13,800	-5,571	-28.7%

[a] Reflects a government-wide recission of .22% and safeguards and security transfer.

b DOS/USAID amounts for FY 2000 includes funding received for Ukraine, Armenia, and Kazakhstan ($40.5 million). In FY 2001, $7,500,000 has been received to date and an additional $39.0 million is planned. FY 2002 DOS/USAID funds of $35.0 million are tentatively planned.

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Soviet-designed Reactor Safety	30,772	13,286	9,100
Less DOS/USAID funding	-20,000	0	0
Subtotal, Soviet-designed Reactor Safety	10,772	13,286	9,100
# Operational safety	2,972	3,600	2,800
Less DOS/USAID funding	0	0	0
Subtotal, operational safety	2,972	3,600	2,800

Conduct projects to improve quality assurance; configuration management; event analysis, reporting, and lessons learned; symptom-based emergency operating instructions; safety maintenance; nondestructive examination; and reliability database. Complete configuration management project at one pilot plant in Russia (Novovoronezh). This project coordinates plant drawings with operational procedures and safety analyses to eliminate safety problems related to less rigorous controls.

A Congressional earmark of $1 million FY 2001 funds is being used for initial steps of a cooperative effort between the U.S. and Russia (and endorsed by IAEA) to address intergranular stress corrosion cracking and restore the structural integrity of Russian nuclear plants until decommissioning. A similar amount is planned for FY 2002.

FY 2002 activities include: Ukraine (event analysis and reporting, quality assurance), and Russia (intergranular stress corrosion cracking, configuration management, reliability database). *The FY 2002 decrease of $800,000 reflects: Ukraine (completion of symptom-based emergency operating instructions projects); Russia (reduced funding for a component reliability database); Bulgaria (completion of symptom-based emergency operating instructions).*

# Training and simulators.	7,900	1,386	3,300
Less DOS/USAID funding	-7,400	0	0
Subtotal, training and simulators	500	1,386	3,300

(dollars in thousands)

		FY 2000	FY 2001	FY 2002
	Transfer training methodology and training courses from training centers to nuclear plants. Provide simulators and simulator support to selected plants, including simulator training, engineering support, and spare parts for Russia, Ukraine, Slovakia, and Bulgaria. Install full scope simulators at Rivne unit 2 and Zaporizhzhya unit 1. Complete full-scope simulators in Russia (Kalinin unit 2) and Ukraine (Zaporizhzhya unit 1), and upgrade full-scope simulator in Slovakia (for Bohunice units 3 and 4). FY 2002 activities include: Russia (Rostov full-scope simulator and simulator training and engineering support), Lithuania (Ignalina training system support), Bulgaria (Kozloduy training system support). *The FY 2002 increase of $1,914,000 provides for the Rostov full-scope simulator.*			
#	Engineering and technology	13,600	4,900	1,000
	Less DOS/USAID funding	-9,800	0	0
	Subtotal, engineering and technology	3,800	4,900	1,000
	Implement safety parameter display system at Armenia unit 2. Complete two safety parameter display systems in Ukraine (Zaporizhzhya units 1 and 6), one in Russia (Novovoronezh unit 5), and one in Lithuania (Ignalina unit 2). Implement fire safety upgrades at Smolensk, South Ukraine units 1-3, Khmelnytskyy unit 1, Zaporizhzhya, Kazakhstan, and Armenia unit 2. Implement control and protection system upgrade at Ignalina units 1 and 2. Manufacture and install electronic modules for the control and protection system of Ignalina unit 2. Complete nuclear service water spray pond cooling system at Armenia unit 2. Upgrade safety maintenance, emergency condensors, and power supply system at Armenia unit 2. Install steam isolation valves at Novovoronezh unit 3 and Armenia unit 2. Transfer technology on valve manufacturing and safer circuit breakers. Initial studies and minimal upgrades to Russia's plutonium production reactors at Seversk and Zhelezhnogorsk, given the recent decision to continue to operate them until replaced with fossil fueled plants in about 2006. FY 2002 activities include: Russia (control system testing technology transfer, circuit breaker technology transfer and demonstration, and valve manufacturing technology transfer). *The decrease of $3,900,000 reflects: Russia (completion of RBMK and for Novovoronezh unit 5 safety parameter display systems); Lithuania (completion of the Ignalina unit 2 safety parameter display system).*			
#	Safety assessment infrastructure.	6,300	3,400	2,000
	Less DOS/USAID funding	-2,800	0	0
	Subtotal, engineering and technology	3,500	3,400	2,000

(dollars in thousands)

FY 2000	FY 2001	FY 2002

Provide U.S. safety codes and training to evaluate safety issues. Assess and adapt U.S. safety codes to Soviet-designed reactors. Validate the use of U.S. codes on Russian reactor test facilities in Electrogorsk. Provide technical support for Ignalina unit 2 safety analysis report. Apply in-depth safety assessment results from lead plants to remaining units of similar type. Complete in-depth safety assessment at Russia's Leningrad unit 2. Conduct in-depth safety assessments at three plants in Ukraine (South Ukraine, Rivne, and Zaporizhzhya) and at one plant in Russia (Leningrad unit 1). FY 2002 activities include: Russia (Kola safety assessment, Leningrad safety assessment, Novovoronezh safety assessment, RBMK and VVER code validation), Lithuania (Ignalina safety assessment), Bulgaria (Kozloduy safety assessment). *The FY 2002 decrease of $1,400,000 reflects activities in Russia as the levels of effort are curtailed on the Leningrad unit 1 in-depth safety assessment and on projects in the area of RBMK and VVER safety analysis code validation, and completion of the Novovoronezh unit 3 in-depth safety assessment and its confinement analysis.*

Nuclear Safety Infrastructure Support		22,000	3,100	2,700
Less DOS/USAID funding		-20,500	0	0
Total, Nuclear Safety Infrastructure Support		1,500	3,100	2,700
#	International Coordination	200	200	200

Participation and coordination with IAEA, EBRD, NEA, and coordinating committees (European Commission, Russia, Ukraine, Japan, Korea, China) to ensure that safety issues are identified and resolved using a team approach.

#	Shutdown and decommissioning support	1,100	1,100	1,100
	Less DOS/USAID funding	-1,100	0	0
	Subtotal, shutdown and decommissioning support	0	1,100	1,100

Complete design of sodium draining equipment and procedures for Kazakhstan's BN-350 reactor, and complete design of residual sodium processing equipment in preparation for decommissioning. Preliminary decommissioning plan for Armenia nuclear power plant. Information exchange on decommissioning with Lithuania's Ignalina nuclear power plant. Support closure and decommissioning of the plants in Armenia and Lithuania.

#	International Nuclear Safety Centers	600	1,000	700

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Support centers in U.S., Russia, and Kazakhstan. In the U.S. and Russia, complete initial analytical projects and maintain a safety database. Develop coupled thermal-hydraulic and neutronic computer codes for reactor safety analyses. Complete three joint projects between the U.S. and Russia International Nuclear Safety Centers related to: (1) the application of the RELAP 5 safety analysis computer code to Soviet-designed reactors; (2) the use of severe accident management guidelines; and (3) the sharing of Soviet-designed reactor safety analysis results with safety centers in Russia, Ukraine, Lithuania, and Armenia. In Kazakhstan, assemble, analyze, and share nuclear safety information related to reactors in central Asia and associated nuclear facilities, including projects with the Kazakhstan Atomic Energy Committee on safety analysis for spent fuel removal, transfer, and storage. *The FY 2002 decrease of $300,000 reflects reduced level of support for joint projects.*			
# International Chornobyl Center for Nuclear Safety, Radioactive Waste and Radioecology	700	800	600
Characterize condition of spent fuel at Ukrainian power plants and evaluate safe options for spent fuel management. Complete planning and safety analyses for the shutdown and deactivation of Chornobyl units 1, 2, and 3. Develop a comprehensive database on radioactive contamination inside the Chornobyl shelter and in the 30-kilometer Exclusion Zone around the plant. Establish basic capabilities for communications, information sharing and cooperative activities with other International Nuclear Safety Centers. Transfer technology on conducting safety analyses, and monitor the Chornobyl shelter implementation plan; and analyze impacts from consequences of Chornobyl accident. *The FY 2002 decrease of 200,000 reflects reduced level of support for joint projects.*			
# Chornobyl heat plant.	11,400	0	0
Less DOS/USAID funding	-11,400	0	0
Subtotal, Chornobyl heat plant	0	0	0
Build heat plant to provide heat and electricity to allow decommissioning activities to proceed. Plant is scheduled for completion in June, 2001 using FY 2000 appropriated funding.			
# Infrastructure support.	100	0	100
Less DOS/USAID funding	-100	0	0
Subtotal, infrastructure support	0	0	100
Conduct trade conference. *Increase of $100,000 provides for topical workshops and develop technical standards to strengthen the independent regulatory infrastructure for nuclear facilities.*			

		(dollars in thousands)		
		FY 2000	FY 2001	FY 2002
#	Nuclear Fuels Qualification	7,900	0	0
	Less DOS/USAID funding	-7,900	0	0
	Subtotal, nuclear fuels qualification	0	0	0
	Provide technology transfer to Ukraine to establish the capability to obtain fuel from a vendor other than only Russia.			
#	Nuclear reactor physical security	0	0	0
	Implement upgrades identified in 1999 assessment. (DOS/USAID funding anticipated in FY01)			
	Technical Support Activities.	2,000	3,000	2,000
#	Provide resources for general programmatic technical support, quality assurance, contracts administration, information and communications products and services. Close-out of completed projects, streamlined contractual management, and supporting strategic planning requirements.			
	Subtotal, International Nuclear Safety and Cooperation	54,772	19,386	13,800
	Less DOS/USAID funding	-40,500	0	0
	Total, International Nuclear Safety and Cooperation [a]	14,272	19,386	13,800

[a] FY 2000 total includes funding that the program received from DOS/USAID for the nuclear safety and cooperation activities for Ukraine, Armenia, and Kazakhstan ($40.5 million). In FY 2001, $7,500,000 has been received to date and an additional $39.0 million is planned. The program is tentatively planning FY 2002 DOS/USAID funding of $35 million.

Funding Crosscut by Country

(dollars in thousands)

Country	FY 2000	FY 2001	FY 2002
Armenia	4,500	0	0
Bulgaria	800	800	300
Czech Republic	100	100	100
Hungary	100	100	100
Kazakhstan	1,200	1,200	1,100
Lithuania	450	1,400	600
Russia	10,122	13,186	9,500
Slovakia	500	100	100
Ukraine	37,000	2,500	2,000
Subtotal:	**54,772**	**19,386**	**13,800**
Less DOS/USAID funds [a]	-40,500	0	0
Total	**14,272**	**19,386**	**13,800**

[a] FY 2000 total includes funding that the program received from DOS/USAID for the nuclear safety and cooperation activities for Ukraine, Armenia, and Kazakhstan ($40.5 million). In FY 2001, $7,500,000 has been received to date and an additional $39.0 million is planned. FY 2002 DOS/USAID funds of $35.0 million are tentatively planned.

Explanation of Funding Changes from FY 2001 to FY 2002

	FY 2002 vs. FY 2001 ($000)
Soviet-designed Reactor Safety	
# The reduced level allows the highest priority and multi-year activities to progress and to be completed. Reductions reflect that projects at some reactors have been completed in the areas of: operational safety (-$800,000) such as symptom-based emergency operating instructions; engineering and technology (-$3,900,000) such as Safety Parameter Display Systems; and safety assessment infrastructure (-$1,400,000) such as reactor safety assessments. A net increase of +$1,914,000 is provided in the area of training and simulators for a full-scope simulator in Russia at the Rostov nuclear power plant, under a cooperative effort with international partners. Safety upgrades will be initiated at Russia's three plutonium production reactors to help them to operate safely until about 2006 when fossil-fueled replacement plants are planned to become operational. These reactors have not received safety upgrades and are high risk.	-4,186
Nuclear Safety Infrastructure Support	
# The FY 2002 decrease reflects a reduced level of support for joint projects through the U.S. International Nuclear Safety Center (-$300,000), and the International Chornobyl Center (-$200,000), while providing an increase of $100,000 for infrastructure support activities providing technical standards in support of nuclear regulations.	-400
Technical Support Activities	
# The reduced project activity requires less contract administration, general programmatic technical support, and less information and communication products and services.	-1,000
Total Funding Changes, International Nuclear Safety and Cooperation	-5,586

HEU Transparency Implementation

Program Mission

The Highly Enriched Uranium (HEU) Transparency Implementation Program (HEU-TIP) is responsible for monitoring the nonproliferation aspects of the February 1993 HEU Purchase Agreement between the United States and the Russian Federation and for helping provide overall confidence that the nuclear nonproliferation objectives are being met. The Purchase Agreement, which has an estimated value of $12 billion, covers the purchase over 20 years of low enriched uranium (LEU) derived from at least 500 metric tons of HEU removed from dismantled Russian nuclear weapons - enough HEU to make approximately 20,000 nuclear devices using the International Atomic Energy Agency's (IAEA) definition of a significant quantity. Under the Agreement, conversion of the HEU components into LEU is performed in Russian facilities. The purpose of the program is to put into place and implement those measures agreed to by both sides that permit the United States to have confidence that the four nuclear non-proliferation goals of the Agreement are achieved. The goals of the program are to have confidence that HEU is in fact: (1) extracted from dismantled nuclear weapons; (2) the same HEU is oxidized; (3) downblended to LEU; and (4) the LEU delivered to the United States is fabricated into fuel for commercial nuclear power reactors. The program also requires the United States to support comparable monitoring activities by the Russian Federation representatives at certain U.S. facilities. Continuation of this program helps to provide confidence that this weapons-grade material is being permanently processed into non-weapons material, which is of paramount importance to U.S. national security goals and strategic nuclear non-proliferation objectives.

The HEU processing in Russia currently includes the following four Russian Federation Ministry of Atomic Energy (Minatom) facilities. The Mayak Production Association (MPA) in Ozersk and the Siberian Chemical Enterprise (SChE) in Seversk who both receive weapon components and process the HEU metal into purified HEU oxide for use in other facilities. SChE and the Electro Chemical Plant (ECP) in Zelenogorsk, then process the HEU oxide into uranium hexafluoride. These two plants, plus the Ural Electrochemical Integrated Plant (UEIP) in Novouralsk, dilute or down blend the HEU hexafluoride into LEU, in the assay specified by U.S. Enrichment Corp. (USEC). The LEU product is shipped to the USEC Portsmouth Gaseous Diffusion Plant in Piketon, OH for subsequent sale and shipment to U.S. commercial reactor fuel fabrication facilities. All of these facilities are involved in transparency operations under the HEU Purchase Agreement.

In addition, starting in FY2001, HEU-TIP will be required to confirm that the natural uranium feed material returned to Russia is stored and used in accordance with the March 1999 Feed Agreement. This natural uranium material is the equivalent quantity of material associated with the HEU to LEU converted and delivered to USEC. Implementation of this new requirement entails (1) developing and reaching agreement on a new Annex that specifies monitoring rights associated with the feed material, and (2) conducting an annual inventory verification visit to the Russian facility/facilities where this material is stored.

From initial delivery in 1995 through December 2000, a total of 111.3 metric tons of HEU has been converted to LEU and delivered to USEC. This quantity of HEU represents enough material for 4,450 nuclear devices under the IAEA definitions. A total of $2.025 billion has been provided to Minatom

through 2000 for this material. Transparency monitoring procedures and operations have been implemented and measuring equipment installed in Russia to assure that stated non-proliferation objectives associated with this material are being achieved. For calendar year 2001, HEU TIP will monitor the conversion and processing of at least 30 metric tons of HEU per contract agreement. A new delivery contract will be negotiated between USEC and Minatom in 2001 for LEU deliveries for the five calendars year beginning 2002, which is expected to be at a rate of at least 30 metric tons HEU per year.

Program Goal

The goal of the HEU Transparency Implementation Program is to provide confidence that Russian LEU sold to the United States Enrichment Corporation (USEC) is derived from HEU removed from dismantled Russian nuclear weapons. It also requires an annual inventory verification of natural uranium feed material returned to Russia in compliance with the March 1999 Intergovernmental Feed Agreement provisions.

Program Objectives

Monitor the conversion of 30 metric tons per year of HEU to LEU from dismantled Russian nuclear weapons for purchase by the USEC. The conversion quantities for the next 5-years, beginning in CY 2002, should be negotiated between USEC and Minatom and signed in 2001.

Implement and enhance transparency monitoring activities at Russian and U.S. uranium processing facilities, subject to the HEU Purchase Agreement, to provide assurance that the nuclear non-proliferation objectives of the Agreement are being met.

Collect and analyze monitoring data and other information to help provide overall confidence that the Russians are converting HEU from dismantled nuclear weapons into LEU delivered to USEC.

Lead the interagency effort to compile and analyze all transparency monitoring data and information to develop an assessment of confidence of compliance with the non-proliferation objectives enumerated in the HEU Purchase Agreement.

Provide assistance in the development and negotiating of new transparency measures to enhance transparency operations and provide enhanced inputs to confidence assessments for intergovernmental deliberations and decisions.

Performance Measures

Monitor the conversion of 30 metric tons of HEU from dismantled Russian nuclear weapons into LEU for purchase by USEC.

Conduct up to 18 of 24 allowed Special Monitoring Visits (SMVs) to the four Russian uranium

processing facilities.

Complete negotiations to open a Permanent Presence Office at Seversk processing facility.

Initiate technical discussions with Seversk on Blend Down Monitoring System (BDMS) allowing equipment installation in FY 2003.

Conduct annual inventory of natural uranium feed returned to Russia.

Significant Accomplishments and Program Shifts

Monitored the conversion of 30 metric tons of weapons grade HEU into LEU that was delivered to the USEC in CY 2001. This brought the total for HEU conversion to 111.3 metric tons of material since the first product delivery in 1995**.** At this time, there are discussions between USEC and the marketing arm of Minatom- Techsnabexport (TENEX) to accelerate this conversion rate in CY2002 by about 3.0 metric tons to replenish a portion of the material that was not processed in CY 1999.

Completed 22 of 24 planned monitoring trips to the four Russian processing facilities to observe processing operations and to gather specified and pertinent transparency data for detailed analysis and assessment of compliance with established objectives. In FY 2002, we expect to complete 18 of the 24 allowed monitoring trips due to higher priority activities. This is our primary means of gathering required transparency data.

Maintained and staffed the Permanent Presence Office (PPO) at the Ural Electrochemical Integrated Plant (UEIP) facility in Novouralsk where we have daily access to the processing and blending facilities. Monitors are also able to access the data generated by the U.S. supplied Blend Down Monitoring System (BDMS) equipment, separately from Special Monitoring team visits, to maintain and diagnose equipment operations**.** In August 2001, we will celebrate the fifth consecutive year of PPO operations at UEIP.

Completed negotiations with Minatom to complete the final technical adjustments to the BDMS equipment installed at UEIP in January 1999. The BDMS is now in continuous transparency operations after all Cf-252 and Co-57 radioactive sources were replaced in December 2000 and final adjustments made to the instruments. The first Joint Data Analysis review was completed at UEIP in January 2001 and the report formed the basis for declaring the BDMS fully operational.

Reached agreement and signed a protocol in January 2001 between DOE and Minatom, at Ministerial level, to proceed on a designated path forward to retrieve and remove BDMS data reports to the US and to agree on a schedule to install BDMS equipment at the remaining two Russian blending facilities. Installation of BDMS equipment at the second dilution facility - the Electro Chemical plant (ECP) in Zelenogorsk, should be completed in 2001or early 2002. Facility modifications are required and this will be included in the detailed planning process.

Collected, analyzed, and evaluated all monitoring data and information and prepared reports to

support a confidence assessment of Russian compliance with the non-proliferation objectives.

- Conducted three executive negotiating sessions of the Transparency Review Committee with Minatom as an integral element of the program operations to enhance transparency operations. The three major topical areas were: (1) BDMS equipment operations and data reports, (2) new monitoring responsibilities associated with the natural uranium feed component, and (3) initial discussions related to the opening of a PPO at Siberian Chemical Enterprise (SChE) where 2/3 of the HEU is now processed.

- Initiated the first annual inventory verification visit to the Russian facility where returned natural uranium feed material is stored. This is an element of the bilateral U.S. and Russian Feed Agreement signed in March 1999. The first feed material was returned to Russia in July 2000. Per the Agreement, Minatom needs to provide a written inventory of feed cylinders to the U.S. by May 1st of each year. This inventory report then becomes the basis for an on-site inventory verification.

Funding Profile

(dollars in thousands)

	FY 2000 Comparable Appropriation	FY 2001 Original Appropriation	FY 2001[a] Adjustments	FY 2001 Current Appropriation	FY 2002 Request
HEU Transparency Implementation	14,813	15,190	-598	14,592	13,950
Total, HEU Transparency Implementation	14,813	15,190	-598	14,592	13,950

Public Law Authorizations:
Public Law 106-398, “National Defense Authorization Act for FY2001"

a Reflects adjustment for government-wide recission of .22% and safeguards and security transfers.

Funding by Site

(dollars in thousands)

	FY 2000[a]	FY 2001[c]	FY 2002	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	1,400	1,200	1,400	200	16.7%
Sandia National Laboratories	1,910	2,000	1,665	-335	-16.8%
Total, Albuquerque Operations Office	3,310	3,200	3,065	-135	-4.2%
Chicago Operations Office					
Argonne National Lab	755	700	800	100	14.3%
Brookhaven National Laboratory	40	27	25	-2	-7.4%
New Brunswick Laboratory	450	450	450	0	0.0%
Total, Chicago Operations Office	1,245	1,177	1,275	98	8.3%
Nevada Operations Office					
Remote Sensing Laboratory	438	375	375	0	0.0%
Oakland Operations Office					
Lawrence Livermore National Laboratory	5,800	6,000	5,800	-200	-3.3%
Oakland Operations Office	800	750	600	-150	-20.0%
Total, Oakland Operations	6,600	6,750	6,400	-350	-5.2%
Oak Ridge Operations Office					
Oak Ridge- (ORNL / Y-12 / K-25)	3,030	3,000	2,770	-230	-7.7%
Portsmouth	160	60	35	-25	-41.7%
Total, Oak Ridge Operations Office	3,190	3,060	2,805	-255	-8.3%
Richland Operations Office					
Pacific Northwest National Laboratory	30	30	30	0	0.0%
Total, HEU Transparency Implementation	14,813	14,592	13,950	-642	-4.4%

Site Description

Argonne National Laboratory

Argonne National Laboratory (ANL) is a DOE National Laboratory which occupies two sites. The Illinois site is about 25 miles southwest of Chicago's Loop, while the Argonne West site is about 50 miles west of Idaho Falls, ID. Argonne also maintains a small staff in the Washington, D.C. metropolitan area. ANL provides the HEU Transparency Implementation Program with technical experts to serve as permanent and special monitors at the Russian facilities involved in the conversion of HEU into LEU; technical assistance in the coordination and maintenance of Permanent Presence Office (PPO) monitors and monitoring activities in Russia; technical and logistical support and expertise in the planned opening of a PPO in Seversk, Russia; and technical support in data analysis of information.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) is a DOE scientific research laboratory located on Long Island, NY. BNL provides the HEU Transparency Implementation Program with personnel to serve as technical experts to serve as permanent and special monitors at the Russian facilities involved in the conversion of HEU into LEU and analysis of information gathered.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a DOE weapons laboratory located in Los Alamos, NM. LANL provides the HEU Transparency Implementation Program with one segment of non-intrusive nondestructive assay equipment - the Blend Down Monitoring System (BDMS) - for measuring the enrichment of uranium hexaflouride gas in the blending pipes and technical experts to maintain and support this equipment. LANL will support engineering efforts to modify current BDMS designs, as well as Russian plant modifications, to support future equipment fabrication and installation. The equipment will provide continuous monitoring of the enrichment level of uranium flowing through the blending pipes. LANL personnel also prepare technical manuals related to the assembly, operation, and maintenance of the enrichment measurement equipment; training of both Russian and U.S. personnel on the installation, operation, and maintenance of the equipment; and, assistance in installing the equipment on the pipes in the Russian facilities. LANL equipment experts are also used as monitors on trips to Russia to ensure that the monitoring equipment is operating properly and to perform maintenance activities as necessary. LANL personnel also provide technical expertise to interpret resultant BDMS data during Joint Data Analyses reviews and to trouble shoot the installed equipment.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is a DOE weapons laboratory located in Livermore, CA and maintains a small technical support staff in the Washington, D.C. metropolitan area. LLNL

provides the HEU Transparency Implementation Program with technical experts to serve as U.S. permanent presence and special monitors at the Russian facilities where HEU is converted into LEU; Russian language interpreters to serve with each special monitoring team and negotiating team; overall coordination for all U.S. special monitoring trips; coordination of training courses for personnel to serve as monitors; operation and implementation of the health and safety monitoring program for all U.S. HEU Transparency personnel serving on trips to Russia; procurement and technical troubleshooting for the portable nondestructive analysis equipment used for measuring the enrichment of uranium in closed Russian material containers; exchange of information with the Russians on the use of LEU delivered to the U.S.; leadership in the collection and analysis of information obtained from monitoring activities; provides expert technical and logistical support to conduct inventories of natural uranium cylinders stored at Russian plants; provides logistical and technical support for the bilateral Transparency Review Committee meetings, and provides technical support at meetings dealing with transparency issues. LLNL has developed and will maintain the automated Data Archive, Retrieval, and Transfer system, to effectively manage all accumulated monitoring data.

Oak Ridge - Oak Ridge National Laboratory, Y-12 Plant, and K-25 Plant

Oak Ridge is a DOE weapons and R&D site located in Oak Ridge, TN. We use technical expert personnel from each of these organizations to participate in the Program to serve as U.S. permanent and special monitors at the Russian facilities where HEU is converted into LEU; they participate in and conduct the training at the Y-12 plant of personnel to serve as transparency monitors; ORNL experts developed a segment of the non-intrusive nondestructive assay equipment - the Blend Down Monitoring System (BDMS) - for measuring the flow of uranium hexafluoride gas in the blending pipes; they will support engineering efforts to modify current BDMS designs, as well as Russian plant modifications to support future equipment fabrication and installation at the ECP blending facility; and K-25 staff will manage the integration of ORNL and LANL efforts on BDMS equipment for its installation and maintenance in Russian plants. This includes the development, procurement, preparation of technical manuals, training of Russian and U.S. personnel, shipment of equipment, licensing of BDMS equipment in Russia, and installation of the BDMS equipment on the blending pipes in the Russian HEU dilution facilities. Oak Ridge personnel assist in the analysis of information obtained from monitoring activities in Russia and provide assistance in hosting Russian monitoring visits to the Portsmouth Gaseous Diffusion Plant. Oak Ridge personnel also provide technical experts to conduct the inventory of natural uranium cylinders stored at Russian facilities, and technical expertise to interpret resultant BDMS data and trouble shoot equipment operations and maintain BDMS equipment.

New Brunswick Laboratory

New Brunswick Laboratory (NBL) is a DOE nuclear material standards laboratory located at Argonne, IL. NBL provides technical experts to serve as permanent presence and special monitors at the Russian facilities involved in the conversion of HEU into LEU. NBL provides technical experts to conduct inventories of natural uranium cylinders stored at Russian facilities.

Oakland Operations Office

DOE's Oakland Operations Office (OAK) provides contract procurement and administrative oversight of LLNL activities. OAK also manages a contract with the Pragma Corporation of McLean, VA that has an office in Yekaterinburg, Russia, to support U.S. personnel assigned to the Permanent Presence Office in Novouralsk, any future PPO e.g. Seversk, Russia, and assistance to U.S. personnel serving on special monitoring visits to Russian processing facilities. OAK also transfers funds to Russian facilities for reimbursable expenses associated with monitoring activities, including the installation of Blend Down Monitoring System (BDMS) flow and enrichment equipment on the pipes in the three Russian dilution facilities.

Pacific Northwest National Laboratory

The Pacific Northwest National Laboratory (PNNL) is a DOE research laboratory located in Richland, WA. A PNNL employee, based in Oak Ridge, TN, serves as a key technical expert on monitoring trips at the Russian facilities involved in HEU to LEU conversion. The PNNL expert also participates in the technical analysis of information obtained from monitoring activities.

Remote Sensing Laboratory

The Remote Sensing Laboratory (RSL) is a DOE laboratory located in Las Vegas, NV, and operates the Washington Aerial Measurement Office at Andrews AFB in Landover, MD. RSL provides technical experts to serve as monitors at the Russian facilities involved in the conversion of HEU into LEU.

Sandia National Laboratory New Mexico

Sandia National Laboratory (SNL) is a DOE weapons research laboratory with facilities in Livermore, CA and Albuquerque, NM. SNL provides technical experts to serve as permanent presence and special monitors at the Russian facilities involved in the conversion of HEU into LEU; provides for the procurement, installation, replacement, and disposal of radioactive sources required for operating the BDMS equipment installed in the Russian HEU dilution facilities. This is achieved through a contract with the “All Russian Technical Institute for Physics” in Schnezinsk, Russia. SNL also constructs secure housings for the enrichment monitoring equipment developed by LANL; participates in technology development activities to enhance current and future transparency equipment and procedures; and acts as an adviser on tamper indicating devices to ensure U.S. equipment, in Russian facilities, is not unknowingly compromised; and, coordinates Russian visits to the United States for discussions related to use of U.S. monitoring equipment in Russian facilities and Russian visits to U.S. facilities subject to Russian monitoring activities.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Permanent Monitoring in Russia	3,723	2,582	2,050	-532	-20.6%
Special Monitoring Visits to Russia	4,160	4,075	4,750	675	16.6%
Russian Monitoring in the U.S. & Negotiations	925	1,225	1,100	-125	-10.2%
Monitoring Equipment	1,940	3,395	3,350	-45	-1.3%
Technical Support Activities	4,065	3,315	2,700	-615	-18.6%
Total, HEU Transparency Implementation	14,813	14,592	13,950	-642	-4.4%

HEU Transparency Implementation

Mission Supporting Goals and Objectives

Permanent Monitoring in Russia

In August 1996, opened the U.S. permanent presence monitoring office (PPO) in Novouralsk, Russia staffed with up to four U.S. technical experts which have routine access to the Ural Electrochemical Integrated Plant (UEIP). In FY 1999, implemented efforts to include PPO staff as members of special monitoring visit (SMV) teams to other Russian uranium processing facilities to enhance the quality of monitoring operations. This practice continues today.

In FY 2002, plan to conduct detailed negotiations with the Ministry of the Russian Federation for Atomic Energy (Minatom) to establish a PPO at the Siberian Chemical Enterprise (SChE), Seversk, Russia. As the SChE facility performs all major HEU to LEU processing steps from weapon component receipt through HEU to LEU blending, a permanent presence monitoring office at this site would offer expanded access to the full complement of activities where 2/3 of the total HEU is processed. Daily access to all processing areas would greatly enhance the level of transparency operations. Full implementation of this PPO would take place in future years.

Special Monitoring Visits (SMV) to Russia

SMVs' are the primary means to acquire direct, expert monitoring information, access to the actual uranium process operating areas, and acquire nuclear material accountability forms and data for return to the U.S. for archival and detailed analysis. Through December 2000, we spent a total of 1000 monitor-weeks at the four Russian uranium processing facilities. In FY 2002, we plan to continue with these critical monitoring visits, but only 18 of the permitted 24 special monitoring trips to the four Russian uranium processing sites would be completed. This will reduce the quantity and quality of transparency data and information available to the Program.

Starting in FY 2001, a new monitoring activity was initiated under the Transparency Program to conduct an annual inventory of natural uranium feedstock provided to Russia. Under the Agreement, natural uranium in quantities equivalent to that associated with the HEU converted to LEU and delivered to the U.S., is returned to Russia for storage and authorized use. In order to provide confidence that the terms of the Assurances Agreement are being implemented, the U.S. is permitted to conduct annual inventories of the uranium in storage in Russia. Specific monitoring measures for this activity will be developed and implemented in FY 2001. The first shipment of natural uranium was initiated in July 2000 and is continuing on a regular basis.

Russian Monitoring in U.S. and Negotiation Support

This program maintains an office facility for Russian monitors at the U.S. Portsmouth Gaseous Diffusion Plant and coordinates transparency actions with the Nuclear Regulatory Commission and U.S. fuel fabricators for Russian monitoring visits to these facilities. Minatom conducted a monitoring trip to the U.S. in October 2000, which the program supported by briefing facilities on current transparency operations, Russian monitoring activities, and logistical support to the Russian monitoring team.

The program provides technical, logistical, and document preparation support for various bilateral negotiation meetings that produced the bilateral Memorandum of Understanding (MOU) on Transparency (1993), a Protocol on HEU Transparency Arrangements in Furtherance of the MOU (1994), and 16 Annexes to the Protocol (1994-1999). Critical to program operations is the use of bilateral Transparency Review Committee (TRC) meetings to negotiate transparency rights and responsibilities for current and future activities. To date, eight such meetings were conducted and we expect to support at least one major TRC meeting per year. We also supported and participated in three Executive sessions of TRC's in 2000 to complete technical negotiations involving the BDMS equipment installed at UEIP. Additional meetings are planned to fully implement and complete the "path forward" agreed to by DOE and Minatom in January 2001 to fully implement the BDMS installations and operations at all three blending facilities.

Provide Minatom with prescribed nuclear material accountability documentation for the LEU product received by USEC, transferred to the five U.S. reactor fuel fabrication facilities, and delivered to power reactors. This will consist of over 3,000 total pages of information per year provided on a quarterly basis.

Monitoring Equipment

In FY 1996, developed and fabricated portable, non-destructive assay system to interrogate closed material containers to assure the presence or absence of weapons grade uranium (nominally 90% U-235 assay material). By 1998, ten sets of instruments had been sent to the four Russian plants for use by U.S. monitoring teams. These units provide direct and independent measurement data for HEU material processing through the various plant operations. Enhanced and more reliable instruments are being developed and should be fielded to replace the initial instruments beginning in FY 2002. These are more reliable and rugged instruments that provide the required transparency information.

The Blend Down Monitoring System (BDMS) equipment provides continuous, independent transparency monitoring data for blend point operations. A key data element is the measurement of HEU material passing through the blending point and into the LEU product stream of material, which we term traceability. This provides significant assurance that HEU is being down blended into LEU product. This data complements Russian plant data.

In FY 1998, we installed and demonstrated the BDMS equipment at the U.S. Paducah Gaseous Diffusion Plant. A Russian delegation witnessed this BDMS demonstration which served to facilitate their approval and licensing this equipment in December 1998 for installation at the Ural Electrochemical Integrated Plant (UEIP). In January 1999, we installed BDMS equipment on each of the two blending systems at the

UEIP. This was a major and unique milestone to have U.S. measurement equipment installed in a Russian nuclear processing facility. Efforts and discussions continued with Minatom to complete the full calibration and adaptation of this equipment to actual plant operating conditions at UEIP, with successful implementation in December 2000. Complete data retrieval and analysis is planned to begin in April 2001 after a joint protocol is signed authorizing the release of these reports to U.S. monitors.

In 2002, we expect to install the BDMS equipment on the blending system pipes at the second of three Russian enrichment facilities - the Electro Chemical Plant (ECP) in Zelenogorsk. The precise schedule for this installation is dependent upon Russian authorities approving the installation activity. We expect this approval by June 1, 2001. A possible schedule would have the BDMS equipment installed and operating at ECP in early 2002. This is a high priority action for the program.

At the Siberian Chemical Enterprise (SChE) site in FY 2001, the program plans to engage Minatom and the SChE technical staff in detailed engineering discussions on developing or adapting BDMS type equipment for installation at this blending facility. Actual equipment designs and fabrication are dependent upon funding availability and cooperation with Minatom and SChE technical staff. With the installation of BDMS equipment at SChE, all three blending facilities would have continuous BDMS monitoring, as recommended in the 2000 GAO report on HEU Transparency Program activities. This would substantially enhance the level of HEU-to-LEU transparency confidence.

Technical Support Activities

Efforts include detailed logistical support system to manage and facilitate all of the technical monitoring team visits to Russian facilities. Provide personnel health and safety coverage for all monitors inside Russian uranium processing facilities plus technical support during travel inside Russia. A personnel dosimetry and bio-assay program was established and continues to provide individual and group radiation exposure data for all monitors for all trips. An associated Health and Safety plan exists and is updated as necessary to document the Russian facility operations and operating conditions that U.S. monitors are expected to encounter.

In FY 1998, a centralized automated Data Archive, Retrieval, and Transfer (DART) system database was developed to handle all transparency information gathered by monitors. Two assessment teams were formed to focus upon the analysis of information on 1) conversion, and 2) blending of HEU into LEU in Russian plants. Over 58,000 nuclear material accountability and material transfer files from the Russian facilities are managed and made available to analytical experts for technical assessments and generation of necessary technical reports. In FY 2002, system enhancements continue as the volume and complexity of data and information increases.

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Permanent Monitoring in Russia	3,723	2,582	2,050
# U.S. Monitors staffing of PPO	1,568	1,282	850

Provide U.S. monitors to staff the Permanent Presence Office (PPO) in Novouralsk, Russia with daily access to the Ural Electrochemical Integrated Plant (UEIP) down blending operations. This includes travel, salary, and per diem for a staff of three performing bi-monthly assignments, and other expenses such as trip report preparation and technical de-briefings. *FY 2002 decrease will result in the closing of the PPO for 3 months of the year to permit higher priority program activities (-$432,000).*

# Non-staffing Support	1,605	900	850

Provide planning, logistical support, and coordination with Minatom for monitoring activities. Provide training, instructions, and information for monitors and PPO operations. A reallocation of costs to the Technical Support category accounts for the shift in funding level from FY 00. *FY 2002 decrease of $50,000 is consistent with staffing at PPO.*

# Reimburse Russian facilities	550	400	350

Reimburse Russian facilities for costs of good and services provided by the Russian Federation for U.S. monitoring operations. Includes transportation, escorts, interpreters, office supplies, office rent, and other costs necessary to complete transparency tasks. *FY 2002 decrease of $50,000 is consistent with staffing at PPO.*

Special Monitoring Visits to Russia	4,160	4,075	4,750
# Direct Special Monitoring Costs	2,290	1,900	2,100

Conduct up to 24 special monitor visits (SMVs) in FY 2000, involving 175 technical monitors to the 4 Russian plants processing the HEU to LEU for delivery to the United States. Includes salaries, travel, per diem and expenses of monitors, trip reports and technical de-briefings. BDMS maintenance, which includes the replacement of decayed radioactive sources and re-calibration of equipment at UEIP, and data retrieval output reports is also included. *Net funding increase of $200,000 in FY 2002 reflects a decrease in the number of visits from 22 trips in FY 2001 to 18 in FY 2002, and a funding increase to support 2 technical trips to ECP required to install the Blend Down Monitoring System (BDMS) equipment .*

# Reimburse Russian facilities	170	185	650

(dollars in thousands)

	FY 2000	FY 2001	FY 2002

Reimburse Russian facilities for costs of goods and services provided to U.S. monitors. Includes transportation, escorts, interpreters, technical service for BDMS maintenance, etc. *FY 2002 funding increase of $465,000 covers the modifications to the blending facility at ECP to accommodate the BDMS installation at ECP.*

#	Special Monitoring Support Costs	1,700	1,790	1,600

Provide planning, logistical support and coordination with Minatom for all team visits. Training for monitors, maintenance of monitor information database, preparation of trip planning documents and instructions and logistical support in Russia. *The FY 2002 reduction of $190,000 is consistent with fewer trips.*

#	Uranium Inventorying	0	200	400

Conduct annual inventory of natural uranium feedstock in storage cylinders at Russian facilities which were supplied by USEC for the equivalent Russian uranium in the LEU purchased. Prepare comparative report of findings and declared inventories. Includes salary, travel, per diem, and other expenses. New activity in FY 2001. *FY 2002 funding increase of $200,000 covers the team size to inventory a larger number of stored cylinders from 2 years of deliveries in a single week.*

	Russian Monitoring in the U.S. & Negotiations	925	1,225	1,100
#	Accommodate Russian Monitoring	250	250	250

Maintain Permanent Presence Office (PPO) for Russian monitors, assist them in monitoring operations at U.S. facilities and provide LEU accountability documents to Minatom.

#	Coordination efforts	675	975	850

Provide technical experts, interpreters and translators, and logistical support for Transparency Review Committee and other negotiating sessions. The number of Executive sessions required to complete negotiations on BDMS operations at UEIP and ECP are expected to decrease from prior years. *The FY 2002 reduction of $125,000 reflects decrease in negotiating sessions.*

	Monitoring Equipment	1,940	3,395	3,350
#	Portable Equipment	710	550	500

Maintain portable Non Destructive Assay (NDA) instruments shipped to Russian sites for U.S. monitor use. On a multi-year basis, develop, pilot test, fabricate, and deliver to Russia advanced portable NDA instruments. Development and testing was completed in FY 2001. Fabrication and shipment to Russia of upgraded instruments to replace existing systems will begin in FY 2002. *FY 2002 reduction of $50,000 results from replacement of older instruments which reduces maintenance work and costs.*

		(dollars in thousands)		
		FY 2000	FY 2001	FY 2002
#	Stationary Equipment, acquisition	0	0	100

Modification of existing, stationary Blend Down Monitoring System (BDMS) equipment for compatibility with Siberian Chemical Enterprise (SChE) blending facility is necessary for future installation. We plan to work with SChE technical experts on this design modification effort starting in FY 2002. Fabrication and installation of modified BDMS equipment for SChE is contingent on additional funding for this work. *The FY 2002 funding increase of $100,000 supports new technical discussions on BDMS design modifications.*

#	Stationary Equipment, maintenance	1,230	2,845	2,750

Maintain the installed BDMS equipment that provides continuous and independent measurements of uranium hexaflouride (UF_6) at blend-points in dilution facilities. Procure, replace, and dispose of radioactive sources critical to the operation of the BDMS units. Replace and upgrade installed BDMS equipment as necessary and appropriate. Increase in FY 2001 reflects extra work tasks conducted at UEIP to replace all Cf-252 and Co-57 sources and complete the final technical modifications to the equipment. The Co-57 sources have a 1 year life and need to be replaced annually, which includes re-adjustment of the instruments, and are planned in FY 2002 at UEIP. Installation of BDMS instruments in FY 2002 require radioactive source procurement and handling at the site, planned for FY 2002. *The FY 2002 decrease of $95,000 results from not procuring Cf-252 sources for UEIP, which have a 2 year life span.*

Technical Support Activities		4,065	3,315	2,700
#	Data Analysis and Reporting	1,640	1,340	1,000

Compile, archive and analyze all monitoring records, forms, and data gathered by monitoring activities. Prepare monthly, annual, and ad hoc reports on HEU to LEU conversion rates and quantities. Conduct and document internal assessments of transparency performance and results. *The FY 2002 funding reduction of $340,000 will be accommodated by reducing the frequency of detailed analyses, assessments, and associated technical reports.*

#	Lab Technical and Management Support	1,400	1,250	1,000

Management and Operating contractors exercise local program management activities at each participating DOE laboratory and contractor organization and prepare required budgetary and topical status reports of activities. Provide technical and project management insights to enhance transparency operations and meet program needs. *The FY 2002 decrease of $250,000 is consistent with reductions in program operations and reporting responsibilities.*

#	Worker Health and Safety Support	1,025	725	700

Maintain the personnel radiation dosimetry and bio-assay program covering all monitors traveling to Russia. Assure the occupational safety of U.S. monitors working in Russia and update the Program Health and Safety plan, as needed. *The FY 2002 funding reduction of $25,000 coincides with reductions in monitor trips and staffing and associated reductions in cost of service.*

Total**,** HEU Transparency Implementation	14,813	14,592	13,950

Explanation of Funding Changes from FY 2001 to FY 2002

	FY 2002 vs. FY 2001 ($000)
Permanent Monitoring in Russia	
# Decrease reflects staffing reductions and closing of the Permanent Presence Office (PPO) at Ural Electrochemical Integrated Plant (UEIP) for 3 months of the year..	-532
Special Monitoring Visits to Russia	
# Increase supports two technical teams required to support the installation of the Blend Down Monitoring System (BDMS) equipment at the Electro Chemical Plant (ECP) on the blending pipes and then complete the calibration and adjustment operations. Implement the March 1999 provision of the Assessment Agreement allowing for an annual inventory of natural uranium feedstock in cylinders stored at Russian facilities. The inventory will be compared against declared Russian data on quantity and location of cylinders.	+675
Russian Monitoring in the U.S. & Negotiations	
# Reduction in Executive negotiating sessions with Minatom assumed for FY 2002, especially with planned agreements on BDMS installations.	-125
Monitoring Equipment	
# Increased effort to conduct technical discussions with Seversk staff on BDMS design modifications. Decrease in maintenance and trouble shooting work for older portable instruments replaced with advanced instruments. Decrease in procurement of radioactive sources for UEIP instruments. Net decrease in costs as result of all these efforts..	-45
Technical Support Activities	
# Reductions made in staffing, frequency of technical data analyses and associated technical reports. Also reflects reduced health and safety support costs associated with the reduced number of transparency monitors traveling to Russian plants.	-615
Total Funding Change, HEU Transparency Implementation	-642

Arms Control and Nonproliferation

Program Mission

The mission of the Office of Arms Control and Nonproliferation is to detect, prevent and reverse the proliferation of weapons of mass destruction (WMD) materials, technology and expertise. It is the focal point within the National Nuclear Security Administration (NNSA) and the Department of Energy for activities that support the President's nonproliferation and international security policies, goals and objectives, as well as those activities mandated by statute. The program provides technical expertise and leadership for NNSA and the Department in interagency, bilateral and multilateral fora involved in nonproliferation and international security matters. The major functional areas of the program include: Policy and Analysis; Reduced Enrichment Research and Test Reactor (RERTR); International Safeguards; Export Control Operations; Treaties and Agreements; New Independent States (NIS) Nonproliferation; and International Security.

Program Goal

The programs' goals are to detect, prevent and reverse the threat posed by the proliferation of weapons of mass destruction (WMD) by integrating NNSA and Departmental assets, including those of the National Laboratories, and bringing them to bear on nonproliferation problems and related international security issues.

Program Objectives

- Secure Nuclear Materials, Technology and Expertise.
- Limit the Production and Use of Weapons-Usable Fissile Materials.
- Promote Transparent Nuclear Reductions.
- Strengthen Nonproliferation Regimes.
- Control Sensitive Exports.

Performance Measures

Policy and Analysis

- Provide policymaking, analytical, and technical support to negotiations and implementation of agreements and treaties such as the Nuclear Nonproliferation Treaty, nuclear reduction treaties, treaties relating to nuclear testing and nuclear material, the Biological Weapons Convention (BWC) and the Chemical Weapons Convention (CWC) on such issues as transparency, inspection of and preparation for treaty implementation at DOE facilities, and verification.

Develop implementation strategies and prepare DOE facilities to ensure compliance with treaties, agreements, and policy initiatives.

Develop appropriate compliance demonstration procedures and methodologies that protect national security and proprietary information. Utilize NNSA/DOE policy, analytical, and technical skills to strengthen security in regions of proliferation concern.

RERTR

Continue development of high density Low Enriched Uranium (LEU) fuels and targets for conversion of research and test reactors from use of High Enriched Uranium (HEU).

Support the return from abroad of U.S.-origin spent nuclear research reactor fuel under the Foreign Research Reactor Spent Fuel Acceptance Program.

Return and blend-down spent and fresh fuel inventories to the Russian Federation and the safe shutdown or conversion to LEU fuel use of Russian-origin research reactors.

International Safeguards

Provide technical experts, training and/or equipment to the International Atomic Energy Agency (IAEA) and the United Nations Monitoring, Verification, and Inspection Commission (UNMOVIC) for inspections in Iraq.

Develop verification capabilities to support implementation of the U.S.-Democratic Peoples Republic of Korea (DPRK) Agreed Framework.

Provide technical advice and technologies to the IAEA for development of strengthened safeguards policies and methods; support ratification and implementation of the U.S. protocol for IAEA "Strengthened Safeguards," including supporting U.S. responsibilities for declarations and on-site inspections at DOE facilities, implement international safeguards at DOE facilities in order to meet U.S. treaty obligations under the U.S.-IAEA Safeguards Agreement.

Lead USG teams on visits to countries with U.S.-origin nuclear material to ensure adequate physical protection, per Presidential Decision Directive (PDD) 41, making additional excess fissile material available for IAEA inspections under the "Trilateral Initiative."

Under the “Trilateral Initiative,” develop IAEA verification regime for U.S. excess materials and for Russian excess material to be placed in the Mayak Fissile Material Storage Facility.

Implement a systematic process to review nonproliferation concerns in IAEA Technical Cooperation Project Requests, as mandated by the General Accounting Office (GAO).

Provide physical protection technical assistance to countries with which DOE has bilateral agreements and to the IAEA’s International Physical Protection Advisory Service (IPPAS) in order to prevent theft, sabotage and nuclear smuggling.

Provide training, equipment and technical expertise to the NIS and Baltics, East European, Central Asian, and Transcaucasus republics to sustain Materials Protection, Control and Accounting (MPC&A) upgrades.

Implement cooperation agreements and other cooperative arrangements for development of new strengthened safeguards policies, methods and procedures, and for the promotion of peaceful uses of nuclear energy.

Export Controls

Continue bilaterial and regional export control initiatives and cooperative agreements to help other governments develop the necessary infrastructure to ensure control over nuclear and nuclear-related dual-use equipment, material, and technology.

Ensure the viability of the Proliferation Information Network System (PINS) to support the NNSA export license processing system. Continue development of analytical tools which support implementation of export licensing review responsibilities under the 1979 Nuclear Nonproliferation Act (NNPA).

Serve as the principal U.S. technical agency in negotiating export controls over nuclear and nuclear-related dual-use materials, equipment, and technologies, especially within the Nuclear Suppliers Group (NSG) and the NPT Exporter's Committee (Zangger Committee). Includes ongoing activities to review and revise international nuclear export control lists.

Continue program to detect and prevent proliferation through the installation of radiation detection equipment to strategic transit and border sites in Russia and other countries.

Treaties and Agreements

Continue support for Russian and other former Soviet Union (FSU) activities related to specific agreements resulting from bi-national commissions, the HEU Purchase Agreement and other opportunities to secure, at-risk weapons-usable materials, and activities related to bilateral and trilateral excess fissile materials inspections among Russia, the IAEA, and the U.S.

Provide technical support and personnel to UNMOVIC/United Nations to ensure no re-initiation of WMD programs in Iraq.

NIS Nonproliferation

- Engage NIS weapons scientists, engineers and technicians in peaceful, commercial activities to prevent "brain drain" in the process facilitating broad Western access (including private commercial interest) to NIS chemical, biological and nuclear weapons facilities in order to foster close, one-to-one working relationships with NIS weapons experts, promote openness and transparency; carry out Initiative for Proliferation Prevention (IPP) projects and support activities to generate self-sustaining commercial enterprises with experts from the NIS institutes, making those institutes viable as stable places of peaceful employment.

- Assist the Russian Federation in irreversibly downsizing its nuclear weapons complex by partnering with Russian nuclear institutes, closed city administrations, the U.S. national laboratories, non-governmental organizations, other U.S. Government Agencies, financial institutions and Western industry to diversify the economies of the closed nuclear cities, foster an environment for business creation and expansion, and to help create sustainable civilian jobs for nuclear scientists, engineers and technicians.

International Security

- Maintain North Korean spent fuel that has been placed under IAEA monitoring, until canisters are removed from North Korea. This includes various tasks, such as addressing long-term water treatment, crane maintenance and equipment replacement, resupply of consumable materials, and the provision of fuel for heat and power on-site.

- Carry out technical studies to analyze safety issues, characterize fuel, and develop disposition options; provide a trained team of U.S. experts to conduct regular health physics tests and maintain necessary certifications; provide effective policy and technical support to future negotiations regarding the 1994 U.S.-DPRK Agreed Framework.

- Provide for security and safeguards for plutonium bearing spent fuel stored at the BN-350 breeder reactor in Aktau, Kazakhstan.

Significant Accomplishments and Program Shifts

Policy and Analysis

- Continued activities to strengthen international nonproliferation regimes by providing support to the Nuclear Nonproliferation Treaty (NPT) and by participating in international discussions about the Comprehensive Test Ban Treaty (CTBT). Participated in Biological Weapons Convention (BWC) Protocol negotiations, international meetings on and preparing for negotiations on a Fissile Material Cutoff Treaty; and fulfilled DOE statutory obligations implementing agreements for peaceful nuclear cooperation.

- Assisted the CTBT Organization in developing possible verification and on-site inspection regimes, including cooperative activities with key states.

- Prepared U.S. facilities for transparent nuclear warhead reductions and assisted Russian technical experts to develop methods and techniques for reciprocal activities.

Strengthened security in key regions, such as the Middle East, South Asia, and Northeast Asia through analysis of key issues, initiatives on cooperative monitoring, and engagement of key regional participants on various nonproliferation and related international security issues.

RERTR

Hosted an international RERTR meeting, and addressed technical issues involving the conversion of research reactors from Highly Enriched Uranium (HEU) to low-enriched uranium (LEU) fuels and targets, and the associated development of high-density LEU fuels for use in research and test reactors.

Completed reviews of conversion studies, as well as design, fabrication and testing of high-density LEU test elements for foreign research reactors.

International Safeguards

Implemented IAEA verification procedures for U.S. excess material to promote international confidence in nuclear arms reductions. Included among the facilities under IAEA inspection are those for plutonium storage, HEU storage, and HEU down-blending. Increased focus on developing international verification approaches for fissile material disposition programs.

Broadened technical support to the IAEA for implementation of the Strengthened Safeguards System through integrated safeguards development, continued to develop procedures for information analysis, environmental sampling and remote monitoring; and promoted full compliance with the International Atomic Energy Agency (IAEA) strengthened safeguards protocol.

Continued technical support to IAEA and UNMOVIC inspections in Iraq by providing experts, training and equipment in anticipation of renewed inspections.

Supported U.S.-North Korean negotiations and provided urgent verification support to meet the terms of the U.S.-DPRK Agreed Framework.

Sustained protection and control of weapons-usable nuclear materials in non-Russian Soviet successor states through training and facility upgrades.

Implemented nine bilateral agreements for safeguards cooperation and negotiated two others (with Japan and UK); implemented six bilateral arrangements for cooperation on peaceful nuclear applications.

Export Control Operations

- Led the Nuclear Suppliers Group and the Zangger Committee to successful completion of negotiations on adding conversion technologies to the Part 1 control list (Trigger List). This closed a major loophole in the international nuclear export control regime.

- Completed the U.S.-developed upgrade to the Nuclear Suppliers Group (NSG) Information Sharing System and began the implementation process. Nearly 75 percent of the current NSG membership has installed the upgraded version of this system, which allows for timely, secure information-sharing among NSG member states on information such as denial notifications.

- Reviewed approximately 5,000 dual-use and munition export applications from the Department of Commerce, Department of State and the Nuclear Regulatory Commission. This was a dramatic increase over FY 1999 activity, and included reviews of Iraq oil-for-food licenses, as well as Initiatives for Proliferation Prevention, International Science and Technology Center, and Science and Technology Center of the Ukraine applications.

NIS Nonproliferation

- Broadened IPP involvement with institutes formerly engaged in the development and production of biological and chemical weapons. Have engaged approximately 8,000 Russian scientists and engineers and 170 institutes in the four major successor states to the Soviet Union (Russia, Ukraine, Kazakhstan, and Belarus).

- Accelerated the closure schedule of a Russian weapons assembly/disassembly plant by converting a significant portion into an NCI-sponsored technopark; completed telecommunications and other infrastructure upgrades necessary to support commercial businesses. Program activities have shifted from conducting needs assessments and infrastructure support to implementing projects and establishing commercial businesses in the sectors of medical technologies, software engineering services, automotive parts manufacturing, physical protection equipment, and research services in three nuclear cities.

International Security

- Since canning of the spent nuclear fuel at Nyongbyon has been completed, activities have shifted to minimizing the corrosion of the spent fuel and maintaining the integrity of the storage canisters, prior to their eventual removal from North Korea.

- Activities are focused on continued work on security, safeguards, and the ultimate long-term disposition of plutonium-bearing spent fuel at the BN-350 breeder reactor in Kazakhstan.

Funding Profile

(dollars in thousands)

	FY 2000 Comparable Appropriation	FY 2001 Original Appropriation	FY 2001[a] Adjustments	FY 2001 Comparable Appropriation	FY 2002 Request
Arms Control & Nonproliferation					
Policy and Analysis	24,543	23,287	-586	22,701	20,701
Reduced Enrichment Research and Test Reactor (RERTR)	5,197	6,822	-179	6,643	6,643
International Safeguards	19,561	17,166	-427	16,739	16,739
Export Control Operations	12,450	14,060	-434	13,626	14,628
Treaties and Agreements	2,832	3,225	-90	3,135	3,135
NIS Nonproliferation	28,216	52,000	-1,241	50,759	28,759
International Security	16,640	35,454	-469	34,985	10,895
Subtotal, Arms Control and Nonproliferation	109,439	152,014	-3,426	148,588	101,500
Use of Prior-Year Balances	0	-166	0	-166	0
Total, Arms Control and Nonproliferation	109,439	151,848	-3,426	148,422	101,500

Public Law Authorization:
Public Law 95-91, "Department of Energy Organization Act"
Public Law 103-62, "Government Performance Results Act of 1993"
Public Law 106-65, "National Defense Authorization Act FY 2000"

[a/]Reflects adjustment for government-wide recission of .22% and safeguards and security transfers.

Funding by Site

(dollars in thousands)

	FY 2000	FY 2001[a]	FY 2002	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	15,861	27,082	19,953	-7,129	-26%
Pantex	1,002	30	30	0	0%
Kansas City Plant	940	3,270	3,000	-270	-8%
National Renewable Energy Laboratory	3,062	2,510	2,140	-370	-15%
Sandia National Laboratory	15,496	20,812	16,289	-4,523	-22%
Albuquerque Operations Office	310	310	310	0	0%
Total, Albuquerque Operations Office	36,671	54,014	41,722	-12,292	-23%
Chicago Operations Office					
Argonne National Laboratory	10,451	15,277	10,614	-4,663	-31%
Brookhaven National Laboratory	4,835	2,240	1,902	-338	-15%
New Brunswick Laboratory	104	0	0	0	0%
Total, Chicago Operations Office	15,390	17,517	12,516	-5,001	-29%
Idaho Operations Office					
Idaho National Engineering & Environmental Laboratory	700	1,104	1,103	-1	0%
Nevada Operations Office	175	197	155	-42	-21%
Oakland Operations Office					0%
Lawrence Berkeley National Laboratory	2,528	1,254	1,251	-3	-0.24%
Lawrence Livermore National Laboratory	12,081	22,444	13,605	-8,839	-39%
Oakland Operations Office	16,386	11,147	3,069	-8,078	-72%
Total, Oakland Operations Office	30,995	34,845	17,925	-16,920	-49%
Oak Ridge Operations Office					
Oak Ridge National Laboratory	8,949	10,242	7,648	-2,594	-25%
Richland Operations Office					
Pacific Northwest National Laboratory	10,924	13,012	8,500	-4,512	-35%
Savannah River Operations Office	3,720	5,605	4,546	-1,059	-19%
Washington Headquarters	1,915	12,052	7,385	-4,667	-39%
Subtotal, Arms Control and Nonproliferation	109,439	148,588	101,500	-47,088	-32%
Use of Prior-Year Balances	0	-166	0	-166	0%
Total, Arms Control and Nonproliferation	109,439	148,422	101,500	-46,922	-32%

[a/]Reflects adjustment for government-wide recission of .22% and safeguards and security transfers.

Site Description

Albuquerque Operations Office

The Albuquerque Operations Office provides technical support for the Initiatives for Proliferation Prevention (IPP) program, monitoring treaties and agreements, and spent fuel activities in Kazakhstan and North Korea.

Argonne National Laboratory

The Argonne National Laboratory (ANL) provides technical support for the IPP and Nuclear Cities Initiative (NCI) programs; supports export controls by providing unique technical expertise; provides training and technical assistance to Ukraine on export controls; administers the Nonproliferation Graduate Program; and makes export control and nonproliferation determinations for visits and assignments by foreign nationals. ANL supports Reduced Enriched Research Test Reactor (RERTR) objectives and Kazakhstan spent fuel activities by designing and fabricating the equipment required to safely stabilize, package, and storage of nuclear material via the U.S.-Kazakhstan BN-350 Nuclear Material Disposition project. ANL also participates in international material protection, control and accountability upgrades/sustainability through training, project management, and technical evaluation/review.

Brookhaven National Laboratory

The Brookhaven National Laboratory (BNL) supports policy and analysis necessary to strengthen nonproliferation regimes, promotes transparent nuclear reductions, and limit weapons-usable fissile material by providing analytical and technical support to ongoing negotiations and implementation, provides technical support related to safeguards and verification of fissile material processing; and supports negotiations for the implementation of transparent nuclear reductions to confirm that Russian nuclear weapons are being dismantled and the excess fissile materials removed are not reused for military purposes. BNL also provides technical support for the IPP program. BNL leads the NCI Environmental and Energy Efficiency Working Group, provides a technical review of proposals in this area, and develops projects in the nuclear cities in these sectors.

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) provides technical support for the IPP and NCI programs and export control activities.

Kansas City Plant

The Kansas City Plant (KCP) provides technical support for the IPP programs. KCP supports the NCI program through its work to develop commercial businesses in the Avangard Technopark at Sarov.

Lawrence Berkeley National Laboratory

The Lawrence Berkeley National Laboratory (LBNL) provides technical support for the IPP program.

Lawrence Livermore National Laboratory

The Lawrence Livermore National Laboratory (LLNL) support export control operations by providing unique technical support in the areas of nuclear-related dual-use export license evaluation; multilateral negotiation within the Nuclear Suppliers Group (NSG); training and assistance to potential nuclear suppliers on export controls, with special emphasis on Russia and the Southern Tier States; and training for customs officers on the use and integration of radiation detection equipment at ports of entry. LLNL provides support to ongoing negotiations and in preparation for the implementation of agreements and treaties, by providing technical support related to safeguards and verification of fissile material processing; and supports negotiations for the implementation of transparent nuclear reductions to confirm that Russian nuclear weapons are being dismantled and the excess fissile materials removed are not reused for military purposes. Provides regional expertise and analyzes nuclear proliferant activity in South Asia, the Middle East and Northeast Asia; and supports the IPP program. LLNL also serves as the lead laboratory for the NCI Snezhinsk Working Group, develops NCI-sponsored medical technologies businesses in Sarov and Snezhinsk, and continues to develop the Snezhinsk Open Computing Center.

Los Alamos National Laboratory

The Los Alamos National Laboratory (LANL) supports export and control operations by providing unique technical support in the areas of nuclear-related dual-use export license evaluation, in particular, end user analyses and specific weaponization technologies; multilateral negotiation within the NSG; training and assistance to Kazakhstan and other NIS on export control laws; development and implementation of Proliferation Information Network System (PINS) and the NSG Information Sharing System (NISS). LANL supports spent fuel activities in Kazakhstan, and in close coordination with the IAEA, designs and fabricates the nuclear material measurement accounting and monitoring equipment required to safeguard material inventories during packaging, transportation, and storage operations. Provides support to transparent nuclear reductions by enhancing transparency, specifically focusing on Mayak Transparency in the development of radiation signatures. Strengthens nuclear safeguards in Asia and the Pacific Rim countries, supporting technical exchanges on international safeguards with Israel and other countries; participating in “sister lab” arrangements; assisting NNSA in providing support to the IAEA for development and implementation of environmental sampling, unattended nondestructive assay systems, and remote monitoring systems; providing technical support to the U.S.-Russia-IAEA Joint Working Group; providing support to NNSA in the area of international material protection, control and

accountability upgrades and sustainability through training, project management, and technical evaluation and review; providing support to implementation of IAEA safeguards at DOE facilities; supporting IAEA through development of integrated safeguards and the Integrated Safeguards Evaluation Methodology; and providing technical support, including development of verification capabilities, to meet the terms of the U.S.-DPRK Agreed Framework. Also supports the IPP program. Leads the Sarov working group for NCI, develops Sarov projects and provides project management of the Sarov Open Computing Center.

National Renewable Energy Laboratory

The national Renewable Energy Laboratory (NREL) provides technical support to the IPP program.

Nevada Operations Office

The Nevada Operations Office (NVO) provides technical support to promote transparent nuclear reductions by supporting the U.S. delegations to the CTBT PrepCom and its verification working group for the implementation of the CTBT verification system and possible U.S. ratification of the Treaty; provides expertise and analysis during OSI and in the development of equipment specifications; and manages the conduct of inspections at the test site.

Oakland Operations Office

The Oakland Operations Office provides support to the spent fuel activities in North Korea by working to minimize corrosion of spent fuel and maintaining the integrity of the storage canisters, prior to the spent fuel's ultimate disposition, in accordance with the 1994 U.S.-DPRK Agreed Framework. Oakland also provides support to spent fuel activities in Kazakhstan and serves as the lead for procurement activities for the transportation phase of the U.S.-Kazakhstan BN-350 Nuclear Material Disposition project. Also provides support to enhance regional security activities performed by universities and nonprofit organizations and managing the ITA system which tracks and analyzes foreign nuclear activity.

Oak Ridge National Laboratory

The Oak Ridge National Laboratory (ORNL) supports safeguards technology development through cooperation agreements with Latin American countries, provides technical support for the Subcommittee on Technical Program and Cooperation, the Trilateral Initiative (U.S.-Russia-IAEA Working Group), supports preparations for implementation of IAEA safeguards at DOE facilities. ORNL provides technical support, including development of verification capabilities, to meet the terms of the U.S.-DPRK Agreed Framework. Supports policy and analysis efforts for the possible implementation of agreements and treaties; provides technical support related to safeguards and verification measures and uranium enrichment processes and facilities; supports work with Russia to negotiate and implement transparent nuclear reductions, to confirm that Russian nuclear weapons are being dismantled and that the excess fissile materials removed are not reused by demonstrating various transparency techniques. Provides

cooperative monitoring and energy security to further international engagement in arms control activities; and provides support to assist DOE in fulfilling requirements under bilateral peaceful nuclear cooperation agreements. Provides export control support to the OR Y-12 facility in the areas of nuclear-related dual-use export license evaluations; training and assistance to Russia on export controls and to the interagency Nuclear Export Violations Working Group, and training for Russian customs officers on the use and integration of radiation detection equipment at ports of entry. Also supports the IPP program. Provides support to NCI through participation on the Zheleznogorsk Working Group and leads NCI efforts to develop a physical protection business in Snezhinsk.

Pacific Northwest National Laboratory

The Pacific Northwest National Laboratory (PNNL) provides export control technical support in the areas of nuclear-related dual-use export license evaluations, training and assistance to potential nuclear suppliers, technology security, and radiation detection equipment and development of procedures and training for Russian customs officers on the use and integration at ports of entry. Provides support to spent fuel activities in North Korea that limits weapons-usable fissile materials, and strengthens nonproliferation regimes, working in accordance with the 1994 U.S.-DPRK Agreed Framework. In support of spent fuel activities in Kazakhstan, provides technical support for the transportation phase of the U.S.-Kazakhstan BN-350 Nuclear Material Disposition project, and analyses on transportation options. In addition, provides out reach activities into the academic, State government, and private sector to support NNSA goals of nuclear nonproliferation and global security through the Pacific Northwest Center for Global Security. Assists in the implementation of the U.S.-Russian agreement to shut down plutonium production reactors and monitor storage sites. Supports international material protection, control and accountability upgrades and sustainability through training, project management, and technical evaluation and review, by supporting preparations for implementation of IAEA safeguards at DOE facilities. Promotes effective safeguarding of nuclear materials through bilateral safeguards agreements with Argentina, Brazil, European Atomic Energy Community (EURATOM), South Korea, and Japan. Provides technical support to the IPP program. Supports the NCI program by providing technical assistance and strategic analysis; provides analysis on economic diversification and guidance to the NCI International Development Centers.

Pantex

The Pantex Plant supports policy and analysis work involving U.S.-Russian negotiation and implementation of transparent nuclear reductions to confirm that Russian nuclear weapons are being dismantled and the excess fissile materials removed are not reused for military purposes.

Sandia National Laboratory

The Sandia National Laboratory (SNL) provides export control technical support in the areas of nuclear-related dual-use export licensing evaluations; multilateral negotiation within the NSG; training and assistance to potential nuclear suppliers on export controls; and radiation detection equipment, physical security analysis and evaluations for customs officers on the use and integration of radiation detection

equipment at ports of entry. SNL also supports spent fuel activities in North Korea to minimize corrosion of spent fuel and to maintain the integrity of the storage canisters prior to the spent fuel's ultimate disposition, in accordance with the 1994 U.S.-DPRK Agreed Framework. SNL supports spent fuel activities in Kazakhstan by procuring the physical security system upgrades at the BN-350 breeder reactor facility. Provides leadership and support to international use of cooperative monitoring as an approach to reduce regional tensions; provides technical expertise in the areas of inspections, data surety and authentication; supports the U.S. delegations to the CTBT PrepCom and its verification working group. Improves IAEA effectiveness and efficiency in detecting clandestine nuclear activities and safeguarding declared nuclear material by providing technical support to IAEA and UNMOVIC inspections, assisting NNSA when it leads U.S. interagency physical protection visits; participating in International Physical Protection Advisory Service (IPPAS). Provides assistance to the IAEA in implementing remote monitoring systems to streamline nuclear safeguards. Also provides technical support to the IPP program, and serves as the lead laboratory for the NCI Zheleznogorsk City working group and provides technical evaluation of Russian proposals in the area of waste management.

Savannah River Operations Office

The Savannah River Operations Office (SRS) provides export control technical support in the areas of nuclear-related dual-use export license evaluations within its area of expertise (e.g., tritium production); technology security and nonproliferation domestic training; and export control and nonproliferation determinations for visits and assignments by foreign nationals. SRS supports spent fuel activities in North Korea by providing direct contract procurement support and managing the fuel canning site contractor to minimize corrosion of spent fuel and to maintain the integrity of the storage canisters prior to the spent fuels ultimate disposition, in accordance with the 1994 U.S.-DPRK Agreed Framework. Also supports spent fuel activities in Kazakhstan by providing on-site staff and expertise support through a contractual arrangement to manage the nuclear material packaging operations at the BN-350 reactor facility. Assists in the implementation of the U.S.-Russia agreement to shut down plutonium production reactors and monitor storage sites, and by providing staff support during monitoring visits to shutdown U. S. production reactors at the Savannah River Site. Supports the development and verification techniques for excess fissile material storage and disposition options at the Savannah River Site, and provides technical support to the IPP program. Serves on the Sarov Working Group for the NCI program, develops and manages projects in the area of telemedicine in the nuclear cities, provides business management training to the closed cities.

Policy and Analysis

Mission Supporting Goals and Objectives

The Policy and Analysis function provides technical expertise and analytical support to nonproliferation treaty and agreement policy formulation, negotiation, and implementation at DOE facilities. It also supports regional and international security initiatives. Assistance is provided to the Department of State for increased contact with states of proliferation concern to explore motives driving proliferation aspirations, and to engage DOE technical resources in training, confidence-building measures, implementation and verification of treaties, cooperative monitoring, and application of technology to facilitate proliferation prevention and reversal of nuclear weapons buildup. Resources are applied to negotiation and implementation of global and regional nonproliferation treaties and agreements (e.g., NPT, BWC, CWC) and to analysis of nuclear fuel cycles in an effort to minimize use of those that can destabilize international security and threaten regional stability. Analysis is for U.S./Russian nuclear weapon dismantlement and fissile material disposition; developing and refining procedures for confirming stockpiles of materials removed from weapons, and alternative cost-effective dismantlement, verification, and chain of custody measures. In addition, analysis is performed on securing HEU in the FSU, regional proliferation threats and policy options, and evaluation of the effects of warhead monitoring regimes. Implementation of the U.S./Russian agreement for exchange of technical information on nuclear warhead safety and support of projects for continued employment of former Soviet weapons scientists in non-weapon activities.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Policy and Analysis	25,542	22,701	20,701	-2,000	-8.8%
Total, Policy and Analysis	25,542	22,701	20,701	-2,000	-8.8%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Policy and Analysis	25,542	22,701	20,701

Promote transparent and irreversible nuclear reductions by working with the Russian Federation to negotiate treaty and other legally binding agreements which allows confirmation that Russian nuclear weapons are being dismantled and that excess fissile materials, including those removed from dismantled Russian nuclear weapons, are not used in the production of new nuclear weapons. Under the U.S.-Russian Plutonium Production Reactor Agreement (PPRA), conduct nine monitoring visits to shutdown Russian and U.S. reactors, and Russian plutonium oxide storage facilities to monitor the non-weapons use of weapons-grade plutonium. Participate in two meetings of the PPRA Joint Implementation and Compliance Commission (JICC). Implement agreements for cooperation and peaceful uses of nuclear energy. Conduct negotiations, preparations, and consultations, including those related to Nonproliferation Treaty (NPT), Biological Weapons Convention (BWC), Chemical Weapons Convention (CWC), and bilateral agreements for peaceful nuclear cooperation. Maintain technical experts to support studies, domestic and international exercises, and multilateral verification workshops. Support technical and policy analysis of critical nonproliferation threats and options for addressing them; initiate and support engagement and technical collaboration on nonproliferation, international security, and confidence building, other regional security efforts, including activities carried out by the Cooperative Monitoring Center and other programs, focusing especially on South Asia, Northeast Asia, the Middle East, and other regions of concern. The FY 2002 level of funding will support of U.S. nonproliferation goals, specifically in the areas of confidence building and stability between India and Pakistan and between North and South Korea. Will enable the return and blend-down of spent and fresh fuel inventories to the Russian Federation and the safe shutdown or conversion to LEU fuel use of Russian-origin research reactors. *The decrease in FY 2002 funding level is due to the uncertainty of negotiating a START III Treaty with Russia that would require the actual elimination of warheads. The activities that will not take place are to conduct, analysis, and prepare the Pantex Plant for warhead elimination and inspections and studies related to conducting inspections at Russian nuclear facilities.*

Total, Policy and Analysis	25,542	22,701	20,701

Reduced Enrichment Research and Test Reactor (RERTR)

Mission Supporting Goals and Objectives

The RERTR function supports development of LEU fuels to further LEU conversion of research and test reactors; expedited return of U.S. origin research reactor spent fuel from overseas; and development of targets and chemical processes for producing molybdenum-99 using LEU. Included within this subprogram is the Russian Research Reactor Spent Fuel Acceptance program, which will reduce nuclear proliferation threats posed by HEU fuel at former Soviet-designed research reactors outside Russia. Countries where Soviet research reactors are located include Serbia, Romania, North Korea, Bulgaria, Ukraine, and Libya. Significant risk reduction will be realized by removing fresh and spent fuel and converting or shutting down these sites around the world.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Reduced Enrichment Research and Test Reactor	5,197	6,643	6,643	0	0.0%
Total, RERTR	5,197	6,643	6,643	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
RERTR	5,197	6,643	6,643

Provide the Executive Branch with a technical evaluation of each significant request for export of HEU, and support implementation of the USG's policy on the return of foreign research reactor spent fuel. Maintain the program's computational database, develop analytical capabilities, study foreign research and test reactors' conversion feasibility, and assist U.S. reactor conversion. Develop fabrication techniques for research and test reactor fuels of very-high-density, low-enrichment uranium for use in research reactors unable to use current technology LEU fuels. Qualify new LEU fuels, and demonstrate the same performance with the new LEU fuels as achieved with current HEU fuels. Develop alternative targets and chemical processes to allow use of LEU to produce molybdenum-99 for use in medical applications. Enable Russia to complete its RERTR program, established in 1998, by supporting Russian institutes participating in the program, providing reactor analyses and fuel expertise from the U.S., and jointly assessing the feasibility of converting Soviet-designed reactors (e.g., in the Czech Republic, Hungary, Poland, Kazakhstan, Uzbekistan, Ukraine, etc.). Complete internal USG assessment of vulnerabilities posed by HEU stockpiles at Soviet-origin research reactors; initiate bilateral discussion between Russian Federation and host country officials on an accelerated pilot project to take back Russian origin spent fuel.

Total, RERTR	5,197	6,643	6,643

International Safeguards

Mission Supporting Goals and Objectives

The International Safeguards function provides policy and technical leadership and funds efforts to strengthen the nuclear nonproliferation regime, particularly with respect to global nuclear material security. These efforts improve the cost-effectiveness of the IAEA in detecting clandestine nuclear activities and safeguarding declared nuclear material. New approaches, such as environmental sampling, remote monitoring, and information management tools are addressed. Policy and technical support is provided to NNSA program offices and sites for the implementation of IAEA inspection of U.S. excess material at DOE sites under bilateral and trilateral (with Russia) arrangements. Verification measures are developed, in coordination with the international Policy and Analysis activity and the NNSA Office of Research and Development for implementing the FMCT and the U.S.-DPRK Agreed Framework. The application of nuclear technology for peaceful purposes is promoted through bilateral "Sister Laboratory" arrangements and IAEA technical assistance programs. NNSA objectives in NPT activities are advanced by preparing for and participating in working-level meetings, international consultations, and PrepCom meetings leading to the Year 2005 Review Conference (RevCon). Agreements for safeguards cooperation are negotiated and implemented for strengthening the nonproliferation regime through improved material protection, control, accountancy; transparency, the transfer of technologies to other countries, regions, and international organizations. The technologies to be transferred include strengthened safeguards measures for the adoption of the IAEA Additional Protocol for regional organizations and nation states such as Argentina, Australia, Brazil, the Brazilian-Argentine Agency for Nuclear Material Control and Accountancy (ABACC), China, EURATOM, France, Japan, South Africa, and South Korea. The physical protection program ensures that all countries possessing U.S.-origin nuclear materials are adequately protecting them against theft, sabotage, and nuclear smuggling. The ITA system, which tracks and analyzes foreign nuclear activity to satisfy statutory requirements and international obligations and to support U.S. nonproliferation policy, is managed and operated.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
International Safeguards	19,561	16,739	16,739	0	0%
Total, International Safeguards	19,651	16,739	16,739	0	0%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
International Safeguards	19,561	16,739	16,739

Strengthen the global nonproliferation regime by implementing nuclear material safeguards technology, providing physical protection assistance, and promoting peaceful nuclear applications in countries party to the Non-Proliferation Treaty. Expand efforts in the NIS/Baltics to meet International Atomic Energy Agency (IAEA) requirements and to sustain systems that provide for nuclear material safeguards and security. Complete preparations for implementation of U.S. Protocol for strengthened IAEA safeguards. Complete certification of a measurement system in Russia, complete design and construction of the monitoring system at Mayak, begin implementing verification regime at the Mayak Fissile Material Storage Facility (FMSF), begin technical discussions with second nuclear weapons state (NWS), and initiate transition of facilities under IAEA safeguards to verification under the Trilateral Initiative. Enter into one new agreement for bilateral safeguards cooperation. Provide technical assistance to IAEA and United Nations Monitoring, Verification, and Inspection Commission (UNMOVIC) for inspections and wide area monitoring in Iraq.

Total International Safeguards	19,561	16,739	16,739

Export Control Operations

Mission Supporting Goals and Objectives

Export Control Operations advance U.S. nonproliferation objectives by developing and implementing policies, regulations, and procedures to halt the spread of weapons of mass destruction and their related technologies; promotes and extends multilateral and bilateral nuclear supply arrangements in support of U.S. nonproliferation policy; controls the export of WMD equipment, materials, and technologies as mandated by law and in accordance with national security objectives; and provides technical leadership and training for NNSA, the DOE complex, U.S. government agencies, and the international nonproliferation community. Through the use of unique technical expertise and training, this function will effect a Second Line of Defense program to detect and deter the illicit trafficking of nuclear materials and key equipment.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Export Control Operations	10,450	11,226	10,628	-98	-0.9%
Second Line of Defense	1,000	2,400	4,000	1,600	66.7%
Total, Export Control Operations	11,450	13,626	14,628	1,002	11.0%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Export Control Operations	10,450	11,226	10,628

Efforts to improve multilateral nuclear supplier controls under the Nuclear Suppliers Group (NSG) and the Zangger Committee by undertaking technical reviews of items or technology to be controlled by these regimes, advancing bilateral consultations with key and emerging supplier governments, and preparing guidance, agendas, and technical reviews of issues for discussion in NSG and Zangger diplomatic meetings. Implementing statutorily-mandated activities to regulate nuclear technology exports and review commercial license applications for the export of proliferation-related items.

Second Line of Defense (SLD)	1,000	2,400	4,000

Supporting initiatives internationally to strengthen export control systems and procedures and prevent illicit nuclear trafficking. Continue efforts to assist Russia, the New Independent States, and other key governments to develop the infrastructure required to control the export of proliferation-related items and technology, principally through training, workshops, and industry outreach, as well as installation of radiation detection equipment at strategic transit and border sites in Russia and elsewhere. *The FY 2002 increase is intended to expand efforts to install radiation detection equipment in at least three high-priority sites in Russia; initiate planning to equip strategic sites in Kazakhstan and Ukraine; continue developing hand-held isotope identifiers to provide improved plutonium detection capabilities; modify existing Russian-built detectors to monitor cargo; conduct nuclear-specific training seminars in cooperation with Russian Customs at all four regional customs academies; and procure mobile radiation detection vans for use by Customs officials at remote locations where fixed facilities and infrastructure is lacking*.

Total, Export Control Operations	11,450	13,626	14,628

Treaties and Agreements

Mission Supporting Goals and Objectives

The Treaties and Agreements subprogram supports implementation of bilateral or multilateral, Presidentially-directed or Congressionally-mandated nonproliferation and international security initiatives, agreements and treaties. In addition, it provides for unexpected, unplanned responses to requirements of an immediate nature based on unanticipated U.S. national security needs, as well as preparations to meet new transparency or verification requirements arising out of ongoing activities that are consistent with U.S. national policy, security requirements, and without compromising proliferation sensitive information.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Treaties and Agreements	2,832	3,135	3,135	0	0.0%
Total, Treaties and Agreements	2,832	3,135	3,135	0	0.0%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Treaties and Agreements	2,832	3,135	3,135

Provide support to unforeseen nonproliferation and international security requirements to secure WMD materials, technology and expertise, limit weapons-usable fissile materials, promote transparent nuclear reductions, strengthen nonproliferation regimes, and control sensitive exports. Rapidly respond to unanticipated proliferation international security challenges, including threats posed by nuclear materials at risk of diversion, by designing and implementing urgent remedial actions. Support additional and unexpected requirements for international negotiations, and continue technical support to the IAEA and United Nations.

Total, Treaties and Agreements	2,832	3,135	3,135

New Independent States (NIS) Nonproliferation

Mission Supporting Goals and Objectives

The NIS Nonproliferation subprogram encompasses both Initiatives for Proliferation Prevention (IPP) efforts and the Nuclear Cities Initiative (NCI). IPP was designed to reduce the global nuclear danger of proliferation of technologies and expertise through focused, cooperative projects involving the ten major DOE laboratories and science and engineering institutes in Russia, Ukraine, Kazakhstan and Belarus. Some of these projects will involve cost-sharing with U.S. industry. Major initiatives include preventing "brain drain" by engaging former Soviet weapons scientists, engineers, and technicians in non-weapons-related projects; motivating participation in proliferation prevention activities; facilitating continued access to NIS facilities through technical engagement with personnel; and establishing self-sustaining commercial linkages that will support future independent commercial projects and assure an exit strategy for the U.S. government. Cooperative, cost-sharing projects are aimed at establishing direct partnerships that will provide for long-term commercial employment of key former Soviet weapons scientists, engineers, and technicians. The NCI contributes to core U.S. nonproliferation goals and reduces global nuclear danger from the proliferation of nuclear weapons expertise in direct and concrete ways. By working closely with MINATOM, USG representatives and the U.S. private sector will assist in the development of suitable and gainful employment in the commercial sector for skilled scientific personnel of the Russian nuclear complex. Of the approximately 170,000 employees who work directly at the nuclear weapons facilities in the ten nuclear cities of the Russian Federation, many are considered potential proliferation risks due to their direct knowledge of nuclear weapons technology. These individuals will likely be among those who lose their jobs when the production of the weapons facilities is scaled back. It is in the U.S. interest to support MINATOM in this undertaking to prevent the proliferation of nuclear expertise to countries with the means and the intention of gaining access to nuclear technology.

In the NCI nuclear cities, strategic plans are developed that establish goals, costs and time lines for economic development and civilian employment. The strategic planning process assists the Russian Federation in accelerated conversion of its nuclear weapons facilities from military to civilian use. In each strategic plan, specific performance metrics and milestones are identified for planned work. Through this planning process, the NCI works closely with MINATOM in its restructuring of the Russian weapons complex to align its plans with economic development and employment opportunities in the nuclear cities.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Initiatives for Proliferation Prevention	20,716	24,143	22,143	-2,000	-8.3%
Nuclear Cities Initiative	7,500	26,616	6,616	-20,000	-75.1%
Total, NIS Nonproliferation	28,216	50,759	28,759	-22,000	-43.3%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Initiatives for Proliferation Prevention (IPP)	20,716	24,143	22,143

Under IPP, engage about 1,200 former Soviet weapons scientists, engineers, and technicians in 20 projects to provide long-term commercial employment at nuclear (MINATOM/Academy of Science) NIS institutes. *Since FY 1999, the IPP has steadily increased the number of long-term commercial projects with an ever-larger portion of the funding being allocated to the NIS.* Engage about 500 former Soviet weapons scientists, engineers and technicians in 10 projects to provide long-term commercial employment at chemical/biological NIS institutes. *The decrease is due to a reduced number of projects that will be funded.*

Nuclear Cities Initiative	7,500	26,616	6,616

Establish a commercial infrastructure for economic diversification of the Russian closed nuclear cities to support downsizing of the Russian nuclear weapons complex. Implement strategic plans for closure of warhead production capabilities at Avangard including development of medical equipment production and MPC&A technology production; and provide support and training to displaced warhead production workforce. The Department will continue work in Sarov and will decrease activities in the other two nuclear cities. *Decrease will limit or eliminate activities in two Nuclear Cities and will maintain the level-of-effort in only one nuclear city. The Department will honor existing commitments as able, but will not likely proceed with new commercial ventures.*

Total, NIS Nonproliferation	28,216	50,759	28,759

International Security

Mission, Supporting Goals and Objectives

International Security supports the implementation of security commitments made by the USG regarding Russia, the NIS of the FSU, and the DPRK. Specific efforts are: Implement a nuclear spent fuel maintenance plan by continuing technical dialogue with the DPRK. Spent fuel activities in the DPRK include managing the corrosion of the spent fuel from the 5MW research reactor in Nyongbyon, North Korea; and safely storing spent fuel prior to its ultimate disposition in accordance with the 1994 U.S.-DPRK Agreed Framework. Ensure safe, secure storage of spent nuclear fuel at the BN-350 reactor in Aktau, Kazakhstan. Spent Fuel Activities in Kazakhstan support the urgent security and storage requirements for plutonium-bearing spent fuel located at the reactor. The objective of this activity is to secure approximately three tons of weapons-grade plutonium under IAEA safeguards.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Spent Fuel Activities in the DPRK	1,944	1,950	1,950	0	0.0%
Spent Fuel Activities in Kazakhstan	14,697	15,871	8,945	-6,926	-43.6%
Separated Civil Plutonium	0	14,779	0	-14,779	-100.0%
Spent Fuel Storage and Geological Repository in	0	2,385	0	-2,385	-100.0%
Total, International Security	16,641	34,985	10,895	-24,090	-68.9%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Spent Fuel Activities in the DPRK	1,954	1,950	1,950

Provide equipment replacement and maintenance, and purchase fuel sources for equipment operation in the DPRK. Conduct two, visits to perform on-site inspections, repair equipment, recondition canisters, and perform several technical analyses on safety, fuel composition, and disposition. Provide two DPRK personnel maintenance training sessions, one refresher training course for U.S. experts, and up to three health physics tests. Resolve technical problems impacting IAEA activities.

Spent Fuel Activities in Kazakhstan	14,697	15,871	8,945

At the BN-350 Aktau reactor, secure spent fuel containing plutonium in welded stainless steel canisters (six assemblies per canister). Ultimately the spent fuel will be placed in long-term dry storage. The storage facility will be instrumented with nuclear material safeguards technology in order to detect with continuous, unattended monitoring from a remote location, any diversion of the spent fuel material. *The decrease will require stretch-out of the time to complete long-term storage of BN-350 plutonium bearing spent fuel.*

Spent Fuel Storage and Geological Repository in Russia	0	2,385	0

Supports the initial analysis on a geological repository in Russia to dispose of high level radioactive waste and fissile materials, such as spent nuclear fuel and civil plutonium from Russia. A center for geological repository technology will be established to develop a scientific plan, conduct feasibility studies and perform site selection technical assessments for the development of a geological repository in Russia. A Russian geologic repository program will have to assess the issues of selecting one or two geologic repository sites. If Russian law is amended to permit the storage and disposal of foreign spent nuclear fuel in Russia, funds may also be used to support feasibility studies and licensing reviews for a spent fuel storage facility. *The decrease reflects completion of the initial analysis.*

Separated Civil Plutonium	0	14,779	0

Effort to reduce inventories and secure weapons-usable fissile materials from the RT-1 reprocessing plant at Mayak; dry storage concept analyses and assessments; safety and safeguards activities; long-term maintenance requirements analyses; criticality assessments; facility and site analyses; updating the Mayak facility systems and procedures for spent fuel accounting, physical security, fuel handling systems, packaging equipment designs; procurement of fuel fabrication; licensing; and lab-to-lab assessments of the Mayak. *The decrease reflects the decision to reprogram funds to priority programs within the nonproliferation office.*

Total, International Security	17,954	34,985	10,895

Explanation of Funding Changes from FY 2001 to FY 2002

	FY 2002 vs. FY 2001 ($000)
# Policy and Analysis	
• The decrease is due to the uncertainty of negotiating a START III Treaty with Russia that would require the actual elimination of warheads at the Pantex Plant. The activities that will not take place are to conduct, analysis, and prepare the Pantex Plant for warhead elimination and inspections and studies related to conducting inspections at Russian nuclear facilities.	-2,000
Total, Policy and Analysis	-2,000
# Export Control Operations	
• The increase is intended to expand efforts to install radiation detection equipment in at least three high-priority sites in Russia, and initiate planning to equip strategic sites in Kazakhstan and Ukraine. Continue developing hand-held isotope identifiers to provide improved plutonium detection capabilities. Modify existing Russian-built detectors to monitor cargo. Conduct nuclear-specific training seminars in cooperation with Russian Customs at all four regional customs academies. Procure mobile radiation detection vans for use by Russian Customs at remote locations where fixed facilities and infrastructure is lacking. ...	1,002
Total, Export Controls Operations	1,002
# NIS Nonproliferation	
• The decrease is due to a reduced number of IPP projects that will be funded.	-2,000
• Decrease curtails activities in two Nuclear Cities and maintains the same level-of-effort in one city. The Department will honor existing commitments but will not proceed with new commercial ventures.	-20,000
Total, NIS Nonproliferation	-22,000
# International Security	
• The decrease reflects the decision to reprogram funds to higher priority programs within the nonproliferation program in FY 2001..	-24,090
Total, International Security	-24,090
Total Funding Change, Arms Control and Nonproliferation	-47,088

International Material Protection, Control and Accounting

Program Mission

Unsecured stockpiles of nuclear material amassed by the former Soviet Union pose a clear threat to U.S. national security. During the Cold War, the Soviet Union accumulated these vast stockpiles of plutonium and highly-enriched uranium (HEU), that are the essential material for nuclear weapons. Acquiring these nuclear materials is the primary obstacle for terrorist organizations and nations seeking to develop nuclear weapons capabilities. The Soviet-era security system, which focused on preventing outsider threats and relied heavily on the use of military guards, closed cities, and the constant surveillance of personnel by state security forces (such as the KGB), has been severely weakened due to political and economic upheavals since the breakup of the Soviet Union.

The mission of the International Materials Protection Control and Accounting (MPC&A) program is to secure Russian weapons and weapons-usable nuclear material by upgrading security where the material is currently located or by consolidating material at Russian sites where installation of enhanced security systems have already been completed. 'Rapid' and 'comprehensive' upgrades significantly improve the security of Russian weapons-usable nuclear material. Rapid upgrades include measures establishing controlled areas and limits on personnel access to nuclear material; implementing a "two-person" rule; conducting baseline item inventories; bricking up windows; hardening doors; installing locks, delay blocks and steel cages, implementing random guard patrols and improving alarm communications. Comprehensive upgrades include rapid upgrades plus hardening of facilities to allow relocation of guard forces closer to the target; installing interior and exterior detection systems, closed-circuit television (CCTV) monitoring and assessment systems; implementing electronic access control systems, central alarm monitoring stations, and radio communications enhancements and conducting material inventories using advanced measurement equipment and computerized accounting systems.

All non-Russian site upgrade work was completed in Kazakhstan, Ukraine, Belarus, Uzbekistan, Latvia, Georgia, and Lithuania in FY 1998 and responsibility for sustainability at the 13 nuclear sites in these countries transferred to the National Nuclear Security Administration's (NNSA) International Safeguards program. Sustainability cooperation includes a testing and maintenance program, annual updates of vulnerability assessments (VAs), training, and the development of regulatory requirements. FY 2002 funding provides for crucial MPC&A upgrades at sites of the Russian Navy complex, sites of the Ministry of Atomic Energy (MinAtom) weapons complex, and Russian civilian sites; consolidation of material into fewer buildings at fewer sites and the conversion of excess weapons grade HEU (not coming directly from dismantled warheads) to low-enriched uranium (LEU); security upgrades for Russian truck and rail transportation of nuclear material; and the establishment of a U.S. exit strategy which fosters Russian self-sustaining security infrastructure, culture, national MPC&A regulations, and training facilities.

In FY 2001, funding for NNSA's cooperative emergency management work was combined with elements of the International MPC&A program to take advantage of synergy between the two programs. International Emergency Cooperation (IEC) efforts ensure that foreign governments, international organizations, and U.S. embassies receive emergency assistance in nuclear matters. Funding provides for assistance in responding to nuclear material smuggling or trafficking incidents; providing credibility assessments of any nuclear threat and assisting in the development of emergency policy.

Program Goal

The goal of the International Material Protection, Control and Accounting Program is to reduce the threat to U.S. national security posed by unsecured Russian nuclear weapons and nuclear weapons-usable nuclear material by installing physical security and accountancy upgrades appropriate for the level of material attractiveness and the threat of theft. This program is working with Russian officials in developing the capabilities and commitment to sustain these upgrades, consolidating material into fewer buildings and at fewer sites, and converting excess HEU (not coming directly from dismantled warheads) to LEU to reduce the number of theft targets. The program also provides credibility assessments and tracking of nuclear smuggling and nuclear threat cases.

Program Objectives

- Install physical security and accountancy upgrades appropriate for the level of material attractiveness and the threat of theft.
- Consolidate material into fewer buildings and at fewer sites and converting excess weapons-grade HEU to LEU to reduce the number of theft targets.
- Work with Russian MinAtom, Navy, and Gosatomnadzor (GAN) officials to foster the capabilities and commitment to sustain MPC&A improvements after U.S. cooperation ends.
- Provide assessment and tracking of nuclear smuggling and nuclear threat cases.
- Enhance international nuclear emergency early warning, preparation, and response capabilities.

Performance Measures

The performance measures and significant accomplishments of each individual MPC&A element represent part of the overall program's metrics. The NNSA has currently identified ninety-five nuclear sites which may require security upgrades (53 Navy, 11 MinAtom Weapons Complex, and 31 Civilian (18 Russian and 13 Non-Russian). By the end of FY 2002, comprehensive upgrades will be completed at 50 of the 95 sites (21 Navy, 2 MinAtom Weapons Complex, and 27 Civilian sites (14 Russian and all 13 Non-Russian).)

NNSA estimates that these 95 sites contain about 850 metric tons (MTs) of weapons attractive nuclear material (37% at Navy sites, 59% at MinAtom Weapons Complex sites, and 4% at Civilian sites), enough for approximately 51,000 nuclear devices. By the end of FY 2002, NNSA's plans to have begun MPC&A upgrades on about 67% of this material.

After upgrades are begun, NNSA quickly works to install rapid MPC&A upgrades (such as bricking up windows, hardening doors, installing locks, etc.). By the end of FY 2002, NNSA's plans to have about 53% of the total 850 MTs under rapid upgrades.

After rapid upgrades are completed, NNSA installs comprehensive MPC&A upgrades which include rapid upgrades plus additional upgrades such as intrusion detection equipment, CCTV and alarm assessment systems, electronic access control systems, material measurement and inventory instruments, etc. By the end of FY 2002, NNSA's plans to have comprehensive upgrades on about 29% of the 850 MTs.

Navy Complex

- Continue MPC&A upgrades on ~315 MTs of weapons usable nuclear material at 53 sites.
- Install MPC&A rapid upgrades on an additional 7% of nuclear material (increasing the total amount of nuclear material under rapid upgrades to 87%).
- Complete MPC&A comprehensive upgrades on an additional 18% of nuclear material (increasing the total amount of nuclear material under comprehensive upgrades to 59%).
- Complete MPC&A comprehensive upgrades at an additional 6 nuclear warhead sites and 2 fuel sites (Sergiev Posad and Sevmash) (increasing the total number of sites where comprehensive upgrades have been completed to 21 (11 nuclear warhead sites and 10 fuel sites).

MinAtom Weapons Complex

- Continue MPC&A upgrades on ~500 MTs of weapons usable nuclear material at 11 sites.
- Install MPC&A rapid upgrades on an additional 4% of nuclear material (increasing the total amount of nuclear material under rapid upgrades to 29%).
- Complete MPC&A comprehensive upgrades on an additional 1% of nuclear material (increasing the total amount of nuclear material under comprehensive upgrades to 6%).
- Complete MPC&A comprehensive upgrades at the initial two sites, Krasnoyarsk-45 and Sverdlovsk-44.

Material Consolidation and Conversion and Civilian Sites

- Continue MPC&A upgrades on ~32 MTs of weapons usable nuclear material at 31 sites (18 Russian and 13 Non-Russian).
- Install MPC&A rapid upgrades on an additional 1% of nuclear material (increasing the total amount of nuclear material under rapid upgrades to 94%).
- Complete MPC&A comprehensive upgrades on an additional 20% of nuclear material (increasing the total amount of nuclear material under comprehensive upgrades to 92%).
- Complete MPC&A comprehensive upgrades at the Lytkarino, Luch and Novosibirsk sites (increasing the total number of sites under comprehensive upgrades to 27 (14 Russian and all 13 Non-Russian).)
- Eliminate an additional 1.8 MT of HEU by converting it to LEU (increasing the total HEU converted to 4.0 MT).

Clear an additional 3 buildings of all weapons-usable material consolidating it to other secured buildings.

National Programs and Sustainability

Establish an MPC&A Program-wide approach to operational areas of upgrades based on documented criteria, standard practices, and project team interaction, implemented via a team of U.S. and Russian operations and infrastructure resources utilized by MPC&A project personnel.

Perform a baseline analysis of economic and political issues that impact the gradual and strategic reduction of US financial support to Russia for nuclear material security. Perform additional analyses in the areas of establishing effective methods to monitor and validate MPC&A operations.

Harden an additional 23 trucks and 5 railcars (increasing the total to 103 trucks and 38 railcars) establishing a secure means of transporting proliferation attractive materials both within and between 27 Minatom nuclear sites.

Develop 6 new courses at central training facilities, conduct 50 courses for over 2,400 students, conduct 10 seminars and workshops to promote awareness of nonproliferation and MPC&A, and upgrade the human and equipment infrastructure of central and regional training facilities.

Graduate an additional 30 MPC&A Masters students from the Moscow Engineering and Physics Institute (MEPHI) MPC&A program (increasing the total graduates to 54, working in 14 different nuclear facilities directly supporting upgraded MPC&A systems) and expand the MPC&A graduate program to one branch institute.

Establish 10 new Russian requirements in the form of regulations, orders, reporting requirements, and procedures that, when enforced, will set the parameters of an acceptable MPC&A system.

Establish a third regional technical support center to provide equipment repair, maintenance, calibration assistance, warranty service, spare parts inventory's and training for critical MPC&A systems and components.

Participate as observers in 5 additional Gosatomnadzor (GAN), MinAtom, or Ministry of Interior inspections of nuclear sites to determine the level of compliance with MPC&A and Protective Force requirements (increasing the total U.S. observed inspections to 13).

Enable 6 additional sites to begin reporting full nuclear material inventory to FIS (increasing the total to 26 sites).

International Emergency Cooperation

Provide advice on development of emergency programs to select foreign governments e.g. Ukraine, Russia, Japan.

Provide advice to IAEA and NEA on emergency policy issues.

Provide assessment and database tracking of approximately 75 nuclear material smuggling cases and an annual report on illicit nuclear material transactions.

Provide credibility assessments of nuclear threat communications involving nuclear weapons, devices or materials. (These assessments average approximately five cases per year.)

Significant Accomplishments and Program Shifts

Navy Complex

Continued MPC&A upgrades on the 315MTs of weapons usable nuclear material at 53 sites.

Installed MPC&A rapid upgrades on 80% of the 315 MTs of nuclear material.

Completed MPC&A comprehensive upgrades on 41% of the 315 MTs of nuclear material.

Completed MPC&A comprehensive upgrades at 13 sites of the 53 sites.

MinAtom Weapons Complex

Continued MPC&A upgrades on the 500 MTs of weapons usable nuclear material at 11 sites.

Installed MPC&A rapid upgrades on 25% of the 500MTs of nuclear material.

Completed MPC&A comprehensive upgrades on 5% of the 500 MTs of nuclear material.

Material Consolidation and Conversion and Civilian Sites

Continued MPC&A upgrades on the 32 MTs of weapons usable nuclear material at 31 sites (18 Russian and 13 Non-Russian).

Installed MPC&A rapid upgrades on 93% of the 32 MTs of nuclear material.

Completed MPC&A comprehensive upgrades on 72% of the 32 MTs of nuclear material.

Completed MPC&A comprehensive upgrades at 24 sites (11 Russian and all 13 Non-Russian) of the 31 sites.

Eliminated 2.2 MTs of HEU by converting it to LEU.

National Programs and Sustainability

Hardened 80 trucks and 33 rail cars, establishing secure transport of nuclear material within and between 27 sites.

Conducted 6,500 person-weeks of MPC&A training, serving over 1,250 students with over 65 course sessions taught fully by Russians. Transitioned ten courses to exportable media to include CD-ROMs and textbooks.

Graduated 24 MPC&A Masters students from the MEPHI MPC&A Program, working in ten different nuclear facilities directly supporting upgraded MPC&A systems.

- # Worked with Russian officials in development of 12 new federal or agency level Russian regulations directly pertaining to critical MPC&A elements and continued to assist enforcement of the recently adopted MPC&A regulations.
- # Established two technical support facilities to provide equipment repair, maintenance, calibration assistance, warranty service, spare parts inventories, and training for critical MPC&A systems and components.
- # Supported GAN inspectors (by providing equipment, procedures, training, and methodology) ability to conduct over 200 MPC&A inspections per year, with over 160 trained MPC&A inspectors covering more than 50 nuclear facilities and accompany GAN inspectors on eight inspections.
- # Established capability at 20 sites to report full nuclear inventory to FIS.

International Emergency Cooperation

- # Enhanced the effectiveness of international emergency early warning and notification systems and increased communication capability between NNSA and MinAtom by enhancing voice and video communication connections from NNSA to MinAtom's SCC.
- # Worked with MinAtom, Ukraine, and other foreign governments and international organizations (IAEA, NEA, EU, Arctic Council, France and Japan) in developing emergency procedures, plans and training and conducted five drills and exercises.
- # Provided rapid assessment and database tracking of ~70 annual cases of nuclear material smuggling. Provided an annual report on illicit nuclear material transactions.
- # Provided one-hour initial reports and four-hour credibility assessments of any nuclear threat involving nuclear weapons, devices or materials.
- # Assisted Ukraine in establishing its Offsite Crisis and Training Center. Provided technical assistance for communications, training, and procedures development and delivery.

Funding Profile

(dollars in thousands)

	FY 2000 Comparable Appropriation	FY 2001 Original Appropriation	FY 2001 [a] Adjustments	FY 2001 Comparable Appropriation	FY 2002 Request
International Material Protection, Control and Accounting					
Navy Complex	56,698	79,356	-1,805	77,551	38,000
MinAtom Weapons Complex	20,375	30,852	-1,436	29,416	35,300
Material Consolidation and Conversion and Civilian Sites	32,868	31,948	-427	31,521	40,000
National Programs and Sustainability	28,094	25,500	-481	25,019	22,000
International Emergency Cooperation	700	6,200	0	6,200	3,500
Subtotal, International Material Protection, Control and Accounting	138,735	173,856	-4,149	169,707	138,800
Use of Prior-Year Balances	0	0	-179	-179	0
Total, International Material Protection, Control and Accounting	138,735	173,856	-4,328	169,528	138,800

Public Law Authorization:

Public Law 95-91, "Department of Energy Organization Act"

Public Law 103-62, “Government Performance Results Act of 1993"

Public Law 106-398, “National Defense Authorization Act FY 2001"

[a] Reflects impact of Long-Term Russian Initiative realignment and a reduction of $374 Government-wide rescission of .22% rescission and safeguards and security transfers of $3,775.

Funding by Site

(dollars in thousands)

	FY 2000	FY 2001 [a]	FY 2002	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	6,855	4,924	4,190	-734	-14.9%
Pantex	294	470	558	88	18.7%
Sandia National Laboratory	52,392	51,989	37,447	-14,542	-28.0%
Albuquerque Operations Office	5,435	3,039	3,204	165	5.4%
Total, Albuquerque Operations Office	64,976	60,422	45,399	-15,023	-24.9%
Chicago Operations Office					
Argonne National Laboratory	1,616	1,631	1,527	-104	-6.4%
Brookhaven National Laboratory	17,627	25,435	27,493	2,058	8.1%
New Brunswick Laboratory	37	79	70	-9	-11.4%
Total, Chicago Operations Office	19,280	27,145	29,090	1,945	7.2%
Idaho Operations Office					
Idaho National Engineering & Environmental Laboratory	88	15	12	-3	-20.0%
Nevada Operations Office					
Remote Sensing Laboratory	588	422	233	-189	-44.8%
Nevada Operations Office	0	739	410	-329	-44.5%
Total, Nevada Operations Office	588	1,161	643	-518	-44.6%
Oakland Operations Office					
Lawrence Livermore National Laboratory	23,601	40,916	24,862	-16,054	-39.2%
Oak Ridge Operations Office					
Y-12 Plant	20,908	26,416	22,120	-4,296	-16.3%
Oak Ridge Operations Office	0	392	315	-77	-19.6%
Total, Oak Ridge Operations Office	20,908	26,808	22,435	-4,373	-16.3%
Richland Operations Office					
Pacific Northwest National Laboratory	8,716	12,921	16,054	3,133	24.2%
Savannah River Operations Office	406	161	195	34	21.1%
Washington Headquarters	172	158	110	-48	-30.4%
Subtotal, International Material Protection, Control and Accounting	138,735	169,707	138,800	-30,907	-18.2%
Use of Prior-Year Balances	0	-179	0	179	0
Total, International Material Protection, Control and Accounting	138,735	169,528	138,800	-30,728	-18.1%

[a] Reflects impact of Long-Term Russian Initiative realignment and a reduction of $374 Government-wide rescission of .22% rescission and safeguards and security transfers of $3,775.

Site Description

Albuquerque Operations Office

The Albuquerque Operations Office provides technical support to the International Material Protection and Emergency Cooperation Program through their contract with the Wackenhut Services Incorporated (WSI)/Non-Proliferation and National Security Institute (NNSI). WSI has a world-wide subsidiary, Wackenhut International, that maintains offices in over 50 different countries. In Russia, there are three offices including Moscow and St. Petersburg and a total of 420 Wackenhut International employees. All are Russian citizens and their expertise ranges from administrative to physical security systems installation and maintenance. They are available through WSI/NNSI for in-country activities covering all aspects of physical security and assurance. Specifically, WSI/NNSI provides staff expertise for material conversion and consolidation and is active in all MPC&A training projects in Russia. As one of only two designated Centers of Training Excellence within NNSA, NNSI is a leader in both traditional and distance learning activities and in developing training programs for other institutes.

Argonne National Laboratory

Argonne National Laboratory (ANL) provides experience in export control, regulatory development, sustainability and the Russian national accounting system. In addition, ANL supports MPC&A upgrade activities at civilian sites.

Brookhaven National Laboratory

Brookhaven National Laboratory (BNL) provides experience in the design and implementation of MPC&A upgrades on Russian facilities by virtue of their actual work at such facilities and by their involvement with developing MPC&A approaches for such facilities as part of work for and at the IAEA. BNL provides experience in contracting with various Russian vendors, including government-run institutes, and contracts all of the downblending activities for material conversion and consolidation. BNL also provides extensive knowledge of the political and economic situation in Russia, leads vendor evaluation and development activities, and has supported development and delivery of MPC&A training courses.

Idaho National Engineering and Environmental Laboratory

Idaho National Engineering and Environmental Laboratory (INEEL) provides technical expertise and advice on Russian protective force Ministry of Defense related issues.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) provides operational experience in nuclear material protection, control and accounting in combination with institutional expertise in nuclear energy, international and domestic safeguards, and the assessment of the proliferation impacts on U.S. national security of foreign nuclear energy programs. LLNL supports international MPC&A activities at several Navy, Civilian and MinAtom Weapons Complex sites. In addition, LLNL provides support to the emergency cooperation program. Major support activities include real-time assessments of nuclear black market transactions, field support for seizures of illicit nuclear materials, analysis of potential end-user motivations and acquisition paths, and providing NNSA courses on nuclear crime at various national and international law enforcement training venues.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) provides experience in the development and implementation of material control and accounting (MC&A) systems at the Russian Navy, MinAtom, and Civilian facilities. LANL supports GAN inspections through provision of necessary nondestructive assay equipment and infrastructure, and addresses MC&A issues in Russia to include equipment calibration, nuclear reference materials, and training. LANL's leadership of the Russian MPC&A conferences has provided a unique perspective into the status and needs for Russian sustainability and cultural MPC&A implementation issues.

New Brunswick Laboratory

New Brunswick Laboratory (NBL) provides expertise in assessing analytical chemistry techniques and equipment needs in Russia. NBL also provides expertise in evaluating measurement standard needs in Russia and the establishment of indigenous reference material capability.

Oak Ridge Y-12 Plant

The Oak Ridge Y-12 Plant subject matter experts have unique working experience in the development of vulnerability assessments; the design and application of physical security and material control and accounting systems; performance assurance; sustainability; transportation; storage; and response force training for Navy, MinAtom, and Civilian sites. Oak Ridge's experience in defense conversion, and the handling, processing and safeguarding of extremely large and varied inventories of enriched uranium and related materials, provides unique experience to the Material Conversion and Consolidation (MCC) efforts. In addition, Oak Ridge provides expertise in the areas of acceptance testing, performance assurance, inspection, maintenance, and procedures to the national programs.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory (PNNL) provides experience with physical security; MC&A systems, activities, and methodologies; nuclear material production/processing technology; nuclear material storage/facility operations; design, construction, operation and decommissioning of reactor type facilities; measurement/sensor development; counter terrorism/intelligence; containment and surveillance technology; tamper indicating device (TID) technology and application; and radiation measurement/detection systems. In addition, PNNL provides experience with regulatory structure and development; safeguards and security training and course development; international safeguards implementation; IAEA inspectors/inspections; information science technology; computer network security; network infrastructure/design; computer systems/software development; nuclear material transportation; physical protection; and protective forces.

Pantex

Pantex provides expertise in operation and maintenance of installed MPC&A systems at sites within the MinAtom Weapons Complex.

Remote Sensing Laboratory

The Remote Sensing Laboratory (RSL) provides design, engineering, installation, integration, and operational support of leading edge communications technologies that include voice, data, and video communications systems. RSL also provides support of emergency management planning and operations that require geographic information system support.

Sandia National Laboratory

Based on their extensive work for the NNSA, Department of Defense (DOD), and other federal agencies, Sandia National Laboratory (SNL) provides experience with the design and installation of physical protection systems. SNL has specific technical expertise in access delay systems; intrusion detection and assessment systems and associated display systems; access control systems; and vulnerability analysis procedures, processes and associated computer codes. SNL provides experience in developing secure transportation systems, and plays the lead role in implementing rail and truck systems in Russia. SNL also provides expertise in advising Russian institutes and enterprises as they develop physical protection regulations and training programs.

Savannah River Operations Office

Savannah River (SR) Operations Office provides monitors for down blending operations and technical support for the study of plutonium consolidation options. In addition, SR provides MC&A support specializing in plutonium chemistry for various civilian sites.

Navy Complex

Mission Supporting Goals and Objectives

The Navy Complex improves security of Russian Federation (RF) Navy weapons usable material by installing improved MPC&A systems at RF Navy nuclear warhhead sites, RF Navy HEU fuel storage facilities (fresh and damaged fuel), and shipyards where nuclear materials are present. The Navy Complex has refined the process of working with the RF Navy which includes upgrades to be driven by VAs, rapid upgrades that are completed within six months of the work beginning, comprehensive upgrades for all sites, and a sustainability program which assures the systems will remain effective when construction efforts are complete.

Rapid upgrades may include barriers (hardened doors and windows) that enhance delay times at the target area, locks and keys for access control, ballistic armor for response force survivability, passive perimeter (as appropriate from VAs), and moveable barriers at entry point. Comprehensive upgrades may include hardening of facilities to allow relocation of guard forces closer to the target, interior and exterior detection systems, CCTV monitoring and assessment systems, electronic access control systems, and central alarm monitoring stations. Sustainability includes a testing and maintenance program, annual updates of VAs, training, and the development of regulatory requirements.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Nuclear Warhead Sites	43,231	68,601	34,900	-33,701	-49.1%
Navy Fuel Storage Sites	13,467	8,950	3,100	-5,850	-65.4%
Total, Navy Complex	56,698	77,551	38,000	-39,551	-51.0%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Nuclear Warhead Storage Sites	43,231	68,601	34,900

Complete rapid MPC&A upgrades at an additional 4 RF Navy nuclear warhead sites (total of 37), complete comprehensive upgrades at 6 additional nuclear warhead sites (total of 11) and initiate comprehensive upgrades at five additional RF Navy nuclear warhead sites. Ensure the sustainability of installed MPC&A upgrades. *Decrease due to completion of upgrades at most of the sites where warheads are stored on a permanent basis and the need to fully address the security concerns and priority of the remaining sites. The MPC&A program assumes that temporary sites may require fewer upgrades. This will be closely assessed through visits by U.S. personnel.*

Navy Fuel Storage Sites	13,467	8,950	3,100

Complete MPC&A comprehensive security upgrades at the Sergiev Posad and Sevmash sites, increasing the total number of completed RF land- and ship- based naval sites storing fuel and other material of high proliferation concern to 10 of 11. Continue upgrades at the remaining site of Kurchatov. Assist in ensuring that elements are in place to sustain installed upgrades. Facilitate implementation of sustainability efforts that support an exit strategy for these activities. *Decrease due to the completion of MPC&A comprehensive upgrades at all but one Navy fresh fuel site and the transfer to sustainability work at these sites.*

Total, Navy Complex	56,698	77,551	38,000

MinAtom Weapons Complex

Mission Supporting Goals and Objectives

This program enhances U.S. national security by providing MPC&A upgrades to the RF MinAtom nuclear weapons, uranium enrichment, and material processing/storage sites. The MinAtom Weapons Complex, located in closed cities, consist of seven sites and four Enterprises of the Nuclear Weapons Complex (ENWC). These sites account for about 500 MTs of highly attractive weapons-usable nuclear materials. The strategy of this joint cooperative program is to identify areas that handle highly attractive material and provide protection against both internal and external threat scenarios.

The approach, in the protection of special nuclear material, is to give highest priority to areas that contain the most desirable material in terms of material type, vulnerability, and quantity. The upgrades are implemented utilizing a strategy that focuses on improved security near the material. The NNSA works closely with MinAtom and the respective sites to obtain proper assurances for all U.S. sponsored upgrades. Proper assurances are required to ensure that the upgrades for the sensitive sites are cost-effective and meeting U.S. national security objectives.

Two MinAtom sites, Krasnoyarsk-45 and Sverdlovsk-44, have been put on an accelerated schedule for completion of U.S. sponsored MPC&A upgrades. This "fast track" schedule will result in the completion of comprehensive upgrades at these two sites during FY 2002. Following completion of site upgrades, MinAtom Weapons Complex site teams will continue sustainability efforts to ensure the long-term effectiveness of installed upgrades.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Materials Processing/Storage Sector	10,092	20,358	23,800	3,442	16.9%
Weapons Labs Sector	961	4,818	8,500	3,682	76.4%
Uranium Sector	9,322	4,240	3,000	-1,240	-29.2%
Total, MinAtom Weapons Complex	20,375	29,416	35,300	5,884	20.0%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Materials Processing/Storage Sector	10,092	20,358	23,800

Provide MPC&A upgrades to Mayak, Tomsk-7, and Krasnoyarsk-26. Upgrades at Mayak will focus on the RT-1 fuel reprocessing plant and at a portion of Plant 1. Complete rapid physical protection upgrades at Mayak RT-1 reprocessing plant and start comprehensive physical protection upgrades at Mayak Plant 1. At Tomsk-7, comprehensive MPC&A upgrades will initiated at four plants and comprehensive upgrades for physical protection will be initiated at three of these plants. Upgrades at Krasnoyarsk-26 will focus on construction of a new PuO_2 storage facility. *Increase due to additional access negotiated by the U.S. to these sites during FY 2001 and the large amount of weapons attractive material at these sites.*

Weapons Labs Sector	961	4,818	8,500

Provide MPC&A upgrades to Arzamas-16, Chelyabinsk-70, and the ENWC (also known as Serial Production Enterprises). Upgrades at Arzamas-16 will focus on production and reactor sites. Upgrades at Chelyabinsk-70 will emphasize completion of baseline inventories for all facilities, and material protection upgrades at key buildings. *Increase to accelerate MPC&A upgrades at Arzamas-16, Chelyabinsk-70 due to anticipated increased U.S. access negotiated during FY 2001.*

Uranium Sector	9,322	4,240	3,000

Complete site wide comprehensive upgrades at Krasnoyarsk-45 and Sverdlovsk-44 which contain approximately 3.6MTs of weapons usable nuclear material. Ensure the sustainability of installed MPC&A upgrades. *Decrease due to the completion of MPC&A comprehensive upgrades at the two Uranium Sector sites and the transfer to sustainability work at these sites.*

Total, MinAtom Weapons Complex	20,375	29,416	35,300

Material Consolidation and Conversion and Civilian Sites

Mission Supporting Goals and Objectives

Material Consolidation and Conversion (MCC) simplifies the requirements and reduces the long-term costs of securing Russian weapons-usable nuclear material. MCC works to consolidate HEU and plutonium into fewer sites and fewer buildings, thereby reducing the number of potential theft targets and reducing the equipment and personnel requirements and the costs associated with securing such material. MCC also converts weapons-usable HEU to LEU, which significantly reduces its attractiveness to would-be proliferators. By the end of FY 2010, it is planned that the MCC will convert ~27 MTs of HEU to LEU and clear out 60 buildings.

Civilian Site projects install MPC&A systems at 31 civilian nuclear sites in Russia and the Newly Independent States (NIS). The civilian sites contain more than 32 MTs of the most vulnerable, proliferation concern material. These facilities are located in densely populated areas throughout the RF and NIS and are considered to be the most likely target for proliferants seeking weapons usable material through either abrupt theft or protracted diversion. The basic MPC&A upgrade objective is to employ a cost-effective, graded approach with an initial focus on installing MPC&A upgrades on the most highly attractive nuclear material at each site. Rapid MPC&A upgrades are installed to mitigate the immediate risk of theft and diversion while longer term, more comprehensive MPC&A upgrades are designed, installed and placed into operation. Following completion of site upgrades, U.S. support continues to help foster site capabilities to operate and maintain installed security systems. This line item will cover sustainability support for the 18 Russian sites. As previously stated, sustainability support for the 13 Non-Russian sites was transferred in FY 1998 to the International Safeguards line item.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Material Conversion and Consolidation	22,770	17,685	26,000	8,315	47.0%
Large Fuel Sites	10,098	13,836	14,000	164	1.2%
Total, Material Consolidation and Conversion and Civilian Sites	32,868	31,521	40,000	8,479	26.9%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Material Conversion and Consolidation	22,770	17,685	26,000

Continue to implement MPC&A strategy to simplify the nuclear security situation in Russia by consolidating material to fewer sites and fewer buildings, and converting much of this material to LEU, rendering it less attractive to would-be proliferators. *Increase due to the amount of HEU that is to be converted to LEU from 1.2 MTs per year to 1.8 MTs per year.*

Large Fuel Sites	10,098	13,836	14,000

Completed comprehensive MPC&A upgrades at the Lytkarino, Novosibirsk and Luch bringing the total number of completed sites to 27 of 31 (14 Russian and all 13 Non-Russian) storing 32 MTs weapons-usable material. Continue upgrades at the remaining four sites which include the Institute of Physics and Power Engineering (IPPE), Elektrostal, Bochvar, and Dimitrovgrad. Continue to provide support to eleven commissioned Russian civilian research reactor sites in the area of training, procedures, critical spare parts, and performance testing in order to ensure the sustainability of installed MPC&A upgrades. *Increase to accelerate the completion of MPC&A comprehensive upgrades at the four remaining large civilian fuel fabrication sites.*

Total, Material Consolidation and Conversion and Civilian Sites .	32,868	31,521	40,000

National Programs and Sustainability

Mission Supporting Goals and Objectives

National Programs and Sustainability assists the RF in establishing and implementing national and other infrastructure components necessary to create an environment in which effective MPC&A systems will be operated and sustained long-term. This infrastructure enables the protection of special nuclear material from the threats of nuclear proliferation.

The National Program establishes the requirement for MPC&A systems through development of technically sound, internally consistent regulatory requirements that are suited to Russian conditions and are effectively enforced. Reporting requirements are established as well, which ensure that accurate and complete nuclear material inventory data is provided to responsible governmental bodies in Russia through a jointly developed Russian national nuclear material information system.

The National Program also empowers sites to operate systems by establishing training and education programs that develop, maintain, and sustain a cadre of Russian MPC&A professionals. Development of a Russian network of experts to support successful equipment performance and accurate nuclear material measurements is also an objective of the National Program. Finally, the National Program addresses the ability to securely transport special nuclear material in the RF within and between sites.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Transportation	5,033	7,752	6,333	-1,419	-18.3%
Regulation	6,908	3,826	3,326	-500	-13.1%
Enforcement	8,290	7,162	6,562	-600	-8.4%
Sustainability	7,863	6,279	5,779	-500	-8.0%
Total, National Programs and Sustainability	28,094	25,019	22,000	-3,019	-12.1%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Transportation	5,033	7,752	6,333

Assist the RF in establishing a secure means of transporting proliferation attractive materials both within and between 27 Minatom nuclear sites. This includes providing security upgrades to Russian railcars and trucks. Purchase 23 additional trucks and upgrade 5 additional Russian railcars. *Decrease due to reduced need since most trucks have already been provided to the large nuclear sites and transition to sustainability of existing upgraded trucks and railcars.*

Regulation	6,908	3,826	3,326

Assist the RF in establishing the necessary federal or agency level regulations and reporting requirements that set the parameters for an acceptable MPC&A system. This includes overarching federal regulations pertinent to all nuclear facilities and agency specified internal requirements, processes and procedures. *Decrease due to having completed most of the work on the basic federal level MPC&A laws and regulations and shifting focus to the Agency level regulations to implement these federal laws, which should require less effort now that overarching laws have mostly been adopted.*

Enforcement	8,290	7,162	6,562

Create an infrastructure and environment in which MPC&A operators are required and empowered to successfully perform all necessary system functions. This includes establishing targeted and timely national and regional training, inspection methodologies, procedures and equipment, and measurement support and reference materials. *Decrease due to reduced need for new development of training courses, due to the maturity of the existing training programs.*

Sustainability	7,863	6,279	5,779

Establish a consistent program wide approach to sustainability throughout the RF. Assist the Russian sites in achieving long-term effective operation of their MPC&A systems. Assist the RF in establishing the support network, such as qualified equipment vendors and technical support facilities, necessary for effective MPC&A system operation. Continue to establish technical support facilities with provision of equipment repair, maintenance, calibration assistance, warranty service, spare parts inventories, and training for critical MPC&A systems and components. *Decrease due to the fact that the MPC&A program has developed an MPC&A operations criteria document that will allow for more effective use of program resources.*

Total, National Programs and Sustainability	28,094	25,019	22,000

International Emergency Cooperation

Mission Supporting Goals and Objectives

The International Emergency Cooperation (IEC) program supports other Federal agencies, U.S. embassies, foreign governments, and international organizations in combating nuclear smuggling and nuclear terrorism and promoting sound policies for emergency management programs. The Office responds to nuclear materials smuggling or trafficking incidents and advises in the development of emergency systems.

Under the Nuclear Assessment Program, IEC monitors, identifies, and analyzes incidents of actual or suspected trafficking in nuclear materials world-wide. Through this program, NNSA provides assessments of nuclear black market transactions and advises diplomatic, intelligence, and law enforcement entities regarding follow up actions. Another important element of this program is to provide assessments of nuclear extortion threats received world-wide in support of the law enforcement and intelligence communities, the State Department, and others. This capability draws upon specialists in nuclear explosives design and fabrication, nuclear reactor operations and safeguards, linguistic analysis, logic analysis, and terrorist tactics and behavior patterns. The program utilizes a unique analytical database and its assessment products can form the basis for a "go/no go" decision for response to communicated nuclear threats.

IEC assistance focuses on providing advice in developing emergency management programs, including development of emergency policies. The Office's goal is to promote sound policies worldwide for emergency management and response.

These activities are in support of the Atomic Energy Act of 1954, as amended; Presidential Decision Directives 39, 41, 62 and 67; Executive Order 12656; Federal emergency plans; and international agreements.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Emergency Cooperation	700	1,300	30	-1,270	-97.7%
Nuclear Assessment	0	4,900	3,470	-1,430	-29.2%
Total, International Emergency Cooperation	700	6,200	3,500	-2,700	-43.5%

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Emergency Cooperation	700	1,300	30

Provide advice only to MinAtom of Russia's Situation and Crisis Center regarding networking, training, and procedure development. Continue to interact with select international organizations and foreign countries to provide advice in ensuring development of adequate emergency policy for response to radiological situations. Continue to work with the government of Ukraine in establishing their Offsite Crisis and Training Center which will provide a uniform platform for a coordinated Ukranian response to any nuclear emergency. *Decrease due to a scale back of emergency operations assistance and a shift to the use of federal managers to provide advice and reduce Laboratory involvement.*

Nuclear Assessment	0	4,900	3,470

Operate the Nuclear Assessment program to provide a capability for monitoring and assessing illicit nuclear materials trafficking incidents and assessing communicated threats. Maintain a centralized nuclear assessment program database. *Decrease due to the reduction in the pool of available experts to perform assessments and cancellation of all special event support and all nuclear material forensic activities.*

Total, International Emergency Cooperation	700	6,200	3,500

Explanation of Funding Changes from FY 2001 to FY 2002

	FY 2002 vs. FY 2001 ($000)
Navy Complex	
Decrease reflects completion of upgrades at the majority of sites where warheads are stored on a permanent basis, and the estimate that temporary warhead sites may require fewer upgrades. Security concerns and upgrade requirements of the remaining 30 warhead sites (mostly temporary storage sites) will be assessed and implemented through visits by U.S. personnel.	-33,701
Decrease due to the completion of MPC&A comprehensive upgrades at all but one Navy fresh fuel site and the transfer to sustainability work at these sites.	-5,850
Total Funding Change, Navy Complex	-39,551
MinAtom Weapons Complex	
Increase due to additional access negotiated by the U.S. to these sites during FY 2001 and the large amount of weapons attractive material at these sites	2,342
Increase to accelerate MPC&A upgrades at Arzamas-16, Chelyabinsk-70 due to anticipated increased U.S. access negotiated during FY 2001..	5,582
Decrease due to the completion of MPC&A comprehensive upgrades at the two Uranium Sector sites and the transfer to sustainability work at these sites.	-2,040
Total Funding Change, MinAtom Weapons Complex	5,884
Material Consolidation and Conversion and Civilian Sites	
Increase the amount of HEU that is converted to LEU from 1.2 MTs per year to 1.8 MTs per year.	8,315
Increase to accelerate the completion of MPC&A comprehensive upgrades at the four remaining large civilian fuel fabrication sites.	164
Total Funding Change, Material Consolidation and Conversion and Civilian Sites	8,479
National Programs and Sustainability	
Decrease due to reduced need since most trucks have already been provided to the large nuclear sites and transition to sustainability of existing upgraded trucks and railcars.	-1,419

	FY 2002 vs. FY 2001 ($000)
Decrease due to having completed most of the work on the basic federal level MPC&A laws and regulations and a shift in focus to the Agency level regulations to implement these federal laws, which should require less effort now that overarching laws have mostly been adopted..	-500
Decrease due to reduced need for new development of training courses, due to the maturity of the existing training programs. .	-600
Decrease due to the fact that the MPC&A program has developed an MPC&A operations criteria document which will allow for more effective use of program resources.	-500
Total Funding Change, National Programs and Sustainability	-3,019
International Emergency Cooperation	
Decrease due to a scale back of emergency operations assistance and a shift to federal managers to provide advice and reduce laboratory involvement.	-1,270
Decrease due to the discontinuance of a reduction in the pool of available experts to perform assessments and cancellation of all special event support and all nuclear material forensic activities..	-1,430
Total Funding Change, International Emergency Cooperation	-2,700
Total Funding Change, International Material Protection, Control and Accounting	-30,907

Fissile Materials Disposition

Program Mission

Since the end of the Cold War, significant quantities of plutonium and highly enriched uranium (HEU) have become surplus to national defense needs, both in the United States and Russia. Continued implementation of arms reduction agreements is expected to result in further weapons dismantlements and increases in stockpiles of these surplus, weapons-usable fissile materials. The threat of theft or diversion by terrorists or rogue nations of these surplus materials in Russia has been characterized by the National Academy of Sciences as a "clear and present danger" to national and international security.

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

Program Goal

Reduce inventories of U.S. and Russian surplus weapons fissile materials in a transparent and irreversible manner.

Program Objectives

- Eliminate surplus U.S. plutonium within approximately 20 years by irradiating mixed oxide (MOX) fuel and converting some of the material to an immobilized radioactive waste form.
- Eliminate surplus U.S. HEU within approximately 20 years primarily by down-blending the material to low-enriched uranium (LEU) for peaceful use as fuel for commercial reactors.
- Implement the U.S.-Russia Plutonium Management and Disposition Agreement with Russia to eliminate similar quantities of Russian surplus plutonium.

Strategies

U.S. Plutonium Disposition

- Implement the U.S.-Russia Plutonium Management and Disposition Agreement for surplus weapon-grade plutonium disposition in the U.S. in rough parallel with plutonium disposition in Russia.
- Complete the design for and construct three key U.S. plutonium disposition facilities for pit disassembly and conversion, immobilization, and MOX fuel fabrication.
- Operate a MOX Fuel Fabrication Facility (MOX FFF) to convert oxide materials to a MOX fuel and irradiate the fuel in existing domestic, commercial reactors.

Operate a Pit Disassembly and Conversion Facility (PDCF) to convert surplus weapons plutonium to an unclassified oxide form suitable for disposition and international inspection.

Operate an Plutonium Immobilization Plant (PIP) using the "can-in-canister" approach to immobilize surplus "non-pit" plutonium in a ceramic material which is then surrounded with vitrified radioactive high-level waste.

U.S. Uranium Disposition

Transfer quantities of surplus HEU to the United States Enrichment Corporation, Inc. (USEC) and the Tennessee Valley Authority (TVA) to make LEU for commercial reactors.

Arrange for disposition of additional lots of surplus HEU through down-blending and commercial use.

Russian Plutonium Disposition

Assist in conducting tests and demonstrations of plutonium disposition technologies with Russia.

Participate in U.S. efforts to implement the provisions of the U.S.-Russia Plutonium Management and Disposition Agreement with Russia for the disposition of surplus weapon-grade plutonium.

Assist U.S. government efforts to secure international financing to support plutonium disposition in Russia.

Continue cooperative efforts with Russia.

Initiate and assist in the design of plutonium disposition facilities to be constructed in Russia.

Develop advanced reactor technology.

Performance Measures

FY 2002 performance measures include the following:

U.S. Surplus Fissile Materials Disposition

U.S. Plutonium Disposition

Reactor-Based Technologies

- Complete Title II (detailed) design for the MOX FFF.
- Begin implementing the integrated plan for Lead Test Assemblies (LTA).
- Submit the MOX FFF operating license application to the Nuclear Regulatory Commission (NRC).

- Initiate long-lead equipment procurement.
- Begin MOX FFF site preparation.

Pit Disassembly and Conversion Facility (PDCF)

- Continue limited upgrades of the Advanced Recovery and Integrated Extraction (ARIES) prototype system and demonstration of the ARIES technology.
- Continue disassembly of every pit type destined for the PDCF.
- Continue limited laboratory and host-site design support for the PDCF.
- Continue the design of the PDCF at a reduced rate.
- Continue long-lead equipment procurement.

Immobilization and Associated Processing Facility (Plutonium Immobilization Plant (PIP))

- Complete suspension of immobilization activities.

U.S. Uranium Disposition

HEU Disposition

- Ship surplus HEU (9 MT) from the Y-12 Plant (Oak Ridge Reservation) to USEC for blend down to LEU.
- Continue capital improvements at SRS for off-specification HEU blend down.

Supporting Activities

Surplus Plutonium Storage

- Complete the new surplus pit shipping container design and initiate the certification process for the container.

National Environmental Policy Act (NEPA)

- Prepare follow-up Environmental Assessments (EA) and Environmental Impact Statements (EIS) to support changes to the existing disposition approach.
- Coordinate, review, and comment on the NRC's EIS for the MOX FFF.

Common Technologies

- Participate in technical negotiations with Russia to develop a detailed inspection and monitoring regime.
- Initiate a transportation study to identify all packaging and transportation requirements for the plutonium disposition program.
- Complete an evaluation to identify possible alternative plutonium disposition options.

Russian Surplus Fissile Materials Disposition

Russian Plutonium Disposition

- Plutonium Conversion
  - **S** Continue the design of the plutonium conversion demonstration facility.
  - **S** Begin the preliminary design of an industrial-scale plutonium conversion facility.
- Immobilization
  - **S** Continue the studies and evaluation of immobilization options.
- MOX Fuel Fabrication
  - **S** Initiate the design of modifications to existing facilities for the fabrication of MOX LTAs.
  - **S** Begin the preliminary design of an industrial-scale MOX facility.
- VVER-1000/BN-600 Reactors
  - **S** Initiate BN-600 reactor plant life extension studies.
  - **S** Continue work on BN-600 and VVER-1000 reactors MOX fuel insertion studies.
  - **S** Continue the BN-600 reactor hybrid core design and safety analysis.
- Regulatory Infrastructure and Other Logistical Support
  - **S** Continue the development and review of new Russian licensing regulations.

Support and Oversight in the U.S.

- Complete the review of deliverables from Russian design activities for the plutonium conversion facility.
- Review the design and procurement for the VVER-1000 reactor LTA line.
- Initiate breeder blanket replacement activities for the BN-600 reactor.
- Complete the review of deliverables from Russian design activities for the MOX LTA facilities.

Advanced Reactor Technology

- Complete the preliminary design of the gas turbine-modular helium reactor (GT-MHR).
- Complete the development of the GT-MHR needed to authorize at least 33 percent work scope for final design of the GT-MHR.
- Begin testing and fabrication of test fuel at the Bench-Scale Fuel Fabrication Facility at Bochvar.

Significant Accomplishments and Program Shifts

FY 2001 accomplishments include the following:

U.S. Surplus Fissile Materials Disposition

Conducted a cost estimate review and submitted the Cost Report to Congress.

U.S. Plutonium Disposition

Reactor-Based Technologies

- Completed Title I (preliminary) design of the MOX FFF.
- Initiated Title II (detailed) design of the MOX FFF.
- Completed the mission reactors (e.g., existing domestic commercial nuclear reactors) irradiation plan.
- Submitted the Environmental Report (ER) and the Construction Authorization Request (CAR) for the MOX FFF to the NRC.
- Approved the Regulatory Management Plan and completed early and intermediate irradiation testing of Advanced Test Reactor fuel.

Pit Disassembly and Conversion Facility (PDCF)

- Continued Title I (preliminary) design.
- Operated the ARIES demonstration system and verified the Direct Metal Oxidation (DMO) technology.
- Initiated Phase 2 of the full-scale ARIES demonstration at Los Alamos National Laboratory (LANL).
- Completed 12 studies to resolve facility design issues.
- Completed the bulk of geotechnical investigation of the PDCF site.

Immobilization and Associated Processing Facility (Plutonium Immobilization Plant (PIP))

- Completed the installation of the prototype plutonium metal conversion (Hydride-Oxide (HYDOX)) facility and ceramification facility in preparation for future testing with plutonium.
- Completed the design for the prototype demonstration test facility at Clemson University.
- Completed the Design-Only Conceptual Design Report (DOCDR) for the PIP.
- Prepared a demobilization plan and initiated phased suspension of immobilization activities.

Repository Impacts

- Completed Quality Assurance implementation at DOE national laboratories to support performance testing.
- Issued the Technical Data Package to the Office of Civilian Radioactive Waste (RW) to incorporate additional test data from ceramic form.

Plutonium Disposition Support Systems (PDSS)

- Developed a DOCDR.
- Suspended PDSS activities pending completion of the Administration's review of the U.S.-Russian nonproliferation programs.

U.S. Uranium Disposition

Highly Enriched Uranium (HEU)

- Shipped 9 MT of HEU oxides from the Y-12 Plant to USEC for blend down to LEU.
- Began implementation of the surplus HEU Inventory Baseline configuration control process.
- Signed the TVA/DOE Interagency Agreement for blend down of off-specification HEU and initiated the design and construction of capital improvements at the Savannah River Site (SRS).

Supporting Activities

Surplus Plutonium Pit Storage

- Completed the systems analysis for the selection of a new surplus pit shipping container.
- Completed the preliminary design of a new surplus pit shipping container.

NEPA

- Initiated preliminary work on a Surplus Plutonium Disposition Supplemental EIS for fabrication of LTAs.
- Reviewed NEPA documents (i.e., Environmental Impact Statements) prepared by other DOE programs (e.g., Office of Environmental Management, Office of Radioactive Waste, etc.) for their impact on the Fissile Materials Disposition Program.

Common Technologies

- Initiated an evaluation to identify possible alternative plutonium disposition options.

Russian Surplus Fissile Materials Disposition

Russian Plutonium Disposition

- Signed the U.S.-Russia Plutonium Management and Disposition Agreement in September 2000.
- Prepared a detailed budget justification to support the $200,000,000 appropriated in FY 1999 (part of this document).
- Plutonium Conversion
  - **S** Supported the development of the selected process to convert plutonium metal to oxide.
  - **S** Determined the technology and site for plutonium conversion.
  - **S** Initiated the design of the plutonium conversion demonstration facility.
- Immobilization
  - **S** Completed the technical and engineering feasibility studies for plutonium immobilization at Krasnoyarsk-26 Chemical and Mining Combine (K-26).
- MOX Fuel Fabrication
  - **S** Supported the research and development (R&D) to develop and fabricate MOX fuel for use in Russian VVER-1000 and BN-600 reactors.
  - **S** Developed a schedule for plant activities to burn MOX fuel at the Balakovo Nuclear Power Plant.
- VVER-1000/BN-600 Reactors
  - **S** Initiated post-irradiation examination (PIE) of previously irradiated BN-600 MOX fuel.
  - **S** Developed plans for BN-600/VVER-1000 reactors MOX fuel insertion studies.
  - **S** Continued the BN-600 reactor hybrid core design and the safety analysis.
  - **S** Designed equilibrium 30 percent MOX core for the VVER-1000 reactor.

- **S** Continued the work on safety analysis and design modification and the fuel qualification programs for the VVER-1000 and BN-600 reactors.

- ▸ Regulatory Infrastructure and Other Logistical Support
  - **S** Executed Gosatomnadzor (GAN) task orders for regulatory document outlines, roadmapping, and Parallex licensing and began work on the regulatory and licensing process in GAN.
  - **S** Continued to provide technical assistance for the Russian regulatory infrastructure.

Support and Oversight in the U.S.

- ▸ Participated in the Russian conversion technology and site selection for an industrial-scale plutonium conversion facility.
- ▸ Initiated the PIE of previously irradiated BN-600 reactor MOX fuel.

Advanced Reactor Technology

- ▸ Continued preliminary design of the GT-MHR.
- ▸ Defined the preliminary Russian licensing process for the GT-MHR.
- ▸ Initiated a Level 1 and Level 2 Roadmap effort defining the development, design, licensing, and construction activities required to develop a GT-MHR in Russia.
- ▸ Initiated the construction of a Bench-Scale Fuel Fabrication Facility at Bochvar.
- ▸ Initiated a detailed cost and schedule development effort for the GT-MHR.

Funding Profile

(dollars in thousands)

	FY 2000 Comparable Appropriation	FY 2001 Original Appropriation	FY 2001 Adjustments [a]	FY 2001 Comparable Appropriation	FY 2002 Request
Fissile Materials Disposition					
U.S. Surplus Fissile Materials Disposition					
Operations and Maintenance	128,998	139,517	-22,654	116,863	130,089
Construction	31,126	69,932	-154	69,778	103,000
Total, U.S. Surplus Fissile Materials Disposition	160,124	209,449	-22,808	186,641	233,089
Russian Surplus Fissile Materials Disposition					
Russian Fissile Materials Disposition					
Operations and Maintenance	24,945	45,000	-340	44,660	56,000
Advanced Reactor Technology					
Operations and Maintenance	5,000	10,000	-153	9,847	1,000
Total, Russian Surplus Fissile Materials Disposition	29,945	55,000	-493	54,507	57,000
Subtotal, Fissile Materials Disposition . . .	190,069	264,449	-23,301	241,148	290,089
Less use of prior-year balances [b] . . .		-15,000	-94	-15,094	-42,000
Total, Fissile Materials Disposition	190,069	249,449	-23,395	226,054	248,089

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

Public Law 105-261 Licensing of Certain Mixed Oxide Fuel Fabrication and Irradiation Facilities — 10/99

Public Law 106-61 National Defense Authorization Act of FY 2001 — 10/99

[a]Government-wide rescission of 0.22% and safeguards and security transfers.

[b]FY 2001 General Reduction and use of prior-year balances from the $200,000,000 appropriated in the FY 1999 Emergency Supplemental Appropriation for the Russian Plutonium Disposition program.

Funding by Site

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Albuquerque Operations Office					
Los Alamos National Laboratory	36,732	22,048	18,960	-3,088	-14.0%
Pantex Plant	10,800	5,250	8,257	3,007	57.3%
Sandia National Laboratory	1,090	800	1,400	600	75.0%
Albuquerque Operations Office	320	——	1,483	1,483	——
Total, Albuquerque Operations Office	48,942	28,098	30,100	2,002	7.1%
Chicago Operations Office					
Argonne National Laboratory (West)	1,622	867	0	-867	-100.0%
MOX Fuel Fabrication Facility Design	12,375	25,943	63,000	37,057	142.8%
MOX Fuel Fabrication & Irradiation (DCS)	13,900	19,258	40,050	20,792	108.0%
Pit Disassembly & Conversion Facility	17,396	13,300	15,200	1,900	14.3%
Total, Chicago Operations Office	45,293	59,368	118,250	58,882	99.2%
Idaho Operations Office					
Idaho National Engineering & Environmental Laboratory	380	——	——	——	——
National Energy Technology Laboratory (NETL) (formerly FETC)	3,900	2,420	3,110	690	28.5%
Nevada Operations Office					
Nevada Operations Office	755	299	——	-299	-100.0%
Oakland Operations Office					
Lawrence Livermore National Laboratory	22,863	12,357	2,500	-9,857	-79.8%
Atomic Energy of Canada, Ltd	2,100	615	1,000	385	>999%
Oakland Operations Office	7,252	9,722	750	-8,972	-92.3%
Total, Oakland Operations Office	32,215	22,694	4,250	-18,444	-81.3%

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Oak Ridge Operations Office					
Oak Ridge National Laboratory	9,138	17,279	7,750	-9,529	-55.1%
Y-12 Plant	22,310	9,968	21,350	11,382	114.2%
Total, Oak Ridge Operations Office	31,448	27,247	29,100	1,853	6.8%
Richland Operations Office					
Pacific Northwest National Laboratory	2,808	11,440	3,500	-7,940	-69.4%
Russian Federation	4,168	16,650	42,000	25,350	152.3%
Savannah River Operations Office					
Savannah River Site	17,852	47,381	46,250	-1,131	-2.4%
Savannah River Operations Office	30	271	——	-271	-100.0%
Total, Savannah River Operations Office	17,019	47,652	46,250	-1,402	-2.9%
Washington Headquarters	3,141	24,354	5,740	-18,614	-76.4%
All Other Sites	——	926	7,789	6,863	741.1%
Subtotal, Fissile Materials Disposition	190,069	241,148	290,089	48,941	20.3%
Use of prior-year balances	——	-15,094	-42,000	-26,906	-178.3%
Total, Fissile Materials Disposition	190,069	226,054	248,089	22,035	9.7%

Site Description

Chicago Operations Office

The Chicago Operations Office (CHO) provides project and contract management support for the MOX fuel program and contract management support for the PDCF design contract. It may also prepare the solicitation for an Integrating Contractor for the Russian plutonium disposition effort.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is a multi-program laboratory in Livermore, California. LLNL is a support laboratory for the development of U.S. weapons pit disassembly and conversion technology. LLNL is also the lead laboratory for the development of immobilization technology. In FY 2001 the laboratory managed the development of technical and engineering data on the preferred ceramic plutonium form (using "can-in-canister" approach) to support facility design and the qualification of the waste form for repository disposal.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a multi-program laboratory located in Los Alamos, New Mexico. It is the lead laboratory for the development of U.S. weapons pit disassembly and conversion technology. The ARIES demonstration system, located at LANL, serves as the prototype demonstration project. The lab also provides technical services, independent design review, and independent assessment of the safety basis for the MOX FFF. LANL is also the lead laboratory for the design of a plutonium conversion line in Russia.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) is a multi-program laboratory in Oak Ridge, Tennessee. It is the lead laboratory for R&D of irradiation of MOX fuel in commercial reactors. The lab analyzes MOX fuel, advises on reactor licensing, and supervises fuel qualification R&D. ORNL is the lead laboratory for the Parallex project and also provides physics analysis of reactor types for disposition of Russian plutonium.

Pantex Plant

The Pantex Plant (Amarillo, Texas) stores surplus pits pending shipment to LANL and LLNL to support the PDCF technology demonstration. The Pantex Plan also packages and stores surplus pits for future shipment (estimated to begin around FY 2006) to the Savannah River Site for conversion in the PDCF.

Sandia National Laboratory

Sandia National Laboratory(SNL) (Albuquerque, NM) provides robotic and automation support for pit disassembly and conversion and inspection and monitoring activities.

Savannah River Site

Savannah River Site (SRS) (Aiken, South Carolina) provides design authority and site coordination services for PDCF and PIP. SRS also supports design review of MOX FFF, provides technology support for immobilization processes and equipment development, and integration of all three plutonium disposition facilities with other site support services (actual design of facilities is contracted to private sector firms). In addition, SRS provides down-blending services for off-specification HEU.

Y-12 Plant, Oak Ridge Reservation

The Oak Ridge Y-12 Plant serves as the lead for all surplus HEU disposition activities through the HEU Disposition Program Office. The Y-12 Plant also provides storage for surplus HEU pending disposition via shipment to USEC/TVA.

All Other Sites

Argonne National Laboratory (ANL) (Argonne, IL) and Pacific Northwest National Laboratory (PNNL) (Richland, WA) provided immobilization form performance testing activities in FY 2001. ANL supports ORNL on BN-600 reactor core design modifications and safety analysis. PNNL supports work on licensing and regulation development cooperating with Gosatomnadzor of Russia. The National Energy Technology Laboratory (NETL) (Pittsburgh, PA) contracts for program support and outreach activities, environmental and technical analyses to support U.S. and Russian disposition activities. In FY 2001 the Nevada Operations Office (Las Vegas, NV) contracted for repository analysis support associated with the waste forms of disposition technologies. The Oakland Operations Office contracts for development of gas reactor technology and Parallex testing of a Canadian Parallex heavy-water reactor (CANDU) option for potential future use for plutonium disposition in Russia.

U.S. Surplus Fissile Materials Disposition

Mission Supporting Goals and Objectives

As part of its nonproliferation policy, the United States seeks to eliminate, where possible, accumulation of stockpiles of surplus plutonium and HEU and to ensure that, where these materials already exist, they are subject to the highest standards of safety, security, and international accountability. After reviewing the fissile material required to support the nuclear weapons program and other national security needs, 38 MT of weapon-grade plutonium, 14 MT of non-weapon-grade and approximately 174 MT of HEU were declared surplus to national defense needs.

U.S. Plutonium Disposition

In January 1997 DOE announced it would pursue a hybrid disposition strategy for surplus U.S. plutonium. The strategy relies on two technologies: irradiation and immobilization. The former will dispose of surplus weapon-grade plutonium by converting it to MOX fuel and irradiating it in existing, domestic commercial nuclear reactors. The latter, immobilization, will dispose of surplus weapons-usable plutonium by mixing it in a ceramic and then surrounding it with vitrified radioactive high-level waste.

In January 2000 the Department issued a Record of Decision (ROD) to design, construct, and operate three new plutonium disposition facilities at SRS (South Carolina) to implement the hybrid strategy. The decision also announced that DOE will use up to 33 MT of plutonium as MOX fuel for irradiation in existing reactors and also immobilize up to 13 MT [a] of plutonium. In September 2000 the U.S. and Russia signed the U.S.-Russia Plutonium Management and Disposition Agreement. This program will continue to maintain the minimum requirements of the U.S.-Russia Agreement but a delay of some of the specified milestones will be required.

Reactor-Based Technologies/MOX Fuel Fabrication Facility (MOX FFF)

The MOX FFF will use weapon-grade plutonium oxide from the PDCF and mix it with depleted uranium oxide to make mixed-oxide fuel for use in existing domestic commercial nuclear reactors. A private consortium (Duke Engineering Services, Cogema, and Stone & Webster (DCS)) was selected in March 1999 to design, construct, and operate the MOX FFF and to provide irradiation services for fuel produced in that facility. The irradiation services include all activities needed to irradiate MOX fuel in selected NRC-licensed domestic reactors. The NRC will regulate the MOX FFF. After the anticipated 10- to 15-year operational time span (beginning in FY 2007), the MOX FFF will be decontaminated and decommissioned over a three- to four-year period.

The fabrication and irradiation of LTAs is required prior to production-scale fuel fabrication and irradiation to support irradiation services. The data from these LTAs will be used to predict the

[a] Previous estimate for immobilization was 17 MT. DOE is retaining Zero Power Physics Reactor (ZPPR) fuel (approximately 4 MT) for possible future use and has removed this material from surplus inventories. Therefore, the current estimate is 13 MT.

performance of production quantities of fuel in the domestic nuclear reactors and to support NRC licensing activities. In FY 2001 the program developed a draft integrated plan for fabricating these LTAs in Europe (Eurofab), with a backup plan to produce the assemblies as the first fuel fabricated in the MOX FFF. Fabrication of LTAs in the MOX FFF, however, will cause delays of approximately two years in achieving full-scale MOX production.

Pit Disassembly and Conversion Facility (PDCF)

PDCF will use the ARIES process — a dry pyrochemical-process which is being tested at LANL and LLNL — to convert plutonium metal. [a] This process disassembles surplus weapons pits, extracts the plutonium metal, and converts it to a plutonium oxide powder (plutonium dioxide), which is an unclassified form and suitable for use as feed material to the MOX FFF and which is also suitable for international inspection. The PDCF will be operational for ten years beginning in FY 2007 and then decontaminated and decommissioned over a period of three to four years.

Immobilization and Associated Processing Facility (Plutonium Immobilization Plant (PIP))

The third facility, PIP, will convert surplus plutonium to a homogeneous oxide which is blended with additional uranium along with ceramic and neutron absorber materials to form ceramic pucks. The "can-in-canister" approach seals these pucks in stainless-steel cans which are arranged within large canisters. These canisters are then filled with vitrified radioactive high-level waste at the Defense Waste Processing Facility (DWPF) at SRS. DOE will ultimately dispose of the canisters in a geologic repository. The technology for the immobilization approach is being developed and tested and a new facility (PIP) is required to deploy the technology. PIP is scheduled to be operational for up to ten years, after which it will be decontaminated and deactivated.

Plutonium Disposition Support System (PDSS)

To support the disposition facilities, capital infrastructure improvements are required at SRS. This project will provide integrated site support systems to all three plutonium disposition facilities, and it is anticipated that some economies of scale will be achieved. Site requirements include utilities (e.g., water, sewer, waste treatment, steam systems, electrical switch gear, and telecommunications), road networks, storm water drainage, fire protection systems, permits, archeology remediation, baseline environmental monitoring, traffic studies, trade-off studies, and topographical surveys.

[a] A full-scale ARIES demonstration system is currently operational at LANL.

U.S. Uranium Disposition

HEU Disposition

A July 1996 Record of Decision calls for eliminating the proliferation threat of stockpiles of HEU, where practical, by down-blending the material for sale as low-enriched uranium (LEU) and using it, over time, as commercial nuclear reactor fuel to recover its economic value. This material will be down-blended to LEU fuel for eventual sale to commercial utilities.

In 1994 13 MT was transferred to USEC (pursuant to the Energy Policy Act of 1992). In April 1998 title to another 50 MT of surplus HEU was transferred to USEC. The program will continue to transfer surplus HEU through FY 2005.

In addition, the program plans to blend down and transfer an additional 33 MT of off-specification HEU (not saleable in the open market) to TVA between FY 2003 and 2007 for use in TVA reactors. On February 8, 2001, DOE signed an interagency agreement with TVA. The agreement includes revenue sharing with TVA plus significant capital improvements at SRS where approximately 16 MT of the off-specification HEU will be down-blended, manufactured into fuel, and irradiated in TVA reactors.

Lifecycle costs of the off-specification HEU project requires approximately $350,000,000 to provide for infrastructure improvements at the Savannah River Site and operations at multiple sites. A portion of the $350,000,000 may be repaid by the end of the project from DOE/TVA-shared fuel savings (depending on future market prices for uranium). These actions satisfy Defense Nuclear Facilities Safety Board (DNFSB) Recommendations 94-1 and 2000-1 stabilization/disposition objectives for a portion of the HEU material. The program is also consistent with and supports the July 1996 ROD non-proliferation objectives (down blending surplus HEU to make it non-weapons usable within 15 to 20 years). This approach avoids the alternate disposition option of down blending all off-specification HEU to LEU and disposing of it as waste at a cost of over $900,000,000. Planning for the disposition of additional quantities of surplus HEU is on-going.

Supporting Activities

Surplus Plutonium Storage

In accordance with Congressional direction, in FY 2001 OFMD assumed funding responsibility for storing surplus plutonium in Zone 4 at the Pantex Plant and at the Plutonium Facility at LANL (approximately 1.5 MT) [a] At the Pantex Plant, operational costs associated with surplus plutonium storage include surveillance and maintenance operations and thermal monitoring. Storage costs at the Pantex Plant will continue to be incurred until the material is moved to SRS (shipments estimated to begin around FY 2006). In FY 2001 and 2002 the Office of Defense Programs (DP) will continue to repackage into sealed-insert (SI) storage containers the national security and surplus pits at the Pantex Plant to provide a more controlled storage environment.

[a]Previously the Office of Defense Programs (DP) was responsible for funding this activity.

Surplus pits at the Pantex Plant need to be shipped to the PDCF (at SRS) where pits will be converted to plutonium oxide suitable for fabrication into MOX fuel. Because DOE does not have a shipping container that can perform this function, OFMD initiated a five-year effort in FY 2000 to design, test, certify, and fabricate a new pit shipping container to transport surplus pits from the Pantex Plant to SRS.

Surplus HEU Storage

In FY 2001 operations costs associated with storing 85 MT of surplus HEU residing at the Y-12 Plant were transferred from DP to the Fissile Materials Disposition program. These costs include planning, providing and maintaining storage facilities, and surveillance for surplus HEU materials and facilities.

NEPA

NEPA activities include follow-up EAs and supplemental NEPA analyses for fissile material storage and disposition activities (e.g., transuranic (TRU) waste processing options, changed reactor configuration for the irradiation of MOX fuel, etc.). In addition, NEPA efforts include preparing supplements and amended RODs.

Common Technologies

As specified in the U.S.-Russia Plutonium Management and Disposition Agreement, DOE will participate in government-to-government technical negotiations with Russia to develop a detailed inspection and monitoring regime, which will be implemented at plutonium disposition facilities in both countries. The regime will provide inspection and monitoring throughout the plutonium disposition process to confirm that the obligations set forth in the Agreement are being met and the resulting spent fuel and immobilized forms meet agreed criteria. The Common Technologies program also conducts studies for the U.S. Surplus Fissile Materials Program.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Operations and Maintenance					
U.S. Plutonium Disposition	95,508	89,366	76,000	-13,366	-15.0%
U.S. Uranium Disposition	5,595	9,955	26,000	16,045	161.2%
Supporting Activities	27,895	17,448	28,089	10,641	61.0%
Subtotal, Operations and Maintenance	128,998	116,769	130,089	13,320	11.4%
Construction	31,126	69,778	103,000	33,222	47.6%
Total, U.S. Surplus Fissile Materials Disposition	160,124	186,547	233,089	46,542	24.9%

Detailed Program Justification

(dollars in thousands)

FY 2000	FY 2001	FY 2002

U.S. Plutonium Disposition

Reactor-Based Technologies 33,100 36,263 52,000

Continue work activities for MOX fuel qualification, fuel irradiation services, and fuel packaging. Complete review of Title II (detailed) design, complete fuel packaging design, begin implementing the integrated plan for fabricating MOX fuel LTAs in Europe (Eurofab) or as a backup plan, in the MOX FFF, and complete the mission reactors modification plan. Conduct experimental work to more fully characterize and verify plutonium oxide powder characteristics to support PDCF and MOX FFF. Provide expanded analysis to prepare the Integrated Safety Analysis (ISA) that is part of the MOX FFF license application.

The increase is due to initiation of the LTA integrated plan, increased workscope requirements for plutonium oxide powder characterization, additional NRC information needs, expanded ISA analysis and preparation, and increased equipment specification preparation. Funding for the LTA integrated plan precludes deferral of the LTA program. Fabricating and testing LTAs on the current schedule is crucial to enable start of the MOX FFF at full capacity in FY 2007. The plutonium oxide powder funds reduce the risk of redesigning equipment needed for criticality prevention and ensures optimal performance, thereby potentially avoiding a three-month design and licensing schedule delay which would increase costs ($2,000,000 - $3,000,000) for the equipment redesign. The funding for the ISA will preclude delaying the FY 2003 construction start schedule by approximately two to three months. This funding precludes a one-year delay of large-scale implementation of MOX fuel.

Pit Disassembly and Conversion 29,374 26,970 21,000

Continue limited upgrades of the ARIES prototype system and demonstrating the ARIES technology, continue disassembly of pit types with the eventual goal of completing disassembly of every pit type

destined for the PDCF, and continue limited laboratory and host-site design support for the PDCF. *The decrease is due to reduced production-mode testing and technology demonstration activities.*

Immobilization and Associated Processing 32,279 20,899 3,000

In FY 2001 OFMD prepared a demobilization plan and initiated a phased suspension of immobilization activities. In FY 2002 OFMD will complete the suspension. Suspension activities include completing documentation of all workscope completed to date, placing components and equipment in storage, and decontamination and disposal (if necessary) of contaminated gloveboxes and equipment. *The decrease is due to suspended activities in FY 2002.*

Repository Impacts 755 299 0

No planned activities.

Plutonium Disposition Support System (PDSS) 0 4,935 0

In FY 2001 developed a DOCDR and suspended PDSS activities pending completion of the Administration's review of the U.S.-Russian nonproliferation programs.

Total, U.S. Plutonium Disposition 95,508 89,366 76,000

U.S. Uranium Disposition

Highly Enriched Uranium (HEU) 3,735 9,955 26,000

- **S** Continue surplus HEU planning, project management, HEU disposition technical support and special studies, and inventory management. Continue certification and procurement of the new ES-2100 shipping containers which are needed to ship HEU broken metal and oxides. Develop a new ES-2100 Safety Analysis Report for Packaging (SARP) for HEU oxide contents.
- **S** As part of the transfer of 50 MT to USEC, continue shipping surplus HEU (9 MT) from the Y-12 Plant to USEC for blend down to commercially usable LEU.
- **S** As part of the Off-Spec HEU project with TVA, continue SRS and Y-12 Plant operations leading to blend down and off-site shipments. Begin packaging and shipping activities for HEU metal at the Y-12 Plant; start training personnel and other operational preparations at SRS.
- **S** *The increase is due to the development of a new ES-2100 SARP and certification and procurement of the ES-2100 shipping container. These funds preclude a one-year delay in procurement and certification of the shipping container which will replace the 6M container which is being phased out. The increase is also due to initiation of packaging and shipping*

(dollars in thousands)

activities and start up preparations at SRS. The funds are needed to preclude termination of the HEU Off-Spec Fuel Project and the TVA interagency agreement signed in February 2001. The cost to terminate is approximately $22,400,000 ($18,400,000 operating; $4,000,000 construction). The alternative to stabilize the material will take longer and cost more than the projected $350,000,000; the waste disposal option would cost over $900,000,000.

#	**U-233 Disposition**	1,860	0	0

In FY 2000 the Secretary of Energy directed the Offices of Nuclear Energy and Environmental Management to conduct a program which will use the U-233 for isotopes as a source for cancer treatment. *The decrease is due to termination of the U-233 effort by OFMD.*

Total, U.S. Uranium Disposition	5,595	9,955	26,000

Supporting Activities

#	**Surplus Plutonium Storage**	12,500	7,842	12,000

Continue storing surplus plutonium at the Pantex Plant and LANL. Continue to package pits for shipment from the Pantex Plant to LANL for the ARIES demonstration system; the pits are needed as feed material to validate equipment for the PDCF.

Surplus pits at the Pantex Plant need to be shipped to the PDCF (at SRS) where they will be converted to plutonium oxide suitable for fabrication into MOX fuel. Because OFMD does not have an adequate shipping container that can perform this function, the program initiated a five-year effort in FY 2000 to design, test, certify, and fabricate a new pit shipping container to transport surplus pits from the Pantex Plant to SRS. In FY 2002 the program will complete the design of the shipping container, prepare the Safety Analysis Report for Packaging (SARP), and initiate the certification process for the container.

Based on the results of a FY 2000 DP storage requirements study, LANL vault upgrades are needed to provide additional space to store plutonium materials generated by the ARIES demonstration system, thereby enabling continued operations of the ARIES demonstration. In FY 2002 the program will complete the LANL vault upgrades (initiated in FY 2001). At the Pantex Plant, OFMD must add surveillance testing to the outer pit storage container to allow potential detection of container corrosion and comply with DOE specifications and commitments to the DNFSB.

The increases are due to new vault upgrades for ARIES material storage at LANL and new Pantex Plant surveillance requirements (both of which were identified by Defense Programs after submission of the FY 2001 Congressional Budget). The increase is also due to certification testing of a new pit shipping container needed to ship pits in time for disposition at the PDCF. Funding

(dollars in thousands)

will prevent a potential one-year schedule slip of the certification and SARP and also preclude impacts to the program's critical path.

#	**Surplus HEU Storage**	12,505	6,006	6,000

Continue to store 85 MT of surplus HEU at the Y-12 Plant until the material is moved to the disposition (blending) site (begun in FY 2000 and estimated to end in FY 2020). Storage operations include planning, providing and maintaining storage facilities, and surveillance.

#	**NEPA**	2,400	2,550	1,500

These funds will support follow-up EAs and supplemental NEPA analyses (e.g., changes to the existing disposition approach). Coordinate, review, and comment on the NRC's EIS for the MOX FFF. *The decrease is due to completion in FY 2001 of detailed NEPA documents.*

#	**Common Technologies and Integration**	490	1,050	8,589

- Provide technical support to the U.S. government during the negotiations required by the U.S.-Russia Plutonium Management and Disposition Agreement to develop an inspection and monitoring regime for plutonium disposition. Support will also include development of guidance to U.S. design engineers on inspection and monitoring specifications that need to be taken into account in the design of the facilities. The Agreement requires these negotiations be concluded prior to the construction of Russian facilities.
- Initiate a transportation study to identify, evaluate, and integrate all packaging and transportation requirements and to identify shortfalls (including shipping containers) for the plutonium disposition program. This study will provide interface activities at SRS during facility design to avoid additional costs in later years and to minimize non-compliance issues with DOE shipping specifications. Interface activities address requirements such as the right type and size of the transportation/shipping container and availability of vehicles. Complete an evaluation begun in FY 2001 to identify alternative plutonium disposition options. *The increase is for technical support of the U.S.-Russia Plutonium Management and Disposition Agreement, a new transportation study for the plutonium disposition program, and the alternate plutonium disposition evaluation.*

Total, Supporting Activities	27,895	17,448	28,089
Subtotal, U.S. Surplus Fissile Materials Disposition	128,998	116,769	130,089

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Construction	31,126	69,778	103,000
# See "Capital Operating Expenses and Construction Summary" for details. *The increase is for the following: complete Title II (detailed) design, begin site preparation, and initiate long-lead equipment procurement for the MOX FFF. The increase is also due to ramp up of activities for Off-Specification HEU Blend Down capital improvements.*			
Total, U.S. Surplus Fissile Materials Disposition	160,124	186,547	233,089

Russian Surplus Fissile Materials Disposition

Mission Supporting Goals and Objectives

As part of the U.S. government's nonproliferation strategy, the U.S. initiated a dialog with Russia to address the problem of excess fissile materials weapon programs. At the January 1994 Moscow Summit, the U.S. and Russia agreed to cooperate on measures to prevent the accumulations of excess stocks of weapons-usable fissile materials. At the Moscow Nuclear Safety and Security Summit in April 1996, the G-7 nations and Russia agreed that a hybrid approach of irradiation and immobilization represented appropriate strategies for disposing of surplus plutonium. Both technologies convert plutonium to spent fuel or some other form equally as difficult to recover and use in nuclear weapons.

In September 1997 Russia declared that up to 50 metric tons (MT) of weapon-grade plutonium and up to 500 MT of highly enriched uranium (HEU) were surplus to Russian defense needs. In July 1998 the U.S. and Russia signed the Agreement between the Government of the United States of America and the Government of the Russian Federation on Scientific and Technical Cooperation in the Management of Plutonium That Has Been Withdrawn From Nuclear Military Programs to conduct tests and demonstrations of proposed plutonium disposition technologies. In September 1998 the U.S. and Russia agreed to remove 50 MT of plutonium from their respective nuclear weapons programs in stages and convert this material so that it could never be used again in nuclear weapons. They also committed to enter into a bilateral plutonium disposition agreement between the U.S. and Russia.

In September 2000 the U.S. and Russia signed the U.S.-Russia Plutonium Management and Disposition Agreement. The Agreement defines detailed strategies for implementing disposition activities in both the U.S. and Russia and it specifies the technological approach and facilities to be constructed in Russia. A subsequent effort includes multilateral negotiations to at least double the rate of surplus weapon-grade plutonium disposition in Russia (from 2 MT to 4 MT (or more) per year) and in the U.S. The Agreement calls for financial commitments for a substantial portion of this program from the U.S. and the international community.

Prior-year appropriations have only funded small-scale tests, demonstrations, and feasibility studies on design of facilities with a 2-MT annual capacity to convert plutonium metal to plutonium oxide, a feedstock for MOX fuel. Congress appropriated $22,000,000 from FY 1992 to 1998 and $25,000,000 in FY 1999 to support the Scientific and Technical Cooperation Agreement. To provide additional support for surplus weapon-grade plutonium disposition activities in Russia, the FY 1999 Emergency Supplemental appropriated $200,000,000, of which $49,000,000 was used to offset prior-year balances in FY 2000.

The Administration will consider requesting additional funding through the normal appropriations process if multi-lateral funding for the Russian program is not identified. The United Kingdom, France, and Japan have collectively pledged the equivalent of an additional $200,000,000, but significantly more funding is needed to fully implement the U.S.-Russia Plutonium Management and Disposition Agreement. G-8 leaders agreed to develop additional multilateral arrangements and an international financing plan by the next G-8 Summit in Genoa for assisting Russia's plutonium disposition program. The Department of State is leading U.S. efforts to realize these arrangements and plans.

Russian Plutonium Disposition

Because Russia views surplus plutonium as an important energy source, Russia's plutonium disposition strategy supports nuclear reactors and power generation. Russia plans to disposition all surplus plutonium in reactors after converting plutonium metal to an oxide form and subsequently manufacturing it into MOX fuel.

The Office of Fissile Materials Disposition is funding initial expenditures in the Russian Federation to implement the U.S.-Russia Plutonium Management and Disposition Agreement to dispose of Russian plutonium withdrawn from nuclear military programs.

To support the disposition of the excess Russian plutonium, the U.S. and Russia developed a plutonium disposition roadmap and a nominal schedule for the Russian plutonium disposition program. This roadmap includes technology development of plutonium conversion and nondestructive assay, irradiation of MOX fuel in fast and thermal reactors, and immobilization of plutonium waste. Key elements include assisting Russia to accomplish the following:

- Design and build a demonstration facility for converting weapons-origin plutonium metal to an oxide form for use in MOX fuel and suitable for international inspection (pending an evaluation of the need for this facility).
- Develop a MOX fuel fabrication process that would be compatible with surplus weapon-grade plutonium, testing the resulting fuel, and qualifying it for use in VVER-1000 reactors and the BN-600 reactor.
- Assess the feasibility of converting Russia's BN-600 reactor, a fast-neutron reactor, into a net burner of plutonium.
- Examine the technical feasibility of using the Canadian Parallex heavy-water reactors (CANDU) by burning a small quantity of MOX fuel made from surplus U.S. and Russian weapon-grade plutonium in a Canadian test reactor. Irradiating MOX fuel in Canadian nuclear reactors is one of several options being examined to expand Russia's capacity to disposition surplus weapon-grade plutonium.
- Develop glass and ceramic technologies suitable for immobilizing plutonium-containing materials at Russian sites.

Support and Oversight in the U.S.

This program provides U.S. support to and oversight and management of plutonium disposition activities in Russia as defined in the U.S.-Russia Plutonium Management and Disposition Agreement.

Advanced Reactor Technology

A joint U.S.-Russian development program for the GT-MHR technology may provide additional capability to dispose of surplus Russian weapon-grade plutonium. Funding for this program will be spent only if international partners provide significant matching sums to continue development of GT-MHR in Russia. The Russian Federation Ministry of Atomic Energy should also continue to match the funds

provided by the U.S., as it has in previous years. The U.S. will solicit financial commitments from other nations to continue development of this technology.

Funding Schedule

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Russian Fissile Materials Disposition					
Russian Plutonium Disposition	4,168	16,650	42,000	25,350	152.3%
Support and Oversight in the U.S.	20,777	28,000	14,000	-14,000	-50.0%
Total, Russian Fissile Materials Disposition	24,945	44,650	56,000	11,350	25.4%
Advanced Reactor Technology	5,000	9,857	1,000	-8,857	-89.9%
Subtotal, Russian Surplus Fissile Materials Disposition	29,945	54,507	57,000	2,493	4.6%
Less Use of Prior-Year Balances [a]	——	-15,000	-42,000	-27,000	-180.0%
Total, Russian Surplus Fissile Materials Disposition	29,945	39,507	15,000	-24,507	-62.0%

Detailed Program Justification

(dollars in thousands)

FY 2000	FY 2001	FY 2002

Russian Fissile Materials Disposition

Russian Plutonium Disposition

As specified in the U.S.-Russia Plutonium Management and Disposition Agreement signed in September 2000, funding from new budget authority and the FY 1999 Emergency Supplemental Appropriation continue the work initiated in FY 2001. *Increases are due to initiation of the following: preliminary design of industrial-scale plutonium conversion facility, design of modifications to facilities for the fabrication of MOX LTAs, preliminary design of an industrial-scale MOX facility, and BN-600 reactor plant life extension studies.*

▸ **Plutonium Conversion**	540	4,500	12,000

In FY 2001 supported the development of the selected process to convert plutonium metal to oxide, determined the technology and site for plutonium conversion, and initiated the design of plutonium conversion demonstration facility. In FY 2002 continue the design of the plutonium conversion demonstration facility and begin the preliminary design of an industrial-scale plutonium conversion facility.

[a]Obligational plan for $200,000,000 provided by Congress in the FY 1999 Emergency Supplemental Appropriation. FY 2001 funds will be spent after the submission of a detailed budget justification which is included in this document.

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
▸ **Immobilization**	2,140	1,500	4,000

In FY 2001 completed technical and engineering feasibility studies for plutonium immobilization at the Krasnoyarsk-26 Chemical and Mining Combine (K-26) and initiated contract negotiations for immobilization work at Seversk/Tomsk7. In FY 2002 continue the studies and evaluation of immobilization options.

▸ **MOX Fuel Fabrication**	0	4,000	13,000

In FY 2001 supported the R&D required to develop and fabricate MOX fuel for utilization in Russian VVER-1000 and BN-600 reactors and developed the schedule for plant activities to burn MOX fuel at the Balakovo Nuclear Power Plant. In FY 2002 initiate the design of modifications to facilities for the fabrication of MOX LTAs and begin the preliminary design of an industrial-scale MOX facility.

▸ **VVER-1000/BN-600 Reactors**	1,488	5,000	10,500

FY 2001 activities include the following: initiated PIE of previously irradiated BN-600 reactor MOX fuel and developed plans for BN-600/VVER-1000 reactors MOX fuel insertion studies; continued the BN-600 reactor hybrid core design and the safety analysis which will produce a licensable design in Russia for plutonium disposition, and designed equilibrium 30 percent MOX core for the VVER-1000 reactor. Continued work on safety analysis, design modification, and the fuel qualification programs for the VVER-1000 and BN-600 reactors and shipped U.S. and Russian MOX fuel pins/rods to Canada for the Parallex test. FY 2002 activities include initiating the BN-600 reactor plant life extension studies; continuing the work on BN-600/VVER-1000 reactor MOX fuel insertion studies, and continuing the BN-600 reactor hybrid core design and safety analysis.

▸ **Licensing and Regulation and Other Logistical Support**	0	1,650	2,500

In FY 2001 executed Gosatomnadzor (GAN) task orders for regulatory document outlines, roadmapping, and Parallex licensing. Began work on the regulatory and licensing process in GAN and continued to provide technical assistance for the Russian regulatory infrastructure. In FY 2002 continue the development and review of new Russian licensing regulations.

Subtotal, Russian Plutonium Disposition	4,168	16,650	42,000
Less Use of Prior-Year Balances	0	-15,000	-42,000
Total, Russian Plutonium Disposition	4,168	1,650	0

# Support and Oversight in the U.S.	20,777	28,000	14,000

FY 2000 and 2001 funding primarily supported work begun under the 1998 Scientific and Technical Cooperation Agreement. FY 2001 activities include participating in the Russian conversion technology and site selection for an industrial-scale plutonium conversion facility and initiating the PIE of previously irradiated BN-600 reactor MOX fuel. In FY 2002 the program focuses on U.S. support to and oversight of the work performed in Russia as defined in the U.S.-Russia Plutonium Disposition and Management

(dollars in thousands)

	FY 2000	FY 2001	FY 2002

Agreement. FY 2002 activities include the following: Complete the review of deliverables from Russian design activities for the plutonium conversion demonstration and industrial-scale facilities, review the design and procurement for the VVER-1000 reactor LTA line, initiate breeder blanket replacement activities for BN-600 reactors, and complete the review of deliverables from Russian design activities for the MOX LTA facilities. *The increase in the use of prior-year funds available to spend in Russia which results in less U.S. funds required to be obligated in Russia.*

Subtotal, Russian Fissile Materials Disposition	24,945	44,650	56,000
Less Use of Prior-Year Balances	0	-15,000	-42,000
Total, Russian Fissile Materials Disposition	24,945	29,650	14,000

Advanced Reactor Technology 5,000 9,857 1,000

In FY 2001, continued preliminary design of the GT-MHR and defined the preliminary Russian licensing process for the GT-MHR. Also initiated the following: Level 1 and Level 2 Roadmap effort defining the development, design, licensing, and construction activities required to develop a GT-MHR in Russia; the construction of a Bench-Scale Fuel Fabrication Facility at Bochvar; and a detailed cost and schedule development effort for the GT-MHR.

In FY 2002 continue work in Russia using prior-year balances. Activities include completing the preliminary design of the GT-MHR, completing the development and authorizing at least 33 percent work scope for final design of the GT-MHR, and commencement of testing and fabrication of test fuel at the Bench-Scale Fuel Fabrication Facility at Bochvar. *The decrease is due to reduced U.S. activities. Work in Russia will continue using prior-year balances.*

Subtotal, Russian Surplus Fissile Materials Disposition	29,945	54,507	57,000
Less Use of Prior-Year Balances	0	-15,000	-42,000
Total, Russian Surplus Fissile Materials Disposition	29,945	39,507	15,000

Explanation of Funding Changes from FY 2001 to FY 2002

	FY 2002 vs. FY 2001 ($000)
U.S. Surplus Fissile Materials Disposition	
U.S. Plutonium Disposition	
# Reactor-Based Technologies	
The increase is due to initiation of the LTA integrated plan, increased workscope requirements for plutonium oxide powder characterization, additional NRC information needs, expanded ISA analysis and preparation, and increased equipment specification preparation.	15,737
# Pit Disassembly and Conversion	
The decrease is due to reduced production-mode testing and technology demonstration activities.	-5,970
# Immobilization and Associated Processing	
The decrease is due to suspended activities.	-17,899
# Repository Impacts	
The decrease is due to no planned activities.	-299
# Plutonium Disposition Support System	
The decrease is due to no planned activities.	-4,935
Total, U.S. Plutonium Disposition	-13,366
U.S. Uranium Disposition	
# Highly Enriched Uranium (HEU)	
The increase is due to development of a new ES-2100 SARP and certification and procurement of the ES-2100 shipping container. Increases are also due to initiation of off-specification HEU blend down-related packaging and shipping activities and start up preparations at SRS.	16,045
Total, U.S. Uranium Disposition	16,045

	FY 2002 vs. FY 2001 ($000)
Supporting Activities	
# Surplus Plutonium and HEU Storage	
The increases are due to the following: 1) new vault upgrades for ARIES material storage at LANL and new Pantex Plant surveillance requirements (both of which were identified by Defense Programs after submission of the FY 2001 Congressional Budget) and 2) certification testing of a new pit shipping container needed to ship pits in time for disposition at the PDCF.	4,152
# NEPA	
The decrease is due to completion in FY 2001 of detailed NEPA documents.	-1,050
# Common Technologies and Integration	
The increase is for technical support of the U.S.-Russia Plutonium Management and Disposition Agreement, a new transportation study for the plutonium disposition program, and the alternate plutonium disposition options evaluation.	7,539
Total, Supporting Activities	10,641
Subtotal, U.S. Surplus Fissile Materials Disposition	13,320
Construction	
The increase is for the following: complete Title II (detailed) design, begin site preparation, and initiate long-lead equipment procurement for the MOX FFF and increased activities for Off-Specification HEU Blend Down capital improvements.	33,222
Total, U.S. Surplus Fissile Materials Disposition	46,542
Russian Surplus Fissile Materials Disposition	
Russian Fissile Materials Disposition	
# Russian Plutonium Disposition	
Increases are due to initiation of the following: preliminary design of industrial-scale plutonium conversion facility, design of modifications to facilities for the fabrication of MOX LTAs, preliminary design of an industrial-scale MOX facility, and BN-600 reactor plant life extension studies.	25,350

	FY 2002 vs. FY 2001 ($000)
# Support and Oversight in the U.S.	
The increase in the use of prior-year funds available to spend in Russia which results in less U.S. funds required to be obligated in Russia.	-14,000
Subtotal, Russian Fissile Materials Disposition	11,350
Less Use of Prior-Year Balances	-27,000
Total, Russian Fissile Materials Disposition	-15,650
Advanced Reactor Technology	
The decrease is due to reduced U. S. activities.	-8,857
Total, Russian Surplus Fissile Materials Disposition	-24,507
Total Funding Change, Fissile Materials Disposition	22,035

Capital Operating Expenses and Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Capital Equipment	8,200	8,000	——	-8,000	-100%
Total, Capital Operating Expenses	8,200	8,000	——	-8,000	-100%

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC) [a]	Prior Year Appropriations	FY 2000	FY 2001	FY 2002	Unappropriated Balance
99-D-141 Pit Disassembly & Conversion Facility	TBD	20,000	18,751	19,956	16,000	TBD
TBD01-D-142 Immobilization & Associated Processing Facility	TBD	——	——	2,993	——	TBD
99-D-143 Mixed Oxide (MOX) Fuel Fabrication Facility	TBD	28,000	12,375	25,943	63,000	TBD
01-D-407 Highly Enriched Uranium (HEU) Blend Down Project	74,900	——	——	20,886	24,000	30,014
Total, Construction		48,000	31,126	69,778	103,000	30,014

[a]Total Estimated Cost (TEC) estimates will be determined when the facility construction cost and schedule baselines are established at the completion of Title I (preliminary) design. The baselines will be included in the FY 2003 Congressional Budget.

99-D-141, Pit Disassembly and Conversion Facility, Savannah River Site, Aiken, South Carolina

(Changes from FY 2001 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

The design cost has increased from $47.396M to $93.2M due to design modifications resulting from increased work scope, additional engineering studies, implementation of studies and recommendations, incorporation of Savannah River Site specific requirements into the facility design, and the adoption of DNFSB preferences into the facility design.

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 2000 Budget Request *(A-E and technical design only)*	2Q 1999	4Q 2001	2Q 2001	4Q 2004	[a]	[a]
FY 2001 Budget Request *(Preliminary Estimate)*	3Q 1999	1Q 2002	1Q 2002	3Q 2005	[a]	[a]
FY 2002 Budget Request *(Preliminary Estimate)*	3Q 1999	TBD	TBD	TBD	[a]	[a]

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design, Long-Lead Equipment, and Site Preparation			
1999	20,000	20,000	211
2000	18,751	18,751	13,449
2001	19,956	19,956	25,000
2002	16,000	16,000	26,000
2003	58,200	58,200	64,547
2004	24,300	24,300	28,000

[a]Total Estimated Cost (TEC) and Total Projected Cost (TPC) estimates will be determined when the facility construction cost and schedule baseline are established at the completion of Title I (preliminary) design. The baseline will be included in the FY 2003 Congressional Budget.

3. Project Description, Justification and Scope

The PDCF is a complex consisting of a hardened building (that will contain the plutonium processes) and conventional buildings and structures (which will house support personnel, systems, and equipment). The plutonium processing building will be a material access area of 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 involving 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. This facility is equipped with lag storage for incoming pit materials and one-year lag storage for finished oxide. The facility will be operational for ten years beginning in FY 2007, after which the facility will be decontaminated and decommissioned over a three- to four-year period. The project consists of the following: 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; and associated supporting equipment, components, and systems. The facility will be constructed to Nuclear Regulatory Commission (NRC) licensing standards but will not be licensed by the NRC.

To meet the construction schedule and complete all testing requirements, purchase orders must be placed for equipment which has long-lead time for design and fabrication. The lead time for the equipment ranges from 18 months to three years. Many of these, such as the Material Control and Accounting computer system, must be fully demonstrated in a cold environment to be fully operational and to reliably account for special nuclear material prior to any hot testing. The lead time for the hot and cold testing is approximately 31 months. As a result, purchase orders must be placed in FY 2003 for manufacturing of the equipment to support the project schedule. The long-lead equipment includes: vault security door and embedment, interbox conveyor system, integrated computer systems, transuranic waste assay enclosures, plutonium conversion reactors, and robotic handling systems. At the completion of Title I (preliminary) design in FY 2002, the construction cost and schedule baseline will be established. Current construction estimates are based on a conceptual design.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design, Drawings, and Specifications)	67,779	33,383
Design Management costs @ 10% of Above Costs	6,778	3,908
Total, Design Phase	74,557	37,291
Contingencies at approximately 25% of above costs		
Design Phase	18,639	10,105
Total, Design Costs	93,196	47,396
Long-Lead Equipment and Site Preparation (incl. M&O Support)	64,011	26,355
Total Agency Requirement (Design, Long-Lead Equipment, and Site Preparation)	157,207	73,751

5. Method of Performance

A cost plus fixed-fee contract was awarded in June 1999 for the preliminary and detailed design of the PDCF. The procurement strategy includes an option for construction inspection services (Title III) for which a decision will be made at the end of the Title I (preliminary) design phase. A purchase order for procurement of long-lead equipment fabrication will be issued in FY 2003.

It is anticipated that a fixed-price construction contract will be awarded on the basis of competitive bidding.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 2000	FY 2001	FY 2002	Outyears	Total
Design Cost						
Design	20,000	17,396	13,300	15,200	27,300	93,196
Total Design (Federal and Non-Federal)	20,000	17,396	13,300	15,200	27,300	93,196
Long-Lead Equipment and Site Preparation (incl. M&O Support)	——	1,355	6,656	800	55,200	64,011
Total Agency Requirement (Design, Long-Lead Equipment, and Site Preparation)	20,000	18,751	19,956	16,000	82,500	157,207

7. Related Annual Funding Requirements

(dollars in thousands)

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

[a]Annual facility operating costs will be defined at the completion of Title I (preliminary) design and reflected in the FY 2003 Congressional Budget.

99-D-143, Mixed Oxide Fuel Fabrication Facility, Savannah River Site, Aiken, South Carolina

(Changes from FY 2001 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

| The design cost has increased from $65.4M to $92.3M due to the recharacterization of a portion of project operating costs as Total Estimated Cost (TEC) components, adjustment of DOE contingency, cost growth related to physical security design requirements, and schedule slips resulting from late issuance of the January 1997 Surplus Plutonium Disposition Record of Decision (ROD).

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 2000 Budget Request *(A-E and technical design only)*	2Q 1999	4Q 2001	1Q 2002	4Q 2005	[a]	[a]
FY 2001 Budget Request *(Preliminary Estimate)*	2Q 1999	3Q 2002	4Q 2002	1Q 2006	[a]	[a]
FY 2002 Budget Request *(Preliminary Estimate)*	2Q 1999	4Q 2002	2Q 2003	1Q 2007	[a]	[a]

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
Design, Long-Lead Equipment, and Site Preparation			
1999	28,000	9,600	2,546
2000	12,375	30,775	33,512
2001	25,943	25,943	30,000
2002	63,000	63,000	63,000
2003	9,000	9,000	9,000

[a]Total Estimated Cost (TEC) and Total Projected Cost (TPC) estimates will be determined when the facility construction cost and schedule baseline are established at the completion of Title I (preliminary) design. The baseline will be included in the FY 2003 Congressional Budget.

3. Project Description, Justification and Scope

A MOX FFF will provide the U.S. with the capability to convert plutonium oxide derived from surplus weapons grade plutonium stocks to MOX fuel suitable for use as a fuel source in U.S. commercial nuclear reactors. Subsequent disposal of the spent fuel will be carried out in accordance with the Nuclear Waste Policy Act.

A contract was awarded to a private consortium (Duke Engineering Services, Cogema, and Stone & Webster (DCS)) on March 22, 1999. The contract requires that DCS design a MOX FFF to be built at a DOE site (SRS)and licensed by the Nuclear Regulatory Commission.

The MOX FFF will produce completed MOX fuel assemblies for use in existing domestic, commercial nuclear power reactors. The MOX FFF will be designed to receive and process 3.5 MT of plutonium dioxide powder from the PDCF over a ten-year period, and house about two-years storage for the incoming plutonium dioxide. Design of the MOX FFF is based on processes and facilities currently being successfully operated in Europe, specifically the MELOX and La Hague facilities. The MOX fuel fabrication design will replicate the automated MELOX facility design and will include lessons learned from operations and maintenance experiences. The MOX FFF will be designed and built to meet U.S. codes, standards, and regulatory requirements (Americanization process). After completing its mission, the facility will be deactivated, decontaminated, and decommissioned over a three- to four-year period.

The MOX FFF will require approximately 320,000 square feet to perform all material processing and fabrication operations to produce MOX fuel. Specific MOX FFF operations include the following: aqueous polishing (to purify plutonium before fabrication into fuel); blending and milling; pelletizing; sintering; grinding; fuel rod fabrication; fuel bundle assembly; storage of feed material, pellets, and fuel assemblies; a laboratory; and space for use by IAEA. The facility also requires 120,000 square feet of structures adjacent to the MOX process buildings for secure shipping and receiving, material receipt, secure warehousing, utilities, administration, and technical support. The current process and support building space is greater than the Design-Only Conceptual Design Report (DOCDR) as a result of design work performed to date that reflects a better understanding of facility functions requirements. The current MOX FFF design includes full automation, an increased storage area, and a laboratory which were not reflected in the DOCDR. In addition, enhanced seismic, life safety, and physical security features are included in the current design to meet U.S. requirements.

Recharacterizations: After submission of the FY 2001 Congressional Budget, DOE determined that certain DCS fees, management reserve, and management costs in the contract need to be recharacterized as TEC. This change does not represent an increase in scope or cost to the Government.

Contingency: DOE needs to adjust contingency funding, which was previously underestimated.

Cost Growth: Two issues have resulted in cost growth of the TEC. The first relates to increasing MOX FFF design requirements for physical security to make the design more robust and able to withstand NRC and DOE design basis threats. The second relates to a schedule slip in the MOX FFF design effort that resulted from the late Surplus Plutonium Disposition EIS ROD.

Overall design is 35 percent complete (as of December 2000). Title I (preliminary) design began in mid FY 1999 and was completed in December 2000. Title II (detailed) design activities are currently underway. Based on Title I (preliminary) design information, preliminary cost estimates have been revised to reflect the design and construction cost increases. The initial project performance baseline, which is expected to be completed in FY 2001, will be included in the FY 2003 Congressional Budget. Independent cost estimates have been performed on the Title I (preliminary) design. The schedule baseline for long-lead procurement and construction has been adjusted to accommodate modified design schedule and NRC licensing requirements.

In FY 2002 activities include initiation of long-lead procurement which required to ensure timely installation of equipment during the physical construction phase. The majority of the long-lead equipment consists of the MOX process equipment: receiving, powder, pellets, cladding, rod control, assembly, and partial laboratory equipment. Time frames for the long-lead procurement are based on the analysis of the MELOX experience. Funding for this long-lead equipment will allow the MOX program to maintain the schedule, which include the FY 2003 construction start, FY 2006 construction plant start-up, and FY 2007 full-scale operations start date (to meet the irradiation start date). Physical construction begins in FY 2003. FY 2002 site preparation consists of surveys, land clearing, roads, temporary utilities, and communications necessary to begin construction in FY 2003.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design, Drawings and Specifications)	73,300	49,043
Design Management costs at 10% of above costs	7,700	5,088
Total, Design Phase	81,000	54,131
Contingencies at approximately 14% of above costs [a]		
Design Phase	11,318	11,244
Total Design	92,318	65,375
Long-Lead Equipment and Site Preparation (incl. M&O Support)	46,000	NA
Total Agency Requirement (Design, Long-Lead Equipment, and Site Preparation)	138,318	65,375

[a]The DOE design contingency was previously established at 21 percent based on DOCDR baseline. The current contingency has been modified to 14 percent to reflect a more realistic figure based on establishing the MOX FFF project baseline, assessing known project risks, and considering preliminary NRC feedback from technical exchange meetings.

5. Method of Performance

The procurement strategy calls for a base contract with three options. The first step was completed on March 22, 1999 when DOE awarded a contract to DCS who would provide MOX fuel fabrication and irradiation services. This base contract includes the design and licensing of the MOX FFF, fuel qualification activities, and reactor license modifications.

Sequential contract options includes construction (Option 1), operations (Option 2), and facility deactivation (Option 3). It is expected that an incentive contract with the consortium will be the most appropriate and cost beneficial for the construction work. The construction will 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, contractor operated. It is expected that, during the operational phase of the consortium contract, facility operational costs will be partially offset by the value of the MOX fuel which will displace the low-enriched uranium (LEU) that utility companies would have otherwise purchased.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 2000	FY 2001	FY 2002	Outyears [a]	Total
Design Cost						
Design	28,000	12,375	25,943	26,000	——	92,318
Total Design (Federal and Non-Federal)	28,000	12,375	25,943	26,000	——	92,318
Long-Lead Equipment and Site Preparation (incl. M&O Support)	——	——	——	37,000	9,000	46,000
Total Agency Requirement (Design, Long-Lead Equipment, and Site Preparation)	28,000	12,375	25,943	63,000	9,000	138,318

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	[b]	[a]

[a]Assumes no schedule slips.

[b]Annual costs will be defined during Title I (preliminary) design and included in the FY 2003 Congressional Budget.

01-D-407, Highly Enriched Uranium (HEU) Blend Down Project, Savannah River Site, Aiken, South Carolina

(Changes from FY 2001 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

| # The project schedule and associated funding requirements have been changed to support a later start date (November 1, 2000) than anticipated in the FY 2001 Budget Request.

| # The planned project baseline date (at 35 percent design) has moved from February 2001 to September 2001.

| # The $10,000,000 anticipated from TVA, originally planned for early project funding in FY 2000, is now included in Congressional Budget Request.

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 2001 Budget Request *(Preliminary Estimate)*	2Q 2000	3Q 2001	3Q 2000	3Q 2003	74,900	99,600
FY 2002 Budget Request *(Preliminary Estimate)*	1Q 2001	4Q 2001	1Q 2001	4Q 2003	74,900	99,600

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Cost
2000	——	——	——
2001	20,886	20,886	16,886
2002	24,000 [a]	24,000	28,000
2003	30,014	30,014	30,014

[a]Total requirement is $29,000,000. This project will use prior-year balances to provide the additional $5,000,000 needed to fully fund this project.

3. Project Description, Justification and Scope

In the aftermath of the Cold War, significant quantities of weapons-usable highly enriched uranium (HEU) have become surplus to national defense needs both in the United States and Russia. The Department issued a Record of Decision (ROD) on the Disposition of Surplus Highly Enriched Uranium Environmental Impact Statement (EIS) in July 1996. The ROD requires DOE to disposition 174 metric tons (MT) of surplus HEU by blending it down to low-enriched uranium (LEU) and recovering its economic value by using it as fuel in power reactors where practicable. This 174 MT of HEU includes a quantity of "off-specification" HEU that is a product of DOE uranium reprocessing operations. The reprocessed HEU contains uranium isotopes, fission products and other contaminants not present in virgin uranium. This project supports disposition of a majority of the existing inventory of off-specification HEU.

The off-specification HEU includes solutions and spent reactor fuel (located at the Savannah River Site (SRS)) required to be stabilized in accordance with the Department's Implementation Plan for Defense Nuclear Facilities Safety Board (DNFSB) Recommendations 94-1 and 2000-1. Also included are unirradiated fuel at SRS and the Y-12 Plant at the Oak Ridge Reservation, made from reprocessed HEU, and some reprocessed HEU metal at the Y-12 Plant. These off-specification materials total approximately 34 MT.

In January 1997 DOE and the Tennessee Valley Authority (TVA) signed a Memorandum of Understanding to pursue a program to down-blend approximately 34 MT of DOE off-specification surplus HEU to LEU for use as fuel in TVA reactors. At least 16 MT of the HEU would be processed through H-Canyon at SRS to remove impurities and then down-blended to LEU at SRS and delivered to the TVA as LEU solution. The resulting LEU solution would then be converted to nuclear fuel by vendors under contract to TVA. The remainder of the 34 MT would either be processed in H-Canyon or delivered to TVA's vendor as HEU, which would be down-blended by the vendor and converted to fuel.

Several capital improvements are needed at SRS in support of this project. The Conceptual Design Report (CDR) includes the following work scope:

- **Highly Enriched Uranium Material Feed Segment, K-Area Subsegment.** The 105-K assembly area will be modified to provide transitional services for removing the fuel tubes from their current storage configurations, packaging them into bundles, and loading them into shipping containers mounted on a trailer for shipment to H-Area. This includes rooms for denesting contaminated fuel bundles and for worker change/cool down.

- **Highly Enriched Uranium Material Feed Segment, H-Canyon Material Transfer Subsegment**. This subsegment covers the transfer of H-Canyon HEU feedstock materials from Building 105-K to H-Canyon. New infrastructure includes an unloading dock in H-Canyon to receive trailers from Building 105-K, jib crane, transfer sling, and new rail car to move material within H-Canyon.

- **Highly Enriched Uranium Material Segment, Shipping Container Subsegment**. This subsegment provides the shipping containers and related infrastructure for shipping the HEU feedstock from Building 105-K to H-Canyon and/or TVA. It includes flatbed trailers, stainless steel

containers sized to ship ingots, fuel tubes in critically safe amounts, configurations, and handling cranes mounted to the flatbed trailers.

- **Purified Highly Enriched Uranium Production Segment**. This segment includes installing tanks, monitoring equipment, process equipment and jumpers, and reconfiguring certain aspects of the process to improve throughput and meet purity specifications.

- **Low-Enriched Uranium Production/Loading Segment**. This segment consists of the infrastructure to enable receiving natural uranium blendstock, storing HEU solution, blending HEU and natural uranium, and filling the 250-gallon shipping containers with LEU for transport to TVA's vendors. This infrastructure includes a new building with a loading dock to accept flat bed trailers carrying shipping containers and equipment to fill the containers, a Personnel Change Room/Remote Instrument/Control Room, and tanks to facilitate solution transfers, blending, and storage.

- **Feed/Product Chemical Analysis Segment**. The chemical laboratory will perform isotopic composition and chemical impurities analyses to support the off-specification fuel program. The facility will use both new and existing laboratory space and equipment to perform this activity. New infrastructure will include hoods, cabinets, and analytical equipment and physical modifications for safeguards and security purposes. Some existing lab space will be demolished prior to installing the new equipment.

- **Support Services Segment/Safeguards and Security Subsegment**. This segment provides the facilities and services required to protect and maintain accountability for the transportation of Security Category 1 quantities of HEU from Building 105-K to H-Canyon and/or TVA and for transportation within H-Canyon**.** This will be accomplished by enhancing monitoring and alarm capabilities.

The CDR includes an estimate and schedule that will be modified when the project is baselined at 35 percent design in September 2001.

Life cycle costs of this overall program will require appropriations estimated at approximately $350,000,000 to provide infrastructure improvements and operations at DOE facilities and to dispose of low-level radioactive waste from the project start until FY 2013. A portion of the $350,000,000 will be repaid by the end of the project from DOE/TVA-shared fuel savings (depending on future market prices for uranium). These actions satisfy DNFSB Recommendation 94-1 and 2000-1 stabilization/disposition objectives for a portion of the material and meet non-proliferation objectives of the July 1996 ROD for all the material. This approach avoids the alternative disposition path (i.e., blending all off-specification HEU to waste and disposing of it) which would cost $900,000,000.

H-Canyon processing and solution storage tanks will reach operational capacity; and all H-Canyon material stabilization operations, including DNFSB commitments, will be curtailed in March 2003. Because existing tank space is limited for storage of LEU solution, the LEU loading station will be completed first to allow off-site shipment of LEU solutions (beginning in April 2003). This will minimize interruption of material processing and, in particular, processing of the DNFSB Recommendation 94-1 materials. The Office of Fissile Materials Disposition will fund the incremental cost (standby mode to

| operations) of additional processing in H-Canyon for the rest of the HEU that is not covered by DNFSB
| Recommendation 94-1.

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and final design costs (design drawings and specifications)	9,600	9,600
Design management costs (1.4% of TEC)	1,050	1,050
Project management costs (2.5% of TEC)	1,850	1,850
Design Contingency (5.3% of TEC)	4,000	4,000
Total, Design Costs (16.7% of TEC)	16,500	16,500
Construction Phase		
Improvements to Land	500	500
Buildings	5,000	5,000
Special Equipment	8,000	8,000
Other Structures	10,600	10,600
Utilities	300	300
Standard Equipment	4,000	4,000
Removal cost less salvage	1,000	1,000
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	1,000	1,000
Construction. management costs (4.9% of TEC)	4,100	4,100
Project management costs (4.5% of TEC)	3,700	3,700
Construction Contingency (27% of TEC)	20,200	20,200
Total, Construction Costs	58,400	58,400
Total, Line Item Costs (TEC)	74,900	74,900

5. Method of Performance

| The management and integration contractor will design the facility under an existing contract. To the extent feasible, construction and procurement of equipment will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 2000	FY 2001	FY 2002 [a]	Outyears	Total
Project Cost						
Facility Cost [b]						
Design	——	——	7,000	3,504	5,996	16,500
Construction	——	——	13,886	20,496	24,018	58,400
Total, Facility Cost (Federal and non-Federal) (New Budget Authority)	——	——	20,886	24,000	30,014	74,900
Other Project Cost						
Conceptual design costs	619	1,952	400	——	——	2,971
NEPA and other project-related cost	——	——	5,600	7,581	8,548	21,729
Total, Other Project Costs	619	1,952	6,000	7,581	8,548	24,700
Total Project Cost (TPC)	619	1,952	26,886	31,581	38,562	99,600

7. Related Annual Funding Requirements

(dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs	TBD	N/A
Annual facility maintenance/repair costs	TBD	N/A
Annual utility costs	TBD	N/A
Total related annual funding	TBD	N/A
Total operating costs (operating from FY 2001 through FY 2010)	250,400	N/A

[a]Total requirement is $29,000,000. This project will use prior-year balances to provide the additional $5,000,000 needed to fully fund this project.

[b]These funds support five projects in various stages of design and construction.

Defense Nuclear Nonproliferation Program Direction

Mission Supporting Goals and Objectives

The program provides for the Federal workforce responsible for the overall direction of the activities carried out by the following programs in the Office of the Deputy Administrator for Defense Nuclear Nonproliferation: Nonproliferation Verification Research and Development; International Nuclear Safety and Cooperation; Highly Enriched Uranium (HEU) Transparency Implementation; Arms Control and Nonproliferation; International Material Protection and Emergency Cooperation; Fissile Materials Disposition; International Offices in Moscow, Paris, Tokyo, Kiev, and Vienna; and Resource Management (financial management, human resources, procurement, information technology, and strategic planning).

In March 2000, the Offices of Nonproliferation and National Security (NN) and Fissile Materials Disposition (MD) were merged under Defense Nuclear Nonproliferation (DNN) within the newly established National Nuclear Security Administration (NNSA).

The role of the Headquarters workforce is to provide leadership and oversight, establish and implement national policy, integrate activities across sites, conduct analyses, develop strategies, negotiate international agreements, and maintain internal controls to ensure the public trust.

The program also provides program-specific staffing resources at the Chicago, Oakland, and Nevada Operations Offices, and Savannah River Site (SRS) office. Field personnel provide the following support:

- Chicago provides project management support for the MOX fuel program which includes cost and schedule baseline management, tracking, reporting, performance reporting, integration of management data, and contract management support. In addition, Chicago provides contract management support for the Pit Disassembly and Conversion Facility design contract.
- Oakland serves as the lead for development of gas reactor technology in Russia for plutonium disposition and spent fuel canning operations in Kazakhstan and the Peoples Republic of North Korea.
- Nevada provides test site liaison to nonproliferation programs and support to the HAZMAT Spill Center.
- Savannah River plays a key role in disposition of surplus nuclear materials. As the designated site for plutonium disposition missions, SRS assists DOE Headquarters with their overall management role for design and construction activities for new plutonium disposition facilities. SRS provides support to the Highly Enriched Uranium (HEU) disposition program by blending down surplus HEU currently located at SRS and Oak Ridge and contracting its sale as fuel to power generating utilities such as the Tennessee Valley Authority (TVA). SRS also provides technical support in a variety of nonproliferation activities such as export control, spent fuel, agreement implementation, International Atomic Energy Association (IAEA), Nuclear Cities Initiative (NCI), and material accountability in Russia.

The program supports staff in International Offices in five countries:

- Moscow serves as the focal point for all departmental offices conducting business in Russia. Liaison activities are provided by Federal staff and Foreign Service Nationals (FSNs). Primary activities are DNN program technical liaison with Russian institutions, support to the U.S. embassy and support to travelers while in country.
- Paris serves as the focal point for all departmental activities in France. Primary activities involve international personal safety and support to travelers while in country.
- Tokyo serves as the focal point for all departmental activities in Japan. Primary activities involve international personal safety and support to travelers while in country.
- Kiev serves as the focal point for all departmental activities in the Ukraine. Primary activities involve international personal safety, support to the U.S. embassy, and support to travelers while in country.
- Vienna serves as the focal point for all departmental activities in Austria. Primary activities involve IAEA functions, the Mission program at the U.S. Embassy, international personal safety, and support to travelers while in country.

Program Direction has been grouped into four categories:

- Salaries and Benefits provide for 233 Federal full-time equivalents (FTEs) at Headquarters, 34 FTEs in the field, and 10 FTEs and 15 Foreign Service Nationals (FSNs) in five international offices.
- Travel includes domestic and foreign trips by Federal staff necessary to carry out the program mission which spans the U.S., Europe, Asia, Russia, and the Newly Independent States (NIS). Travel is a key element in the success of the nonproliferation mission. International travel is frequent to carry out oversight activities, execute existing treaties and agreements and negotiate new or expanded agreements.
- Support Services includes technical, analytical, administrative, and operational support functions such as project scheduling, outreach, quality assurance, program integration, management information and support. Technical and analytical assistance is provided for a variety of nuclear nonproliferation programs in such areas as: arms control, fissile materials disposition, R&D, HEU, and nuclear safety.
- Other Related Expenses includes information technology, working capital fund (space, utilities, printing, graphics, copying, supplies, telephones, etc.), office automation, training, subscriptions, telecommunications, FSNs associated costs, and other miscellaneous services. The Reception and Representation fund is also included in support of all Defense Nuclear Nonproliferation programs.

Performance Measures

- Fully support the Department's National Nuclear Security Administration Implementation Plan.
- Ensure the availability of a workforce to efficiently and effectively carry out the Defense Nuclear Nonproliferation mission.
- Develop and install equipment to facilitate operations in a classified and unclassified environment with state of the art information technology infrastructure to connect DNN with other national security agencies and with the international offices.
- Undertake independent assessments of the plutonium disposition facilities.
- Fully implement DOE Energy Systems Acquisition Instruction for the line-item construction projects.
- Integrate nuclear nonproliferation activities within DOE relative to mission and budget by coordinating/establishing agreements with other DOE programs.
- Fully implement the Quality Assurance Program and conduct quality assurance reviews in accordance with the audit and surveillance schedules.
- Carryout established construction project management program in accordance with Program Execution Plans (PEPs).

Funding Profile

(dollars in thousands)

	FY 2000 Comparable Appropriation	FY 2001 Original Appropriation	FY 2001[c] Adjustments	FY 2001 Comparable Appropriation	FY 2002 Request
Program Direction					
Defense Nuclear Nonproliferation	41,302	51,468	-9	51,459	51,459
Total, Program Direction	41,302[a]	51,468[b]	-9	51,459[c]	51,459[b]
Full Time Equivalents (FTEs)	162	276	1	277	277
Foreign Service Nationals (FSNs)	12	15		15	15
Total Staff	174	291	1	292	292

[a]FY 2000 funding includes $5,300,000 reprogrammed to fund additional staff hired in late FY 2000 and FY 2001 and reduce M&O and support service contractors.

[b]Excludes prior year balances required to fund FTEs. Some funding and FTE adjustments may be necessary based on the recent NNSA reorganization.

[c]Includes Government-wide rescission of .22%, safeguards and security transfer and transfer of the HAZMAT Spill Center.

Funding by Site

(dollars in thousands, whole FTEs)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Chicago					
Salaries and Benefits	753	922	975	53	5.7%
Travel	47	105	107	2	1.9%
Support Services	0	0	0	0	
Other Related Expenses	50	50	52	2	4.0%
Total, Chicago	850	1,077	1,134	57	5.3%
Full Time Equivalents	6	8	8	0	
Nevada					
Salaries and Benefits	83	193	203	10	5.2%
Travel	0	15	15	0	0.0%
Support Services	0	0	0	0	
Other Related Expenses	3	8	9	1	12.5%
Total, Nevada	86	216	227	11	5.1%
Full Time Equivalents	1	2	2	0	
Oakland					
Salaries and Benefits	192	256	1,242	986	385.2%
Travel	35	42	87	45	107.1%
Support Services	0	0	0	0	
Other Related Expenses	29	11	173	162	1472.7%
Total, Oakland	256	309	1,502	1,193	386.1%
Full Time Equivalents	1	11[a]	11	0	
Savannah River					
Salaries and Benefits	417	1,304	1,369	65	5.0%
Travel	43	100	102	2	2.0%
Support Services	0	0	0	0	
Other Related Expenses	0	65	66	1	1.5%
Total, Savannah River	460	1,469	1,537	68	4.6%
Full Time Equivalents	4	13	13	0	
Total Field Offices					
Salaries and Benefits	1,445	2,675	3,789	1,114	41.6%
Travel	125	262	311	49	18.7%
Support Services	0	0	0	0	
Other Related Expenses	82	134	300	166	123.9%
Total, Field Offices	1,652	3,071	4,400	1,329	43.3%
Full Time Equivalents	12	34	34	0	

[a]Includes 9 FTEs funded by Office of Science

(dollars in thousands, whole FTEs)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Moscow					
Federal Salaries and Benefits	140	468	492	24	5.1%
FSN Salaries and Benefits	245	290	295	5	1.7%
Travel	10	40	42	2	5.0%
Support Services	0	0	0	0	
Other Related Expenses	203	621	1,062	441	71.0%
Total, Moscow	598	1,419	1,891	472	33.3%
Full Time Equivalents	2	4	4	0	
Foreign Service Nationals	9	11	11	0	
Vienna					
Federal Salaries and Benefits	247	260	273	13	5.0%
Travel	5	15	15	0	0.0%
Support Services	0	0	0	0	
Other Related Expenses	171	626	311	(315)	-50.3%
Total, Vienna	423	901	599	(302)	-33.5%
Full Time Equivalents	2	2	2	0	
Paris					
Federal Salaries and Benefits	95	98	103	5	5.1%
FSN Salaries and Benefits	0	33	34	1	3.0%
Travel	3	10	10	0	0.0%
Support Services	0	0	0	0	
Other Related Expenses	151	173	177	4	2.3%
Total, Paris	249	314	324	10	3.2%
Full Time Equivalents	1	1	1	0	
Foreign Service Nationals	0	1	1	0	
Tokyo					
Federal Salaries and Benefits	97	99	104	5	5.1%
FSN Salaries and Benefits	0	145	148	3	2.1%
Travel	4	10	10	0	0.0%
Support Services	0	0	0	0	
Other Related Expenses	60	231	237	6	2.6%
Total, Tokyo	161	485	499	14	2.9%
Full Time Equivalents	1	1	1	0	
Foreign Service Nationals	2	2	2	0	
Kiev					
Federal Salaries and Benefits	123	204	215	11	5.4%
FSN Salaries and Benefits	12	15	16	1	6.7%
Travel	9	15	15	0	0.0%
Support Services	0	0	0	0	
Other Related Expenses	178	397	348	(49)	-12.3%
Total, Kiev	322	631	594	(37)	-5.9%
Full Time Equivalents	1	2	2	0	
Foreign Service Nationals	1	1	1	0	

(dollars in thousands, whole FTEs)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
International Offices					
Federal Salaries and Benefits	702	1,129	1,187	58	5.1%
FSN Salaries and Benefits	257	483	493	10	2.1%
Travel	31	90	92	2	2.2%
Support Services	0	0	0	0	
Other Related Expenses	763	2,048	2,135	87	4.2%
Total, International Offices	1,753	3,750	3,907	157	4.2%
Full Time Equivalents	7	10	10		
Foreign Service Nationals	12	15	15		
Total FTEs and FSNs	19	25	25		
Headquarters					
Federal Salaries and Benefits	21,541	22,579	19,165	(3,414)	-15.1%
Travel	1,706	2,630	2,685	55	2.1%
Support Services	9,387	8,231	8,000	(231)	-2.8%
Other Related Expenses	5,263	11,198	13,302	2,104	18.8%
Total, Headquarters	37,897	44,638	43,152	-1,486	-3.3%
Full Time Equivalents	143	233	233	0	
Headquarters and International Offices					
Federal Salaries and Benefits	22,243	23,708	20,352	-3,356	-14.2%
FSN Salaries and Benefits	257	483	493	10	2.1%
Travel	1,737	2,720	2,777	57	2.1%
Support Services	9,387	8,231	8,000	-231	-2.8%
Other Related Expenses	6,026	13,246	15,437	2,191	16.5%
Total, Headquarters	39,650	48,388	47,059	-1,329	-2.7%
Full Time Equivalents	150	243	243	0	
Foreign Service Nationals	12	15	15	0	
Total FTEs and FSNs	164	258	258	0	
Program Direction					
Federal Salaries and Benefits	23,688	26,383	24,141	-2,242	-8.5%
FSN Salaries and Benefits	257	483	493	10	2.1%
Total, Salaries and Benefits	23,945	26,866	24,634	-2,232	-8.3%
Travel	1,862	2,982	3,088	106	3.6%
Support Services	9,387	8,231	8,000	-231	-2.8%
Other Related Expenses	6,108	13,380	15,737	2,357	17.6%
Total, Program Direction	41,302[a]	51,459[b]	51,459	0	0.0%
Full Time Equivalents	162	277	277		
Foreign Service Nationals	12	15	15		
FTEs and FSNs	174	292	292		

[a]Includes $5,300,000 reprogrammed to fund additional staff hired in late FY 2000 and FY 2001

[b]Excludes prior year balances required to fund FTEs

Detailed Program Justification

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Salaries and Benefits	23,945	26,866	24,634

Federal staff provide management oversight and technical support for programs involved in preventing the spread of weapons of mass destruction materials, technology, and expertise; detecting the proliferation of weapons materials worldwide; reversing the proliferation of nuclear weapons capabilities; initiating safety improvements in Soviet-designed reactors; ensuring that highly enriched uranium purchased from Russia is from dismantled weapons; disposing of surplus fissile materials; and storing surplus fissile materials pending disposition. The FY 2002 staffing level will remain at the FY 2001 level pending the Administration's review of Russian nonproliferation programs. *The FY 2002 decrease excludes prior year balances necessary to maintain FY 2001 FTE level plus 9 FTEs previously funded by Office of Science.*

Travel	1,862	2,982	3,088

Includes domestic and foreign trips necessary to conduct nonproliferation and national security business. International travel is frequent due to the nonproliferation work with international agencies and the Former Soviet Union republics. Domestic travel includes management oversight, public outreach, and national security assistance and interface with field offices, laboratories and local governments. *The FY 2002 increase of $106,000 is due to an additional 9 FTEs previously funded by Office of Science and inflation.*

Support Services	9,387	8,231	8,000

Provides an invaluable resource of highly specialized and analytical expertise required to meet critical nonproliferation and national security issues.

Provides technical expertise capable of addressing technology advancements and the dynamic changing environment associated with weapons returns, materials disposition, arms control, and nonproliferation.

Provides for mailroom operations, travel management, computer system development, miscellaneous Headquarters office operation functions, computer technology development, and outreach services such as community meetings in the U.S. in support of the plutonium disposition program. *The FY 2002 decrease is due to continued efforts to reduce support service contractors.*

(dollars in thousands)

	FY 2000	FY 2001	FY 2002
Other Related Expenses	6,108	13,380	15,737

Provides for Working Capital Fund expenses (space, utilities, general printing, graphics, copying, supplies, telephones, general automation support, payroll outsourcing, postage, and other miscellaneous expenses associated with office operations.

Includes miscellaneous expenses such as the National Archives and Records Administration (NARA) records center; Diversity Partnership program; temporary change of duty station in support of the international offices, training, and intern program.

Provides for official reception and representation expenses for nuclear nonproliferation activities.

Provides for purchases and maintenance of a classified LAN infrastructure. *The FY 2002 increase of $2,357,000 will cover an anticipated increase for space (Working Capital Fund), computer support for additional 9 FTEs previously funded by Office of Science, next phase of classified LAN implementation, and allowable inflation.*

Total, Program Direction	41,302	51,459	51,459

Explanation of Funding Changes from FY 2001 to FY 2002

		FY 2001 vs. FY 2002 ($000)
Salaries and Benefits		
#	The FY 2002 decrease excludes prior year balances to be used to maintain the FY 2001 FTE level to ensure the availability of a workforce to efficiently and effectively carry out the Defense Nuclear Nonproliferation mission	-2,232
Travel		
#	The FY 2002 increase is for allowable inflation	106
Support Services		
#	The decrease reflects a continuing effort to reduce support services contractors.	-231
Other Related Expenses		
#	The increase is primarily for an anticipated increase for space (Working Capital Fund) and the next phase of the classified LAN implementation	2,357
Total Funding Changes, Program Direction.		0

Support Services

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Technical Support Services	7,487	6,350	6,300	-50	-0.8%
Management Support Services	1,900	1,881	1,700	-181	-9.6%
Total Support Services	9,387	8,231	8,000	-231	-2.8%

Other Related Expenses

(dollars in thousands)

	FY 2000	FY 2001	FY 2002	$ Change	% Change
Working Capital Fund	3,590	4,200	5,000	800	19.0%
Training	50	215	215	0	0.0%
Other	2,468	6,965	7,522	557	8.0%
Classified LAN	0	2,000	3,000	1,000	50.0%
Total, Other Related Expenses	6,108	13,380	15,737	2,357	17.6%