

PLAN FOR SECURING THE  
NUCLEAR WEAPONS, MATERIAL, AND EXPERTISE  
OF THE STATES OF THE FORMER SOVIET UNION

Contents

I.	Overview	2
II.	Program Description - Introduction	7
III.	Reduce Weapons-Grade Nuclear Material	13
IV.	Secure Weapons-Grade Nuclear Material	26
V.	Facilitate Nuclear Warhead Dismantlement	37
VI.	Secure Remaining Nuclear Warheads	39
VII.	Downsize Nuclear Weapons Complex	47
VIII.	Prevent Proliferation of Weapons of Mass Destruction Expertise	50
IX.	Summary of Accomplishments	58
X.	Looking to the Future	65

## I. OVERVIEW

In Public Law 107-107, Section 1205, Congress required development of a Plan for Securing Nuclear Weapons, Material, and Expertise of the States of the Former Soviet Union. Specifically, Section 1205 requires that the President report on the Administration plan for:

- Cooperating with Russia on disposing, as soon as practicable, of nuclear weapons and weapons-usable nuclear material in Russia that Russia does not retain in its nuclear arsenals;
- Assisting Russia in downsizing its nuclear weapons research and production complex;
- Cooperating with the other states of the former Soviet Union on disposing, as soon as practicable, of all nuclear weapons and weapons-usable nuclear material in such states; and
- Preventing the outflow from the states of the former Soviet Union of scientific expertise that could be used for developing nuclear weapons, other weapons of mass destruction, and delivery systems for such weapons.

In Public Law 107-314, Section 1205, Congress required an annual report on implementation of that plan. This report includes both the plan required in Section 1205 of Public Law 107-107, and an implementation report for Fiscal Year 2002 (FY02).

The United States has been implementing such efforts under a variety of coordinated Department of Defense, Department of Energy, and Department of State programs since 1991, when the Congress passed the original Nunn-Lugar legislation, the Soviet Nuclear Threat Reduction Act of 1991. From FY91 through FY02, the United States budgeted about \$7 billion for such cooperative efforts with Russia and other former Soviet states, and has requested approximately \$1 billion for this purpose for FY03. Some key programs have been completed, others are nearing completion, and still others will take many years to complete. The effort has also evolved in response to new weapons reduction and nonproliferation opportunities in the former Soviet states.

### **Overview of Strategic Plan**

The United States undertakes a comprehensive effort to deal with all aspects of nuclear weapons, material, and expertise of Russia and other former Soviet states. The basic aims are to: reduce

weapons-grade material; secure the remaining material; facilitate increased warhead dismantlement; secure remaining warheads in transport and storage; downsize Russia's nuclear infrastructure; and prevent proliferation of expertise. The programs conducted to those ends by the Departments of Defense, Energy and State are discussed in detail in Sections III-VIII of this report. Key elements, addressed in detail below, are:

- Reduction of Weapons-Grade Material
  - End to Weapons-Grade Plutonium Production Under the Plutonium Production Reactor Agreement
  - Plutonium Disposition
  - Highly-Enriched Uranium (HEU) Purchase Agreement
  - Additional Materials Disposition
  - Research Reactor Fuel Return
- Security of Weapons-Grade Material
  - Material Protection, Control and Accounting
  - Fissile Material Storage Facility at Mayak
  - BN-350 Spent Fuel Disposition
- Reduction of Russian Nuclear Warheads
  - Nuclear Weapons Transportation
- Security of Russian Nuclear Warheads
  - Storage Security
  - Transport Security
- Downsizing Russia's Nuclear Weapons Research and Production Complex
  - Russian Transition Initiatives
- Preventing Outflow of WMD and Delivery System Expertise
  - Science Centers
  - Bio/chemical Engagement Program
  - Biological Weapons Proliferation Prevention
  - Civilian Research and Development Foundation

### **Program Planning and Coordination**

The Proliferation Strategy Policy Coordinating Committee (PCC), chaired by the Special Assistant to the President and Senior Director for Proliferation Strategy, Counterproliferation and Homeland Defense, and including all relevant United States Government agencies, has been charged by the President to establish priorities for U.S. nonproliferation efforts in the

states of the former Soviet Union, coordinate the implementation of those efforts, and recommend overall policies and budget options to the President. Those roles are essential, given the priority the Administration attaches to weapons reduction and nonproliferation in the former Soviet states, and the size and complexity of the effort. The Proliferation Strategy PCC ensures that programs are effectively implemented according to consistent policy principles, without duplication or overlap. The Proliferation Strategy PCC plays a similar role in ensuring effective U.S. support to the G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction, agreed at the Kananaskis Summit. The G8 Senior Officials group will monitor the implementation of the Global Partnership, endeavoring to focus the effort on nonproliferation priorities and to guard against duplication or overlap.

Working closely with the National Security Council (NSC), the U.S. Assistance Coordinator for Europe and Eurasia, under legal mandate in the FREEDOM Support Act and Presidential Charter, oversees and coordinates all United States Government assistance to the Eurasian states, including these nonproliferation and security programs.

To ensure that the promise of cooperative nonproliferation programs between the United States and Russia is fully realized, the Administration undertook, in consultation with the Congress, a comprehensive review of U.S. nonproliferation and threat reduction assistance to the Russian Federation in 2001. The findings of the review were determined to apply to programs in other former Soviet states as well.

This review, completed in December 2001, examined multiple programs, with a combined budget in FY01 of approximately \$800 million. The aims of the review were to:

- Ensure that existing U.S. cooperative nonproliferation programs with Russia are focused on priority threat-reduction and nonproliferation goals and are conducted as efficiently and effectively as possible;
- Examine what new initiatives might be undertaken to further U.S. threat-reduction and nonproliferation goals;
- Consider organizational and procedural changes to achieve an integrated United States Government approach to cooperative threat-reduction and nonproliferation programs with former Soviet states.

The review found that most U.S. programs to assist Russia in

threat reduction and nonproliferation are focused on priority tasks, are working well, and are well managed. The review identified four programs for expansion:

- The Department of Energy National Nuclear Security Administration (DOE/NNSA) Material Protection, Control, and Accounting (MPC&A) program to help consolidate and secure nuclear weapons and weapons-grade nuclear material;
- DOE/NNSA's Warhead and Fissile Material Transparency program;
- International Science Centers/Biological Redirection programs;
- Biological Weapons proliferation prevention.

In addition, the Department of Defense (DOD) was tasked to accelerate the Cooperative Threat Reduction (CTR) project to construct a chemical weapons destruction facility at Shchuch'ye, Russia, to enable its earlier completion at no increased expense.

Several other programs were adjusted, refocused, or reexamined as a result of the review:

- The State Department and DOE/NNSA examined alternative approaches to the Plutonium Disposition program, with the aim of making the program less costly and more effective. This review was complete, and a revised approach to Plutonium Disposition adopted, in January 2002;
- The project to end Russian production of weapons-grade plutonium was transferred from DOD to DOE/NNSA;
- The DOE/NNSA Nuclear Cities Initiative (NCI) and Initiatives for Proliferation Prevention (IPP) were consolidated to form the Russian Transition Initiatives (RTI) and restructured to focus more effectively on projects to help Russia reduce its nuclear weapons complex; and
- The DOE/NNSA Second Line of Defense program is now being managed within the MPC&A program to accelerate cooperative activities with Russia to install nuclear detection equipment at border posts.

The Proliferation Strategy PCC continues to guide U.S. efforts by establishing:

- Principles to guide joint work;

- Requirements for clear statements of program objectives, priorities, and metrics;
- Comprehensive roadmaps for the duration of the activities;
- United States and Russian Federation resource requirements;
- Processes to evaluate new program options.

The PCC monitors U.S. efforts by:

- Periodically reviewing programs and combinations of programs with regard to the integrated framework;
- Recommending changes to current or planned activities; and
- Providing progress reports of integrated activities, expenditures, and metrics.

The PCC facilitates the implementation of the activities by:

- Identifying and supporting changes to existing bilateral agreements and/or new agreements required to implement the joint efforts; and
- Identifying cross-cutting issues that inhibit implementation and assisting in their resolution.

### **Program Costs**

Detailed information on projected program costs will continue to be included in the President's annual budget requests. Overall program costs may particularly be adjusted in light of the substantially increased allied contribution to these efforts under the G8 Global Partnership.

## II. PROGRAM DESCRIPTION - INTRODUCTION

The individual DOE/NNSA, DOD/CTR, and Department of State (DOS) programs are described in detail in subsequent sections, including current funding requests and, where appropriate, a termination or exit strategy. Table 1 presents an overview of U.S. activities that fall into six categories: reducing weapons-grade nuclear material; consolidating and securing that which remains; facilitating nuclear warhead dismantlement; securing remaining warheads in transport and storage; downsizing the Russian nuclear weapons complex; and preventing the outflow of expertise related to weapons of mass destruction. Table 2 provides a financial overview of these programs.

The program descriptions that follow in Sections III-VIII include, as appropriate:

- Program goals and objectives;
- Accomplishments and key milestones;
- Transition or exit strategy;
- Administrative and organizational changes that have been identified that would improve the coordination and effectiveness of the program; and
- Funding.

These programs and activities are described more fully in the Congressionally required Annual Report to Congress on United States Government Assistance to and Cooperative Activities with Eurasia, submitted to Congress in March 2002.

### **Enduring Objectives of U.S. Cooperative Nonproliferation Programs with Former Soviet States**

The cooperative programs described in this report are directed at minimizing the national and global security risks that would result from the diversion of nuclear weapons and materials, and broader weapons expertise, from the former Soviet states to states of proliferation concern or terrorist groups. These programs address some of the most important and urgent security concerns facing the United States and indeed the world. While downsizing the Russian nuclear weapons complex will in time ease the problem of securing nuclear weapons and materials, and WMD expertise, it is important to address the security concerns raised during the transition to a smaller nuclear weapons complex.

In addition to facilitating the transition to a smaller nuclear weapons complex, there are enduring U.S. security concerns, which will continue even after such a transition is complete.

One enduring objective is to reduce the potential for unauthorized or accidental use of Russian weapons against U.S. interests. Agreements to reduce weapons arsenals and dispose of excess warheads are central to this effort. These warhead reductions occur in conjunction with material protection and disposition programs so as not to create (or increase) stocks of poorly secured weapons-usable material that would raise the risk of diversion.

Another abiding objective is the application of export controls and enhancements of border security to prevent the transfer of materials, equipment, information, or expertise to foreign WMD programs. This requires the development and application of international guidelines such as those required by the Nuclear Nonproliferation Treaty or the Nuclear Suppliers Group, to coordinate national policies regarding exports of proliferation concern and enhancements of infrastructure on the borders to implement such controls.

Clearly, for many years to come, the United States, Russia and the other former Soviet states will need to engage in cooperative activities that address shared security concerns. The successful execution and conclusion of the programs described in this report will pave the way for future joint and mutually beneficial activities.

**Table 1. Principal U.S. Nuclear Reduction and Nonproliferation Programs in Russia and Other Former Soviet States**

<b>Reduce Weapons-Grade Nuclear Material - Russia</b>	<b>DOE</b>	<b>DOD</b>	<b>DOS</b>
• End to Weapons-Grade Plutonium Production	X	X*	
• Plutonium Disposition	X		
• Highly-Enriched Uranium Purchase Agreement and Transparency Implementation	X		X
• Accelerated Material Disposition	X		
<b>Reduce Weapons-Grade Nuclear Material - Other States</b>			
• Russian Research Reactor Fuel Return	X		X
<b>Secure Weapons-Grade Nuclear Material - Russia</b>			
• Material Protection, Control and Accounting	X	X*	
• Fissile Material Storage Facility		X	
<b>Secure Weapons-Grade Nuclear Material - Other States</b>			
• NIS/Baltics, Safeguards and Security	X	X*	
• BN-350 Spent Fuel Disposition	X		
<b>Facilitate Nuclear Warhead Dismantlement</b>			
• Nuclear Weapons Transportation		X	
<b>Secure Remaining Warheads</b>			
• Warhead Storage Security	X	X	
• Warhead Transport Security		X	
• Warhead Dismantlement and Fissile Material Transparency (Warhead Safety and Security Exchange)	X	X	
<b>Downsize Nuclear Weapons Complex</b>			
• Russian Transition Initiatives	X		

<b>Prevent Proliferation of WMD Expertise</b>			
• Science Centers		X	X
• Bio/Chemical Engagement		X	X
• Biological Weapons Proliferation Prevention		X	
• Civilian Research and Development Foundation			X

\*Programs were funded by DOD prior to transfer to DOE.

**Table 2. Program Funding  
(in millions of dollars)**

<b>Reduce Weapons-Grade Nuclear Material - Russia</b>	<b>FY92-02</b>	<b>FY03</b>
• End Weapons-Grade Plutonium Production	99.0	49.3
• Plutonium Disposition	293.0	34.0
• Highly-Enriched Uranium Purchase Agreement and Transparency Implementation	104.4	17.2
• Accelerated Material Disposition	-	14.0
<b>Reduce Weapons-Grade Nuclear Material - Other States</b>		
• Russian Research Reactor Fuel Return	5.8	11.4
<b>Secure Weapons-Grade Nuclear Material - Russia</b>		
• Material Protection, Control and Accounting	1163.4	185.8.*
• Fissile Material Storage Facility	360.2	0
<b>Secure Weapons-Grade Nuclear Material - Other States</b>		
• NIS/Baltics, safeguards and Security	52.0	6.0 from Russian MPC&A budget)
• BN-350 Spent Fuel Disposition	65.8	8.1
<b>Facilitate Nuclear Warhead Dismantlement</b>		
• Nuclear Weapons Transportation	36.6	15.0
<b>Secure Remaining Warheads</b>		
• Warhead Storage Security	463.7	87.1
• Warhead Transport Security	48.7	4.6
• Warhead Dismantlement and Fissile Material Transparency (Warhead Safety and Security Exchange)**	21.045	13.525
<b>Downsize Nuclear Weapons Complex</b>		
• Russian Transition Initiatives	280.1	39.0

<b>Prevent Proliferation of WMD Expertise</b>		
• Science Centers	203.4	32.0***
• Bio/Chemical Engagement	86.4	20.0***
• Biological Weapons Proliferation Prevention	22.3	10.0
• Civilian Research and Development Foundation	85.6	****

.

\* Includes money spent securing radiological materials.

\*\* Program began in FY99, funding includes DOE and DOD.

\*\*\* Estimated pending final State Department allocation of its FY03 appropriation.

\*\*\*\* No decision yet on FY03 funding.

**III. PROGRAM DESCRIPTION:  
REDUCE WEAPONS-GRADE NUCLEAR MATERIAL**

**A. Russia**

**1. End to Weapons-Grade Plutonium Production Under the Plutonium Production Reactor Agreement - DOE**

**Program Description.** The Elimination of Weapons-Grade Plutonium Production program is a cooperative effort with the Russian Federation to reduce the threat from WMD by halting the production of plutonium by Russia. The three Russian plutonium-production reactors still in operation also produce heat and electricity necessary for their surrounding communities. Therefore, before these reactors can be shut down, alternative sources of energy must be secured for these communities.

The reactors are estimated to have approximately 15 years of remaining lifetime and together could generate about 25 metric tons of additional weapons-grade plutonium. An assessment has determined that it is not practicable to convert these reactors to only produce heat and electricity and no plutonium. Consequently, in December 2001, an NSC review concluded that the United States should assist Russia to build fossil-fuel replacement power plants, which would allow the plutonium production reactors to be shut down. It was also decided to transfer this program from DOD to DOE. Because these three plutonium production reactors are expected to continue to operate for up to five or eight more years before the fossil plants are completed, high-priority safety upgrades are being rapidly implemented to correct deficiencies in design, equipment, materials, and training so as to reduce the operating risks of these reactors.

**Accomplishments and Key Milestones.** DOE aims in FY03 to sign an agreement with the Russian Ministry of Atomic Energy (Minatom) and put contracts in place for the initial scope of work with the Mining and Chemical Combine (MCC) in Zheleznogorsk and the Siberian Chemical Combine in Seversk.

The Seversk ADE-4 and ADE-5 plutonium production reactors will be shut down approximately five years after the signing of the initial contract with the MCC. With U.S. assistance in its construction, a refurbished fossil-fuel plant will provide up to 1560 giga-calories per hour of steam generation and 230 megawatts of electricity generation.

The Zheleznogorsk ADE-2 plutonium production reactor will be shut

down approximately eight years after the signing of the initial contract with the MCC and with U.S. assistance, a new fossil-fuel plant will provide up to 478 giga-calories per hour of steam generation and 117 megawatts of electricity.

**Program Future and Exit Strategy.** The project is expected to be completed within eight years at a cost of approximately \$466 million. It will be complete when the fossil-fuel plants are operational and the plutonium production reactors are shut down. Monitoring of the newly shutdown reactors, as well as the plutonium which they had produced, will continue as called for in the 1997 U.S.-Russian Plutonium Production Reactor Agreement. The stored plutonium will continue to be monitored until it is transferred and becomes subject to the U.S.-Russian plutonium disposition program.

**Funding.** Total funding for this project through FY02 is \$99 million. The appropriation for FY03 is \$49.3 million dollars.

## **2. Plutonium Disposition - DOE**

**Program Description.** In 1994, the National Academy of Sciences characterized the buildup of surplus weapons-usable fissile materials in Russia, together with the increasing threat of diversion or theft of these materials, as a "clear and present danger" to national and international security. DOE's Office of Fissile Materials Disposition was created by Congress in 1994 to address this danger. The DOE/NNSA Fissile Materials Disposition Program has three key objectives: eliminating surplus U.S. highly enriched uranium; eliminating surplus U.S. weapon-grade plutonium; and implementing a bilateral agreement with Russia to eliminate similar quantities of Russian surplus weapons grade plutonium. These efforts will take about 20 years to complete.

Below is a description of the Russian component of the plutonium disposition program.

In 2000, the Agreement Between the Government of the United States and the Government of the Russian Federation Concerning the Management and Disposition of Plutonium Designated as no Longer Required for Defense Purposes and Related Cooperation, was signed by the two governments and has been provisionally applied as of September 1, 2000. Each country committed to the disposition of no less than 34 metric tons (MT) of weapons-grade plutonium on roughly parallel timetables. The plutonium is to be fabricated into mixed-oxide fuel (MOX) for nuclear power reactors and converted to spent fuel, making it extremely unattractive and inaccessible for retrieval for use in weapons.

Under the terms of the Agreement, each country will:

- Begin hot startup of industrial-scale disposition facilities no later than the third quarter of FY07;
- Dispose of at least two MT per year of weapon-grade plutonium, and seek to at least double the disposition rate in each country;
- Allow monitoring and inspection to confirm that terms and conditions of the Agreement are met; and
- Allow for the disposition of additional surplus material, beyond the 34 MT.

The Agreement also calls for financial commitments for a substantial portion of the Russian Plutonium Disposition program from the United States and the international community. Congress appropriated \$200 million in FY99 for Russian plutonium disposition and the Administration has committed to seek an additional \$200 million in future appropriations. The United Kingdom, France, and Japan have collectively pledged approximately \$300 million. Since 1996, G-8 countries have provided political support, as well as some research and development funding. The United States is actively seeking to obtain the balance of the funds for the Russian disposition program from countries other than the United States and possibly non-governmental or commercial sources as well.

To support the disposition of the excess Russian plutonium, the United States and Russia are working together on technology development of plutonium conversion and nondestructive assay, and irradiation of MOX fuel in reactors. Key elements of this work include:

- Assisting Russia with the design of a plutonium conversion system for converting weapons-origin plutonium metal to an oxide form for use in MOX fuel and suitable for international inspection;
- Developing 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;
- Supporting the design modification effort to convert Russia's BN-600 reactor to a fast-neutron breeder reactor into a net burner of plutonium; and

- Working with Russian institutes and private industry to develop gas-turbine, modular helium reactor (GT-MHR) technology as an option to dispose of surplus Russian weapon-grade plutonium. Although this is a long-term technology option that would not be used for the 34 MT identified in the Agreement, this technology might be suitable for disposition of additional Russian plutonium beyond the 34 MT.

Recent Russian program decisions include: use of pellet fuel technology for MOX fuel fabrication; reliance on existing VVER-1000 light water reactors and the BN-600 fast reactor for plutonium disposition; and the possible export of some Russian MOX fuel for irradiation elsewhere.

The offer of using the same MOX design as the United States has been accepted by the Russians, which has the advantage of providing an enhanced aqueous process that provides a plutonium metal to oxide conversion capability. Accepting the enhanced U.S. MOX design (70 percent complete at the end of FY 2002) enables Russia to catch up to the U.S. schedule for plutonium disposition. Proceeding with other options (e.g. building a facility in Russia based on the proven Cogema design or designing a totally new indigenous Russian facility) would have slowed down the Russian program, causing a delay in the U.S. program due to the need to assure parallel progress between the two countries.

**Accomplishments and Key Milestones.** This program is challenging both technically and politically. Because it involves the construction of new nuclear facilities, it is also costly. However, important achievements have been made, including the following political milestones:

- The United States and Russia signed the Scientific and Technical Cooperation Agreement in July 1998, providing for joint, small-scale tests and demonstrations of plutonium disposition technologies;
- DOE issued a Record of Decision to locate U.S. plutonium disposition facilities at the Savannah River Site in December 1999;
- The United States and Russia signed the Plutonium Management and Disposition Agreement in September 2000, which calls for each country to dispose of no less than 34 MT of surplus weapons-grade plutonium; and
- In May 2002, President Bush and Russian President Putin announced their intention to seek ways of further reducing both countries' plutonium inventories.

The United States will assist Russia in starting construction of the industrial scale MOX Fuel Fabrication Facility (FFF) in FY04. This work includes support for an expanded scope for the industrial-scale facilities to meet additional requirements, such as assuring that the Russian MOX FFF has the ability to support International Atomic Energy Agency (IAEA) monitoring and inspection activities. Funding will predominantly be provided by international contributors and unobligated balances from the FY99 Supplemental Appropriation for the Russian plutonium disposition program (\$200 million).

**Program Future and Exit Strategy.** The United States and Russia are committed to seeking ways at least to double the annual disposition rate set forth in the September 2000 agreement. Negotiations are also under way for a monitoring and inspection regime that will apply to each country's plutonium disposition program.

Given that the disposition program will take about two decades to complete, that industrial-scale facilities need to be constructed, and that additional plutonium may be added and disposed under the September 2000 agreement, development of an exit strategy is not yet appropriate.

**Funding.** Total funding for this project through FY02 is \$293 million. The appropriation for FY03 is \$34 million.

### **3. Highly-Enriched Uranium Purchase Agreement**

**Program Description.** The 1993 Agreement Between the Government of the United States and the Government of the Russian Federation Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons, provides for the United States to purchase from Russia 500 MT of highly enriched uranium (HEU) derived from nuclear weapons and downblended to commercial-grade, low-enriched uranium (LEU) over 20 years (1993-2013). A contract implementing the HEU Purchase Agreement was signed on January 14, 1994, with the United States Enrichment Corporation (USEC), the sole U.S. enrichment supplier and executive agent on behalf of the United States, and by Techsnabexport (Tenex), majority-owned by the Russian Ministry of Atomic Energy and representing the Russian Federation.

The HEU Purchase Agreement serves mutual U.S. and Russian interests by converting 500 MT of HEU, the equivalent of 20,000 nuclear weapons, to peaceful civilian use in commercial reactor fuel. Transparency measures are in place in Russia and the United States to ensure that the LEU product is indeed derived from weapons-grade HEU. The revenue stream from the HEU

Purchase Agreement helps to stabilize the security of Russia's inventory of HEU derived from surplus nuclear weapons. The HEU Purchase Agreement also provides Russia access to, and a structured basis for participation in, U.S. commercial nuclear fuel markets.

Although the HEU Purchase Agreement itself has been very successful to date and is an integral element of U.S. nonproliferation policy, U.S. energy security also requires the maintenance of an economical and reliable domestic uranium conversion and enrichment industry. The balance between these objectives is routinely reviewed by the Administration, under the direction of the NSC. This oversight ensures that the HEU Purchase Agreement is implemented in a manner that advances U.S. nonproliferation goals without undermining the viability of the domestic U.S. nuclear fuel industry.

**Accomplishments and Key Milestones.** At the beginning of the HEU Purchase Agreement, marketing of the natural uranium and conversion components presented significant obstacles that resulted in several disruptions in scheduled deliveries. (Low prices caused by an oversupplied market generated concern by Russia that it was not receiving fair value for the material.) Congress, the Administration, and industry worked together to place the natural uranium portion of the HEU Purchase Agreement on a stable and predictable path forward. Congress, first through the enactment of the USEC Privatization Act and then through emergency legislation enabling DOE to purchase the natural uranium components of the HEU Purchase Agreement deliveries in 1997 and 1998 (11,000 metric tons), facilitated the restart of deliveries under the HEU Purchase Agreement.

The United States and Russian Governments also worked together to achieve stability in the marketplace through the 1999 signing of a Transfer Agreement. This agreement, in part, kept up to 44,000 MT of surplus government uranium from entering the uranium market for a 10-year period. Finally, Russia and a group of western uranium companies called the Western Consortium signed the Commercial Feed Agreement in 1999. The Western Consortium is composed of Cameco (a Canadian uranium producer), Cogema (a French consortium), and Nukem (a German uranium broker). Globe Nuclear Supply Services (GNSS) is a partner for Russia in the agreement. The Western Consortium and Russia have worked together to ensure substantial new sales of the natural uranium and conversion components of the HEU Purchase Agreement. In November 2001, the Western Consortium and Tenex signed a new amendment to the Commercial Feed Agreement. Under the terms of the amendment, the Western Consortium committed to purchase quantities of natural uranium at least equal to their respective quota shares each year for the period 2002 through 2013. This

amendment provides substantial new revenues to Russia while ensuring reliable and nonthreatening entry of Russian uranium into the commercial market.

From the initial delivery in 1995 through December 2002, a total of 171.4 MT of HEU (roughly 34 percent of the 500 MT total) have been converted to LEU and delivered to USEC. (Annual deliveries under the HEU Purchase Agreement represent about 50 percent of total U.S. domestic utility requirements.) This quantity of HEU represents enough material for approximately 6,850 nuclear warheads. Under the current agreement, Minatom converts 30 MT of HEU to LEU annually for delivery to USEC, for which Russia receives about \$500 million annually. A total of approximately \$3 billion, plus unsold natural uranium feed material equivalent to the quantity of uranium in the LEU delivered to USEC, has been provided to Minatom through 2002.

**Program Future and Exit Strategy.** On June 19, 2002, the United States and Russian Governments approved implementation of new, flexible market-based pricing terms for the remaining 11 years of the HEU Purchase Agreement. The new flexible pricing terms went into effect in January 2003. The implementing contract covering terms and conditions, including market-based pricing, through the end of the contract in 2013, provides for conversion of the remaining 329 MT of HEU (the equivalent of roughly 13,100 nuclear warheads). Based on an estimated fair market value, Russia will receive approximately \$5 billion in additional revenue through 2013. The current HEU Purchase Agreement is expected to be completed on schedule in 2013.

**Funding.** No federal appropriations are required to support this program except to implement transparency measures (see below).

#### **4. Highly-Enriched Uranium Transparency Implementation - DOE**

**Program Description.** The HEU Transparency Implementation Program (HEU-TIP) develops and implements mutually agreed-upon transparency measures to support the nonproliferation objectives of the February 1993 HEU Purchase Agreement. The United States and Russia negotiated a set of access and monitoring measures, required by the agreement and termed "transparency" measures, at four Russian nuclear processing facilities in closed Russian cities. The transparency measures are designed to provide confidence that the HEU Purchase Agreement's arms-control objectives (reducing the number of Russian nuclear warheads) and nonproliferation objectives (reducing Russia's inventory of weapons-grade HEU) are met. More specifically, these measures are intended to provide confidence that the HEU is indeed extracted from dismantled Russian nuclear weapons and downblended to LEU at three Russian downblending facilities.

This program implements the transparency measures through periodic monitoring visits to all Russian facilities that process HEU subject to the agreement. United States experts observe the processes that convert HEU to LEU, review nuclear material accounting records, and monitor quality measurements using U.S. equipment on the HEU to verify that it is weapons-grade. The agreement also requires the United States to support comparable monitoring activities by Russian Federation representatives at the U.S. facilities where the LEU from downblended Russian HEU is received and processed.

Russian facilities and HEU processing plants subject to U.S. transparency monitoring currently include the following four Minatom sites:

- The Mayak Production Association in Ozersk and the Siberian Chemical Enterprise (SChE) in Seversk, which receive weapon components and process the HEU metal into purified HEU oxide for use in other facilities;
- SChE and the ElectroChemical Plant (ECP) in Zheleznogorsk, which then process the HEU oxide into uranium hexafluoride; and
- SChE, ECP, and the Ural Electrochemical Integrated Plant (UEIP) in Novouralsk, which downblend the HEU hexafluoride to LEU in the assay specified by USEC.

The LEU product is purchased by USEC and shipped to the Portsmouth Uranium Enrichment Plant in Piketon, Ohio, for subsequent sale and shipment to U.S. commercial fuel-fabrication facilities.

This program implements the negotiated transparency and access procedures. It also conducts annual inventory-verification visits to the Russian facilities to confirm that the natural uranium feed material returned to Russia is stored and used in accordance with the March 1999 bilateral agreement concerning the transfer of source material to the Russian Federation.

**Accomplishments and Key Milestones.** Transparency is achieved through a combination of: on-site monitoring at the Russian HEU processing facilities; detailed analyses of nuclear material accounting records from each plant; and analysis of independent measurement results from U.S. transparency instruments. Specific program objectives include:

- Conducting on-site transparency monitoring activities at Russian facilities that convert HEU from dismantled Russian nuclear weapons into LEU for purchase by USEC;
- Maintaining U.S. blend down monitoring system (BDMS) equipment at UEIP and working toward installation of similar equipment at the remaining two blend down facilities. This instrumentation continually monitors and independently confirms the enrichment and flow of uranium through the facility;
- Using portable nondestructive analysis instrumentation to confirm that weapons-grade uranium (metal, oxide, and hexafluoride) is being processed;
- Obtaining and analyzing data from transparency monitoring of Russian HEU processing under the agreement and providing reports of this data to the interagency; and
- Supporting the development and negotiation of additional measures to enhance transparency operations.

Under the March 1999 Agreement on the Transfer of Source Material to Russia, the HEU-TIP is also required to conduct an annual inventory verification of the natural uranium equivalent feed material returned to Russia. To date, the United States has performed approximately 1,650 weeks of monitoring in the four Russian nuclear facilities (300 weeks in 2002) and has obtained more than 80,000 pages of material accountability data.

Notable accomplishments during 2002 include:

- Monitoring the process for converting 30 MT of weapons-grade HEU into LEU;
- Conducting 20 of 24 allowed transparency monitoring trips to the four Russian HEU processing facilities to observe processing operations and gather specified and pertinent transparency data. (The United States is allowed to visit each facility up to six times per year, for up to a five-day period for each visit.);
- Staffing the Transparency Monitoring Office (TMO) at the UEIP facility with daily access to the plant. August 2002 began the sixth year of TMO operations at UEIP;
- Performing roughly 2500 measurements using portable NDA equipment to confirm uranium-235 enrichment in Russian HEU containers and cylinders;

- Completing negotiations between DOE and Minatom (November 2002) that will allow U.S. monitors access to BDMS equipment at one of the remaining two Russian blending facilities (ECP in Zheleznogorsk). The United States informed Minatom of the U.S. intent to install the BDMS at ECP in early CY03;
- Holding a technical discussion with SChE (December 2002), to discuss BDMS operational requirements and blendpoint modifications in preparation for a FY2004 installation;
- Obtaining, analyzing, and evaluating all monitoring data and information and preparing reports for interagency review; and
- Completing the second annual inventory-verification visit to UEIP, where returned natural uranium feed material is stored (the first feed material was returned to Russia in July 2000).

**Program Future and Exit Strategy.** This work will continue for at least another 10 years, until 2013 when the last of the 500 MT of HEU is scheduled to be downblended to LEU. In general, the United States will continue to implement transparency monitoring at all Russian facilities that process HEU subject to the agreement. Efforts will also continue to improve monitoring equipment and associated procedures to increase the efficiency of the monitoring and ensure that the most cost effective transparency measures available are being implemented. Specifically, BDMS equipment will be installed at the ECP blenddown facility in Zheleznogorsk by the end of 2002. Facility modifications and installation of BDMS equipment at the SChE facility in Seversk should be completed in late 2003.

**Funding.** Total funding for this project through FY02 is \$104.4 million. The appropriation for FY03 is \$17.2 million.

## **5. Accelerated Material Disposition**

On September 16, 2002, DOE Secretary Abraham and Minatom Minister Rumyantsev issued the following Joint Statement:

In their May 2002 Summit in Moscow, the President of the United States of America, George W. Bush and the President of the Russian Federation V.V. Putin agreed to establish a joint experts group to work out proposals on near- and long-term, bilateral and multilateral means to reduce inventories of highly enriched uranium (HEU) and plutonium. The United States and Russia recognize their common interest in guaranteeing the irreversibility of nuclear disarmament, strengthening nonproliferation and combating terrorism by accelerating the disposition of

excess nuclear weapon materials.

Ambassador Linton Brooks and First Deputy Minister Mikhail Solonin co-chaired the Expert Group on Accelerated Nuclear Material Disposition. We highly appreciate the results of the Expert Group. We are pleased with the accelerated pace the group maintained, finishing the report three months earlier than their initial deadline. The report will be forwarded to Presidents George W. Bush and V.V. Putin.

The Expert Group identified several areas where joint cooperation could lead to reduction of HEU over and above commitments already in place under existing agreements. These include:

- Creation of a strategic reserve in the United States from Russian HEU downblended into LEU;
- Increase in the rate and quantity of HEU converted to LEU under the Nuclear Material Consolidation and Conversion Project;
- Use of LEU down blended from Russian HEU to fuel reactors in Western countries;
- Use of Russian HEU to fuel selected U.S. research reactors, until cores are converted to LEU; and
- In parallel, work on accelerated development of LEU fuel for both Soviet-designed and U.S.-designed research reactors.

New areas of cooperation for plutonium disposition that could be implemented in the near term provide for:

- Adding additional weapons-grade plutonium to the 2000 Agreement for fabrication into MOX for use in Russian reactors; and
- A variation of this scenario where some MOX is irradiated in Russia and the remainder is leased or exported for irradiation elsewhere.

The Expert Group will continue to study additional options that could be relevant in the future, taking into account their technical feasibility, impacts on commercial nuclear fuel market industries, and required financial resources.

Since that announcement, DOE and Minatom have begun discussions

on the following Accelerated Material Disposition efforts:

- U.S. purchase of Russian HEU to fuel U.S. research reactors for which no suitable LEU fuel currently exists;
- U.S. purchase of Russian HEU to be blended down to create an LEU fuel reserve inventory in the United States; and
- Acceleration of LEU fuel design and conversion efforts for U.S. and Soviet-designed research reactors.

**Funding.** The appropriation for this new project in FY2003 is \$14 million.

## **B. Other States**

### **1. Research Reactor Fuel Return - DOE, DOS**

**Program Description.** The Russian Research Reactor Fuel Return (RRRFR) program advances U.S. nuclear nonproliferation objectives by eliminating scattered stockpiles of HEU research reactor spent and fresh fuel and by requiring eligible countries to convert their research reactors to operate on LEU fuel when available. Twenty-four Russian-supplied reactors in 14 countries possess a total of 1,600 kg of HEU. High priority is placed on removing fuel from those reactor sites situated in politically less stable regions and with high HEU inventories. Uzbekistan has expressed a strong interest in the program and may be the first country, after Yugoslavia, to ship HEU back to Russia.

**Accomplishments and Key Milestones.** The RRRFR program was established as the result of 1999 discussions among the United States, Russia, and the IAEA on the need to return spent or fresh nuclear fuel of Soviet or Russian origin currently stored at foreign research reactors to Russia for storage and disposition. Accomplishments since that time include six tripartite U.S.-Russia-IAEA meetings, a fact-finding mission in June 2001 to Ukraine, Uzbekistan, and Yugoslavia, and two technical meetings on the readiness of reactor fuel from the VVR-SM reactor in Tashkent, Uzbekistan, for shipment to Russia.

In March 2002, DOE and Uzbekistan's Ministry of Foreign Affairs signed an agreement to facilitate cooperation between the parties for the return of Uzbekistan's Soviet-supplied spent and fresh nuclear fuel to Russia. This agreement, which was negotiated under the U.S.-Uzbekistan Non-Proliferation Agreement (June 5, 2001), also addresses: the conversion of the VVR-SM reactor from HEU to LEU fuel; the enhancement of security at the VVR-SM reactor site; and the safe and secure storage of Uzbekistan's nuclear materials,

including improving methods of physical protection, control, and accounting of nuclear materials to reduce the risk of theft or diversion.

In addition, the United States Government has tabled an umbrella agreement between the United States and Russia concerning cooperation for the return of Soviet- or Russian-supplied research and test reactor nuclear fuel to Russia from many countries. This agreement is currently under interagency evaluation in Russia.

**Program Future and Exit Strategy.** Agreements must still be reached with Russia and 13 other countries that are eligible to return reactor fuel to Russia. The project will be completed when the current inventory of Soviet- and Russian-supplied HEU fuel from all eligible countries has been returned to Russia. The estimated duration of the program is approximately seven years.

**Funding.** Total funding for this project through FY02 is \$5.8 million. The appropriation for FY03 is \$11.4 million, which is divided between DOE (\$9.5 million) and DOS \$1.9 million).

**IV. PROGRAM DESCRIPTION:  
SECURE WEAPONS-GRADE NUCLEAR MATERIAL**

**A. Russia**

The Material Protection, Control and Accounting program and the Mayak Fissile Material Storage Facility, described in this section of the report, are the primary initiatives to secure weapons-grade nuclear material in Russia. In addition, activities under the Warhead Safety and Security Exchange Agreement, which is described later in this report, also contribute to this objective by developing technologies to improve the security and safety of stored fissile materials.

**1. Material Protection, Control and Accounting - DOE**

**Program Description.** The MPC&A program is upgrading physical protection and material control and accounting at 53 Russian facilities that produce, use, or store weapons-usable nuclear material (the Russian nuclear warhead facilities that MPC&A works with will be discussed separately). The program conducts risk and vulnerability assessments at Russian nuclear facilities and then installs modern MPC&A equipment to correct the identified vulnerabilities.

The program also seeks to foster the development of an indigenous Russian safeguards culture and a domestic capability for maintaining comprehensive MPC&A upgrades. To this end, the program is assisting in the development of management systems to operate and maintain such equipment, ultimately without further U.S. support. The program also supports cooperative projects to help institute national standards in MPC&A and strengthen national nuclear regulatory systems.

Closely related, the Material Consolidation and Conversion (MCC) program is designed: to reduce the proliferation attractiveness of weapons-usable nuclear material (e.g., by converting HEU to LEU); and to reduce the number of Russian sites holding weapons-usable nuclear material.

The MPC&A program requires access to sites to assess material attractiveness and vulnerability. MPC&A upgrades can then be prioritized so that material with a high attractiveness or at greatest risk for theft and diversion is secured first. The program takes a two-phased approach to provide the greatest risk reduction as quickly as possible.

Phase 1 consists of rapid upgrades, which include:

- Creating clear zones and establishing controlled, limited-access areas containing nuclear material;
- Bricking up windows and hardening doors;
- Installing locks, delay blocks, steel cages, and personnel portal monitors;
- Implementing random guard patrols, the two-person rule, and daily administrative checks;
- Conducting baseline inventories; and
- Installing tags, seals, and tamper-indicating devices to prevent unauthorized removal of nuclear material.

Phase 2 consists of comprehensive upgrades, which include rapid upgrades plus:

- Installing intrusion detection equipment, closed circuit television, and alarm assessment systems;
- Installing electronic access controls and central alarm stations;
- Installing advanced material measurement, hold up, and inventory instrumentation;
- Implementing computerized material accounting systems; and
- Supporting a wide range of MPC&A training programs.

Based upon the best available information, the MPC&A program estimates that roughly 600 MT of weapons-usable nuclear material in Russia require complete and comprehensive MPC&A systems upgrades. To date, the program has started, and in some cases completed, rapid upgrades on approximately 80 percent of this material.

**Accomplishments and Key Milestones.** In response to the events of September 11, 2001, the MPC&A program is accelerating key elements of its threat-reduction work. Through the end of FY02, the MPC&A program has completed rapid security upgrades on a total of 40 percent of the roughly 600 MT of Russian weapons-usable HEU and plutonium. This progress has resulted in improved security for enough material to make more than 15,000 nuclear

devices. To ensure that these upgrades will be sustained, the MPC&A program has trained more than 5,000 Russian MPC&A operators, initiated a comprehensive assessment of Russian-based MPC&A equipment, and provided support for the development and deployment of a comprehensive national nuclear material accounting system.

Notable MPC&A program accomplishments through the end of FY02 include:

- Comprehensive upgrades completed at 33 of 53 sites;
- Rapid upgrades complete on 40 percent of the roughly 600 MT of at-risk HEU and plutonium;
- Comprehensive upgrades complete on 17 percent of the at-risk material;
- Elimination of more than 3.25 metric tons of HEU by converting it to LEU;
- Enhanced security of 141 transport and escort trucks, and 59 railcars, and provided 195 secure overpacks (lifetime) thus improving security during transport; and
- Installed radiation detection equipment at 12 international border crossings.

In addition, the MPC&A program achieved several important milestones in FY02:

- The Second Line of Defense (SLD) program was transferred to the MPC&A program in FY02. The SLD program designs and installs improved equipment for detecting and intercepting the smuggling of nuclear material across international borders. Incorporating this program into the MPC&A program will expand nuclear-material-protection activities to Russia's borders;
- Key bottlenecks slowing contract negotiation and design development were removed, enabling the conclusion of six comprehensive upgrade contracts with the Ministry of Defense over a 6-month period;
- The Minatom civilian nuclear complex began to renegotiate work contracts with Russian entities using various incentives to shorten schedule times;

- The Minatom defense nuclear complex increased the frequency of site trips and set a rigorous schedule for developing contracts and statements of work for the upcoming year; and
- A new effort was begun in FY02 to identify and pursue actions that can be taken jointly with Russia to reduce the threat of radiological dispersal device (RDD) attack against the United States and its allies and interests. An initial assessment will be completed in early FY03 to determine the viability, threat, and probable impact of an RDD attack. The MPC&A program will begin installing equipment to enhance the security of vulnerable RDD source materials in Russia and the former Soviet states.

**Program Future and Exit Strategy.** Although the MPC&A program has accomplished much, more work remains to be done. Specific goals through FY03 include:

- Completion of comprehensive upgrades at a total of 39 of the 53 sites (up from 33 sites);
- Completion of rapid upgrades on a total of 46 percent of the roughly 600 MT of at-risk HEU and plutonium (up from 40 percent);
- Completion of comprehensive upgrades on 23 percent of the at-risk material (up from 17 percent);
- Elimination of more than 4.45 metric tons of HEU by converting it to LEU (up from 3.25 metric tons);
- Enhance security features of 196 transport and escort trucks, and 76 railcars, and provide 261 secure overpacks (lifetime), thus improving security during transport;
- Installation of radiation detection equipment at 26 additional international border crossings; and
- Signing of an SLD Memorandum of Understanding between DOE and Russian Customs to allow for increased cooperation and necessary SLD-specific program work requirements.

Several milestones are planned for FY03, including the following:

- Steps have been identified for accelerating and expanding MPC&A cooperation with Russia. Last year estimates were that it would take until 2010 to complete comprehensive upgrades at the 53 known weapons-usable nuclear materials sites, with 9 of

those sites being completed after 2007. These timelines have been shortened as a result of the September 11 attacks, the signing of an access agreement with Minatom, and additional funding. Current estimates are that all 53 known weapons-usable nuclear materials sites will be completed by 2008.

- Negotiations are underway between DOE and Minatom to expand the MCC program.
- The Russian Federal Information System, a computer-based system that accounts for nuclear material in Russian facilities, will add eight additional enterprises to its system in FY03. This will bring the total to 25 enterprises, consisting of 68 Material Balance Areas, reporting on the system. Also, 25-30 nuclear material security-related regulatory documents will be initiated and/or completed for Minatom and GosAtomNadzor (GAN).
- Rapid upgrades for protective forces will be implemented at 5-7 Russian sites and 5-6 sites in Ukraine. The Independent Study Training system will be implemented to enhance the performance of GAN inspectors. The Minatom Oversight Program will initiate Minatom Inspectors' training and complete an Oversight Program Plan. GAN will complete the GAN Inspection Operations System (GIOS) sustainability plan and installation of the GIOS MC&A module in the Central Region. MPC&A Operations Monitoring system installations are planned at nine additional Russian sites.

With the accelerated MPC&A program schedule described above, completion dates have been moved up by two to three years. Comprehensive upgrades at the 53 nuclear material sites in Russia should be completed by FY08. This shortened timeframe requires that the MPC&A program begin developing plans for transitioning to a sustainability phase wherein Russia assumes the funding and maintenance of MPC&A at its nuclear facilities while U.S. MPC&A program representatives continue to visit and inspect sites to ensure that all rapid and comprehensive upgrade systems remain effective. The exit strategy for the MPC&A program is being formalized to ensure a smooth transition from active involvement to passive observation.

The projected end dates assume that no new sites are opened to U.S. personnel. If the scope of the MPC&A program grows over the next few years to include more than the identified 53 sites and roughly 600 MT of material, the expected completion dates will change accordingly.

**Funding.** From FY92 through FY02, the United States Government

provided a total of \$1163.4 million in funding for MPC&A programs in Russia and the other former Soviet states, including work at Russian Navy warhead sites, which is discussed separately. The appropriation for this program in FY03 is \$185.8 million.

## **2. Fissile Material Storage Facility - DOD**

**Program Description.** The Fissile Material Storage Facility (FMSF) program is assisting the Russian Federation in the planning, engineering, design, and construction of a centralized storage facility for weapons grade fissile material. The FMSF will provide centralized, safe, secure, ecologically sound, and operations-ready storage for weapons grade fissile material. The project supports U.S. nonproliferation objectives through enhanced safeguards in the form of material control and accounting (MC&A) and transparency, which requires confidence that the fissile material is of weapons-grade, that the storage is safe and secure, and that the fissile material will not be reused for nuclear weapons. The design incorporates the required support buildings and a receiving/storage building. The FMSF is scheduled for completion during FY03. After all certification requirements are completed, Russia will operate and maintain the facility.

The Mayak FMSF is designed to encourage Russian nuclear warhead dismantlement by furnishing fissile material storage. In January 2002, Minatom stated that it plans to fill the FMSF with 25,434 containers of weapons-origin fissile material, either plutonium or HEU. One storage scenario is to store 50 tons of plutonium and 200 tons of HEU, roughly equivalent to the material required for nearly 13,000 nuclear weapons. The Defense Threat Reduction Agency provides Program Management, the U.S. Army Corps of Engineers (USACE) manages the design and construction of the FMSF, and the Threat Reduction Support Center provides specialized administrative and technical support. Bechtel International Services Inc. (BNI) is the integrating contractor for the facilities. USACE, BNI, and the Russian design and construction firms (VNIPIET and South Urals, respectively) have jointly developed the construction schedule which is reviewed and approved by DOD and Minatom representatives during the semiannual Joint Senior Implementing Group (JSIG) meetings. USACE and BNI have personnel at the construction site daily who inspect the work to verify that it satisfies the construction specifications.

The United States and Russia are negotiating a transparency arrangement that will permit the United States to monitor what is loaded in the FMSF. The arrangement also commits Russia to store only eligible plutonium and HEU in the FMSF. The monitoring regime will examine and measure the nuclear emissions of

plutonium and HEU in CTR Program-provided fissile material containers for conformance with a Russian-provided declaration of what type and how much fissile material is stored in the facility. A prototype nuclear emissions measurement system with information barrier to protect classified information was successfully demonstrated to a Russian team of technical experts at the Los Alamos National Laboratory in August 2000. This demonstration paved the way for joint development of a similar system to be installed at the FMSF for U.S. use during its six monitoring visits per year.

**Accomplishments and Key Milestones.** Construction of the FMSF was over 90 percent complete by the end of FY02. All building construction was completed and equipment installation continues. All power supply systems have been installed, permanent power will soon be energized, and systems start-up and testing have begun. A Thermal Analysis was completed and showed that the facility could be loaded with 85 percent of the containers filled with plutonium rather than only 50 percent. Safeguards work and security fencing and landscaping was nearly completed. The installation of equipment is nearing completion and start up testing is underway. Russia plans to operate the facility 24 hours a day, running 3 shifts a day, in order to complete loading in 4 to 5 years.

**Program Future and Exit Strategy.** It is planned to complete construction of the FMSF in 2003. The Russians have stated that they need the facility and will begin loading immediately after it is completed and certified for loading. DOD anticipates concluding the transparency agreement in 2003.

**Funding.** Total funding for this project through FY02 is \$360.2 million. No additional funding is required.

#### **Other States - DOE**

### **1. New Independent and Baltic (NIS/Baltic) States Safeguards and Security**

**Program Description.** The objectives of the NIS/Baltic Safeguards and Security Program parallel those of the MPC&A program in Russia. These states, like Russia, require assistance to improve the physical security and material accounting and controls of Soviet-legacy weapons-usable nuclear material. The program, which began in 1993, has conducted activities in seven republics: Belarus; Georgia; Kazakhstan; Latvia; Lithuania; Ukraine; and Uzbekistan.

The original goals of this program were to provide:

- Rapid physical protection upgrades of sensitive facilities housing plutonium or HEU;
- Assistance in setting up MC&A systems; and
- Verification that MC&A, physical protection, and maintenance procedures, personnel, equipment, and software meet IAEA guidelines.

The first phase of physical protection upgrades was completed in FY97-98.

The recent infusion of supplemental funding into this program as well as the realities of the post-September 11 world have added additional goals to the program, including:

- Re-evaluation of physical security and safeguards at sensitive sites;
- Additional upgrades based on these evaluations;
- Studies to assess, and revise as necessary, the security/safety interface at all sites where the United States has funded physical protection upgrades;
- Expanded training and support for MC&A and facility protective forces. Expansion of physical protection projects to civilian nuclear power plants;
- Review all sites for compliance with IAEA guidelines that includes protection against sabotage;
- Development of indigenous suppliers for long term sustainability; and
- Creation of exit strategy.

**Accomplishments and Key Milestones.** The following tasks have been completed since 1999.

**Kazakhstan:**

- Comprehensive vulnerability assessment performed at one site;
- Operational inspections performed at two sites;
- Contracts for additional upgrades signed for one site;

- Contract for development of a long term sustainability plan signed;
- Preliminary response force evaluation performed; and
- Introductory MC&A training course and procedure development course conducted.

**Ukraine:**

- Comprehensive vulnerability assessments performed at three sites;
- Contracts for additional upgrades negotiated for two sites;
- Preliminary response force evaluation performed; and
- Training performed in both physical security and MC&A.

**Uzbekistan:**

- Enhanced physical security upgrades installed at reactor building in response to the increased terrorist threat;
- Preliminary response force evaluation performed;
- Performance test training conducted; and
- Procedure development course conducted.

**Latvia:**

- Comprehensive vulnerability assessment performed at the only HEU facility in country.

This program supports or has provided support to 13 sites in the seven countries listed above. As the program expands to LEU sites, the focus will shift to civilian nuclear power plants in Ukraine and other non-Russian republics as necessary.

**Program Future and Exit Strategy.** A great deal of work remains to be done in the NIS/Baltic States. The priority projects over the next five years are to upgrade security at facilities that no longer meet IAEA standards and which face possible new threats exemplified by the events of September 11.

The Program also needs to be expanded to include civilian nuclear power plants in the region. This would include both physical

security upgrades and training for reactor and response force personnel. As of this writing, the Program is planning an initial visit to the Zaporizhzhya Nuclear Power Plant in Ukraine to perform a comprehensive vulnerability assessment. Based on this assessment, upgrades will be performed. The other power plants will follow based on this model. This work will continue for at least the next five years.

Looking ahead to the transition of these activities to indigenous support, the program has focused on simple, low-tech upgrades that do not require expensive and time-consuming maintenance in order to reduce the cost to the host government when it takes over sustainability. In addition, contracts are being negotiated at the state level with Ukraine and Kazakhstan to develop guidelines for self-sufficiency in physical protection and safeguards.

**Funding.** Total spending on this program from FY93 through FY03 is \$52 million. It is anticipated that in FY03 \$6 million will be spent for this program which is included in the appropriation for the Russian MPC&A program.

## **2. BN-350 Spent Fuel Disposition - DOE**

**Program Description.** Kazakhstan's BN-350 fast breeder reactor began producing power and weapons-grade plutonium in 1972, and was shut down in 1999. The majority of the spent fuel has remained in the on-site cooling pond.

In 1995, after U.S. experts studied the quality of the plutonium and its vulnerability to theft, DOE began a \$15 million program of material protection, control and accounting enhancements at the facility. In 1996, the United States and Kazakhstan also began discussing plans for the long-term disposition of the spent fuel. In November 1997, Secretary of Energy Pena and Minister of Energy Shkolnik signed an agreement pledging U.S. support for the packaging and interim dry storage of the material. In June 2001, a joint U.S.-Kazakhstan team completed packaging. Subsequently, the United States and Kazakhstan have been negotiating the storage phase of the project.

The goal of this project is to minimize the proliferation risks of theft or diversion associated with the weapons-grade plutonium in the BN-350 spent fuel. The spent-fuel assemblies will be shipped to the Baikal-1 site, where they will be placed in a storage facility designed to last at least 50 years.

**Accomplishments and Key Milestones.** As of June 2001, all spent-fuel assemblies had been packaged in proliferation-resistant

canisters. An innovative safeguards system for measuring the plutonium in the spent fuel has been developed for IAEA's use in this measurement campaign, the largest of its kind ever. The BN-350 project also developed an instrument that establishes a unique nuclear fingerprint for each canister as well as a nuclear material monitoring system that considerably enhances the IAEA's ability to safeguard the material.

The cost of this effort was about \$43 million, including support to the IAEA for applying safeguards to the material. The IAEA has praised the project as the largest and one of the most successful of its kind in terms of the contribution made to international safeguards. The Government of Kazakhstan refers to this project as an outstanding example of how nations can work together to improve global security by reducing risks posed by the proliferation of weapons of mass destruction.

**Program Future and Exit Strategy.** The canisters will be shipped to Baikal-1 for dry storage. The transportation and storage technologies to be used are under negotiation. Once the material is in dry storage at Baikal-1, the United States will have completed its obligations under the 1997 agreement. The soonest that this could occur is late 2004.

**Funding.** Total funding for this project through FY02 is \$65.8 million. The appropriation for FY03 is \$8.1 million.

**V. PROGRAM DESCRIPTION:  
FACILITATE NUCLEAR WARHEAD DISMANTLEMENT**

**A. Russia**

In large part because of the difficulty of negotiating the required transparency measures, the United States conducts only one program in direct support of Russian nuclear warhead dismantlement - assistance to transport warheads from storage to dismantlement facilities, described below. However, other programs discussed separately in this report play an essential indirect role in encouraging Russian warhead dismantlement. This is especially true for programs like the HEU Purchase Agreement, Plutonium Disposition, and the Mayak FMSF. The first two dispose of material from dismantled warheads, and the third will provide safe and secure storage for remaining material. Further, the United States contributes to dismantlement efforts through the development of technologies and the exchange of unclassified information with the Russian Federation to enhance the safety and security of the dismantlement process. This activity is conducted under the U.S.-Russia Warhead Safety and Security Exchange program, discussed in more detail later in this report. Strategic offensive arms elimination projects, which are outside the scope of this report, also encourage increased Russian warhead dismantlement.

**Nuclear Weapons Transportation - DOD**

**Program Description.** Under the DOD CTR program, the Nuclear Weapons Transportation Security (NWT) project works with Russia to dispose of excess nuclear weapons as soon as practicable. NWT began in January 1998 with initial discussions on a project to safely and securely transport Russian nuclear warheads destined for dismantlement. In November 1999, DOD and the Russian MOD signed a complex implementing arrangement defining the procedures by which DOD would fund the weapons movements. The first rail shipment was conducted in January 2000.

The goal of this project is to transport as many Russian nuclear warheads as possible from deployed or centralized nuclear weapons storage sites, to secure consolidation sites or dismantlement facilities in Russia. United States funding of these train shipments encourages the Russian Federation to dismantle warheads and permanently taking them out of the Russian arsenal. This project and the need to consolidate and protect Russian nuclear warheads from terrorists continued to receive increased attention over the past year.

**Accomplishments and Key Milestones.** As of November 2002, 134 rail shipments had transported Russian nuclear warheads to consolidation sites or dismantlement facilities within the Russian Federation. Each rail shipment is estimated to have contained between 20 to 30 warheads. Therefore, with the 134th shipment, approximately 2,500-4,000 warheads have been transported to consolidation or dismantlement sites in Russia.

**Program Future and Exit Strategy.** Currently, approximately six weapons rail shipments take place each month. Shipments are expected to remain at this rate for the foreseeable future. The United States only pays for shipments after they occur. If a shipment does not comply with the requirements specified in the Implementing Arrangement, payment is not made. The requirement to transport nuclear weapons to dismantlement facilities is evaluated annually by DOD and the Russian MOD and is the basis for executing annual contract options. This project will be terminated by DOD based on input from the Russian MOD or at the end of the CTR program.

**Funding.** The total funding for this program through FY02 is \$36.6 million. The appropriation for FY03 is \$15.0 million.

## **B. Other States**

There are no programs in this area, because Russia is the only former Soviet state with nuclear warheads on its soil. All warheads were removed from Kazakhstan in 1995 and from Ukraine and Belarus in 1996. DOD's CTR programs in those areas played an essential role in that critical nonproliferation achievement.

**VI. PROGRAM DESCRIPTION:  
SECURE REMAINING RUSSIAN NUCLEAR WARHEADS**

**1. Warhead Storage Security - DOD**

**Program Description.** DOD is enhancing the security, safety, and control of Russian nuclear weapons during storage by providing the Russian MOD equipment, material, services, and training through the CTR Nuclear Weapons Storage Security program. CTR projects include: Quick Fix fencing; Security Assessment and Training Center; site security enhancements; personnel reliability and safety; guard force equipment and training; nuclear weapons storage site support; and the Automated Inventory Control and Management System (AICMS). DOD's work in this area is closely coordinated with that of DOE.

DOD has provided the MOD 123 sets of a one-kilometer perimeter security system consisting of an inner and outer layer of security fence surrounding a security fence with microwave sensors, vibration cable, and alarm sensor systems to be installed at MOD nuclear weapons storage sites.

DOD constructed a Security Assessment and Training Center (SATC) at Sergiev Posad to test and evaluate new security alarm and access-denial equipment. DOD and MOD have identified a suite of equipment that will form the basis of security enhancement upgrades that will be procured and installed at Russian nuclear weapons storage sites under CTR security enhancement projects.

Site security enhancement projects will increase the security of Russian nuclear weapons storage sites at national stockpile bases and operational bases. DOD recently concluded with MOD the protocols and arrangements necessary to ensure access to any storage sites receiving these enhancements. Permanent and temporary storage locations that contain either strategic or tactical nuclear weapons will receive security enhancements. DOD has also agreed in principle to provide security upgrades at selected road-to-rail transfer points. The specific requirements will be identified during the site surveys of the permanent storage sites. Security and safety enhancements include Quick Fix fencing used to protect the perimeter of nuclear weapons storage sites, and comprehensive security upgrades. The current concept is to complete the remaining Quick Fix installations during the comprehensive site upgrades. The upgrades will use equipment from the comprehensive suite selected at the SATC. Only equipment items identified in the individual Site Designs (SDs) will be installed. The SDs will identify the amount of effort required to provide the requisite level of security at each site. Assistance includes support equipment, suites of

equipment, and training to implement security enhancements. This effort will be supported through an integrating contractor.

Personnel Reliability Program (PRP) assistance enhances MOD's ability to ensure the reliability of individuals who have access to nuclear weapons through drug and alcohol screening. Under this project, DOD provides portable drug and alcohol testing equipment and related training, test consumables, and a fixed laboratory to conduct urinalysis to support evidentiary-level drug screening and confirmation. The CTR program also is improving the safety of these personnel by providing dosimeters for radiation and radon detection.

Guard force equipment and training provides specialized equipment, training aids, communications equipment, associated training, and logistics support to enhance the capability of MOD's guard force to safeguard nuclear weapons and deny access to nuclear weapons storage areas. Training aids include Small Arms Training Simulators (SATS) and live fire ranges.

Nuclear weapons storage site support provides support equipment for nuclear weapons storage sites and has established a Safety Enhancement Center (SEC). Support equipment includes fire fighting, site preparation and maintenance, environmental control, and safety equipment. All equipment is stand-alone, not requiring integration and will enhance the site safety and security. The SEC addresses MOD's safety concerns regarding aging equipment that supports nuclear weapons storage efforts, such as weapons handling equipment. The SEC supports field inspections and laboratory analysis to certify the continued operation of field equipment that supports the movement and storage of nuclear weapons destined for dismantlement.

AICMS enhances the capability of the Russian MOD to account for and track strategic and tactical nuclear weapons scheduled for dismantlement. The operational configuration will provide hardware, off-the-shelf software, and facilities for a fully integrated system at 18 sites (two central command posts, two central facilities, four regional facilities, and ten field facilities).

**Accomplishments and Key Milestones.** The Russian MOD has reported installation of 33 sets of Quick Fix fencing at nuclear weapons storage sites. SATC testing was completed on 100 percent of the comprehensive security equipment categories and MOD and DOD selected a suite of equipment to be installed at MOD storage sites. MOD has identified eight sites for upgrades and a contract has been signed to complete the vulnerability assessments, conduct site surveys, complete the site designs and

install the upgrades at the eight sites. In April 2002, the Russian Federation agreed to grant site access and DOD and MOD initiated negotiations on the procedures to ensure U.S. access. DOD and MOD concluded in February 2003 the necessary protocols and arrangements to permit the limited access by U.S. representatives needed for site security enhancement projects. To enhance guard effectiveness, DOD has concluded contracts to procure hand-held and base radios with associated repeaters with antennas, additional batteries, and chargers. The CTR program also is procuring and installing 60 SATS and three authoring stations to create simulator scenarios, plus 12 live-fire shooting ranges with pop-up targets. Contractors have delivered 44 SATS and one live fire shooting range. Under the PRP program, DOD has provided fixed lab equipment and associated training, test cups, dosimeter systems, and radon detectors. DOD completed SEC project site renovation, procurement of equipment, laboratory design and renovation, installation of equipment, and provision of related training. The Certification of AICMS hardware and software was completed, the facility design was finalized and approved, and a contract was awarded to install modular facilities at 16 sites as well as a new Central Command post in Moscow.

**Program Future and Exit Strategy.** In AICMS, guard force, PRP, and site support equipment, the exit strategy will be the completion of the procurement and installation of equipment where applicable, the training of MOD personnel on its maintenance and use and the transition to MOD for operation and maintenance. For the security upgrades, the United States Government will pay only for the vulnerability assessments, site design, equipment procurement, and installation as adequate site access is granted. Work is planned to end upon completion of required upgrades at all sites.

**Funding.** The total funding for this program through FY02 is \$373.9 million. The FY03 appropriation is \$39.8 million.

## **B. Other States.**

There are no programs in this area, because Russia is the only former Soviet state with nuclear warheads on its soil.

## **2. Warhead Safety and Security Exchange Agreement - DOE and DOD**

**Program Description.** The United States enhances warhead security during storage, transportation, and dismantlement through projects conducted under the U.S.-Russia Warhead Safety and Security Exchange (WSSX) Agreement. The WSSX Agreement, which is jointly managed for the United States by DOE/NNSA and DOD, provides for the exchange of unclassified technical information

to enhance nuclear warhead safety and security in both Russia and the United States. The WSSX Agreement, which was signed in December 1994, entered into force in June 1995 for a five-year term and was extended for another five-year term in June 2000. Participants are DOE/NNSA and DOD, the Russian Federation MOD and Minatom, and the U.S. National Laboratories and Russian Federation Science Institutes.

Since entry into force, the WSSX Agreement has provided the vehicle for numerous information exchanges between the two governments. Modes of exchange have included papers and presentations, studies, joint experiments and technology development, and participation in joint workshops and conferences. Information exchanges and technology development focus on: warhead and component safety and security through external means; safety and security during warhead dismantlement; technologies to augment storage and dismantlement transparency; and development of technologies that can be applied to combating nuclear-related terrorism.

**Accomplishments and Key Milestones.** Thirty-five projects have been completed under this program (including joint technology development, experiments, and technical interchange meetings). Nearly 40 additional projects are ongoing or are currently planned, including 3 technical interchange meetings planned for FY 2003. In addition to enhancing the safety and security of warheads and their components, this program has also developed technologies that could be utilized as part of potential monitoring and dismantlement transparency regimes. Further, this program has strengthened the working relationship between U.S. and Russian technical experts in the areas of warhead safety and security and nuclear counterterrorism.

**Program Future and Exit Strategy.** Future activities carried out under the WSSX program will address safety and security issues during warhead transportation, storage and dismantlement. Emphasis will be given to protecting against terrorist-related threats during these components of the warhead lifecycle, and to developing technologies with broader applications to protect against nuclear-related terrorism. Continuation of the WSSX program beyond June 2005 requires agreement by the United States and Russia to extend the Agreement for an additional five-year term.

**Funding.** The total funding for this program between FY99 and FY02 is \$21.045 million. The WSSX Agreement entered into force in 1995. Activities associated with the Agreement from FY95-FY98 consisted primarily of technical interchange meetings during which time representatives from the United States and Russia

exchanged unclassified papers addressing warhead safety and security issues. The appropriation for FY03 is \$13.525 million.

### **3. Protection, Control, and Accounting Cooperation with the Russian Ministry of Defense on Warhead Security - DOE**

**Program Description.** DOE began MPC&A cooperation with the Russian MOD in 1999. An Implementing Agreement between DOE and the MOD was signed in August 2000, providing a clear legal framework for this work under the U.S.-Russia MPC&A Agreement and U.S.-Russia CTR Agreement.

The current model for providing upgrades uses a two-phase approach to upgrade security systems. The first phase involves the provision of rapid upgrades that include establishing controlled areas and limits on personnel access to nuclear material, implementing a "two-person" rule, hardening windows and vault doors, installing locks, installing portal monitors, constructing passive physical barriers, and erecting armored guard towers. A comprehensive upgrades phase follows, which includes the construction of entry control points and guard buildings, installation of interior and exterior intrusion detection systems, providing closed-circuit camera monitoring and video assessment systems, and automated access control systems.

The Russian Federation Navy has proposed 42 sites to receive upgrades. Of these, 39 have received rapid upgrades. Of the 39, DOE has completed comprehensive upgrades at 8 sites and is funding comprehensive upgrades at an additional 5 sites. To mitigate the potential for duplication of effort within the United States Government, DOE works closely with DOD in planning and implementing Russian warhead security projects. Technical meetings to share lessons learned and discuss program implementation strategies are held and provide synergistic value towards U.S. collective efforts to enhance the security of Russian nuclear warheads. The Proliferation Strategy PCC also coordinates and provides agreed guidelines for these activities.

In May 2002, the Russian MOD formally requested MPC&A assistance from DOE at Strategic Rocket Force (SRF) sites that would effectively expand the scope of the existing Nuclear Warhead security collaboration. Two sites have been identified and proposed by the Russian MOD to serve as pilot projects to initiate MPC&A cooperation with the SRF. DOE is now evaluating this request and has signed preliminary contracts to perform vulnerability analyses to assess whether existing security systems require strengthening, and to do conceptual designs. DOE has signed contracts to provide rapid upgrades at one SRF site rail transfer point and it prepared to provide upgrades at storage locations at both sites after interagency coordination.

Early in FY03, a decision will be made on whether to pursue the installation of comprehensive upgrades at these and other SRF sites.

**Accomplishments and Key Milestones.** Notable DOE Warhead Security accomplishments through the end of FY02 include:

- Signed an Implementing Agreement in September 2000 providing legal basis for work. Administrative procedures to implement the provisions of the Agreement were also agreed to at this time;
- Installed rapid upgrades at 39 sites that the Russian Federation MOD identified as storing or handling nuclear warheads;
- Completed comprehensive upgrades at seven sites (an additional site has already been completed in FY03);
- Held high-level commissioning ceremonies for the upgraded operational security systems in support of two Russian Navy sites in the Northern Fleet region; and
- Signed vulnerability assessment and conceptual design contracts for two pilot project SRF sites.

**Program Future and Exit Strategy.** Through an established interagency process, DOE will determine how many additional Russian Federation Navy sites should receive comprehensive upgrades. Depending on the results of this study, comprehensive upgrades at Navy sites could be completed in FY07. Studies to determine whether to pursue upgrades at the pilot SRF sites will be completed in FY03. If justified, upgrades will proceed in compliance with established interagency procedures. Upgrades at additional SRF sites would be provided using the same process as that used at the pilot sites.

Sustainability, maintenance, and training for personnel at Russian Navy warhead sites of the Northern Fleet will be provided through the Kola Technical Center. Sustainability will be provided only for those sites for which interagency approval is gained. There are tentative plans to create similar technical support centers in the Far East that would provide long-term MPC&A system operations and sustainability support to upgraded warhead sites located in the Kamchatka and Primorye regions.

**Funding.** From FY92 through FY02, the United States Government provided a total of \$89.8 million in funding for MPC&A programs in support of the Russian Navy. The FY03 appropriation for this

program is \$47.3 million.

### **3. Warhead Transport Security - DOD**

**Program Description.** DOD is enhancing the safety and security of nuclear weapons while in transit from operational sites to secure consolidation sites and dismantlement facilities through CTR's Nuclear Weapons Transportation Security (NWTS) program. In the late-1990s, DOD provided MOD supercontainers that provide ballistic, thermal, and abnormal event protection to a warhead during transport. In addition to U.S. assistance, the United Kingdom has provided 250 supercontainers to the Russian MOD to provide increased ballistic and fire protection for the warheads being transported. The United States purchased 150 supercontainers based on the British design.

Under the Railcar Maintenance and Procurement project, DOD has assisted Russia in maintaining Railway Ministry (MOR) certification for the 200 weapons railcars and 15 guard railcars necessary to support MOD's transportation of nuclear warheads to consolidation sites or dismantlement facilities. Railcar maintenance assistance has included MOR certification maintenance of 100 unheated railcars and 100 aging cold weather (heated) railcars while they are in service. The 15 CTR-modified guard cars were permanently taken out of service by the MOR in recent years due to age. DOD is considering procurement of 15 new replacement guard railcars. MOD has agreed to destroy the old guard railcars. An additional task under this project is to conduct service life extensions on, or to replace, the existing 100 heated railcars. If production of 100 new railcars is approved, MOD has agreed to destroy 200 weapons railcars.

The NWTS program also is funding a project to enhance the ability of MOD to respond to a nuclear weapons transportation accident and mitigate its consequences. This project is providing equipment that will enhance: MOD accident response and emergency operations; MOD command, control, and analysis of emergency operations; and MOD access, recovery, and mitigation capabilities. Transportation, logistics, and technical services will be provided as required. DOD has already provided emergency support equipment that included mobile equipment modules used to respond to an accident across different regions and an Information Analysis System to manage information and resources during a transportation accident. Additional equipment will include emergency response vehicles, portable shelters, and underwater emergency response equipment.

**Accomplishments and Key Milestones.** DOD completed the purchase and delivery of 150 supercontainers in March 1998. In addition, DOD has provided five mobile emergency support equipment modules,

established the Information Analysis System and Training Center in St. Petersburg, and 45 emergency response vehicles. As of November 2002, the NWTs project has installed 115 security enhancement modification kits on cargo and guard railcars and completed the maintenance and certification of the first set of railcars.

**Program Future and Exit Strategy.** DOD will assess the feasibility of extending railcar service life and will procure new railcars only if service life extension proves unfeasible. DOD will continue to provide maintenance and certification of weapons railcars. DOD and MOD plan for 860 maintenance and certification actions to be completed in the next five years. DOD anticipates that a decision will be reached to either extend the service life of existing railcars or procure new railcars in FY 2003. The exit strategy for the Railcar Maintenance and Procurement project is that both maintenance tasks and procurement tasks will be incrementally funded each year, so that contractual efforts can be stopped within 3 to 6 months after a decision to do so is made.

**Funding.** The total funding for this program through FY02 is \$48.7 million. The FY03 appropriation is \$4.6 million for this assistance.

## **B. Other States**

There are no programs in this area, because Russia is the only former Soviet state with nuclear warheads on its soil.

**VII. PROGRAM DESCRIPTION:  
DOWNSIZE NUCLEAR WEAPONS COMPLEX**

**Russian Transition Initiatives - DOE**

**Program Description.** The RTI comprise two complementary but distinct components - the IPP and the NCI. These two programs were consolidated in response to the Administration's review of nonproliferation programs to promote closer coordination and synergy and to enable them to reinforce each other's activities in Russia's nuclear cities.

IPP was established in FY94 with the specific goal of preventing the spread of weapons technologies and expertise by engaging former-Soviet weapon scientists in applied research projects having commercial potential. IPP maximizes the commercial potential of the projects it supports by involving U.S. industry partners from the outset. These industry partners are private U.S. firms that match United States Government funds; they collaborate with the former Soviet scientists in order to commercialize their research projects.

IPP initially engaged nuclear scientists in the four republics that had inherited nuclear weapons (Russia, Belarus, Ukraine, Kazakhstan). In 1997, IPP expanded its efforts to include other WMD technologies, in particular the former-Soviet biological weapons institutes. IPP ceased funding new projects in Belarus in 1997, in accordance with U.S. policy towards that country.

NCI was established through a September 1998 government-to-government agreement. The goals of NCI are to assist Russia's closed nuclear cities in creating sustainable, alternative nonweapons employment for displaced weapons workers and in removing functions and equipment from weapons facilities and reducing their physical footprint; thereby facilitating the irreversible, transparent downsizing of the Russian nuclear weapons complex. Minatom has declared its intention to downsize its complex, eliminating nuclear weapons work at two of its four weapons assembly plants and converting those facilities and workers to civilian production. NCI builds upon the Russian Government's own efforts to reduce the size of its nuclear weapons complex to a more sustainable level.

NCI is currently working in three of the ten Russian nuclear cities: Sarov; Snezhinsk; and Zheleznogorsk. NCI's first priority is Sarov, where Avangard (the first facility slated for closure) and a weapons design laboratory (Arzamas-16) are located. NCI assists in infrastructure development to support economic diversification in Snezhinsk, the location of a second weapons design laboratory (Chelyabinsk-70). NCI is expanding its

efforts in Zheleznogorsk in response to the planned shutdown of the city's plutonium production reactor (Krasnoyarsk-26), which produces heat and electricity for the city.

**Accomplishments and Key Milestones.** The dissolution of the Soviet Union left 30,000 - 75,000 weapons scientists without support. Since it was started, RTI has engaged over 13,000 of these scientists, and currently employs more than 5,000 scientists and engineers on applied R&D projects. Initially, many of these projects were small R&D efforts designed to gain access, build relationships, and assess technological capabilities.

In 1999, the program was redirected toward commercialization, with a requirement that new projects include U.S. industry partners who share costs with the United States Government. Twelve completed projects have reached commercialization, with annual sales of over \$30 million and close to 1,000 permanent jobs in the former Soviet Union. Five successful IPP projects have attracted \$60 million in private-sector venture capital. These funds are over and above the total of \$125 million in commitments by U.S. industry partners.

RTI's progress toward its goal of reducing the size of Russia's weapons complex can be tracked by such metrics as the amount of facility square footage released from closed areas into open "Technoparks," as well as the number of contracts and joint ventures signed, businesses engaged, new enterprises and jobs created, and individuals trained in marketing and business management. Many of the program's initial efforts have been concentrated on physical and business infrastructure, laying the necessary groundwork for economic diversification.

To date, RTI has converted 550,000 square feet of weapons facilities to civilian use, facilitated the signing of two joint ventures, created a number of new enterprises (e.g., ITEC and SATIS, suppliers of MPC&A equipment and industrial security technologies, and SPEKTR-KONVERSIYA, a diversified technology development company), and engaged nine commercial businesses, including Oracle, Motorola, GE, Adapco, and Delphi. The Open Computing Centers have engaged former weapons scientists in complex modeling and research projects on contracts with entities such as Adapco, Oracle, Lucent, and Animatek. International Development Centers have provided business services and support for local entrepreneurs, creating more than 280 new jobs. Project evaluation and support services to the Zheleznogorsk City Administration resulted in the award of \$17 million in defense conversion funds from Minatom on 14 different projects. RTI programs have provided training in business management and marketing to nearly 1,800 individuals.

In addition, in September 2001, RTI negotiated a Closure Agreement between the United States and Russia, stating Minatom's intent to cease nuclear weapons work at Avangard by the end of 2003. At nearly the same time, the United States also negotiated an interim Access Arrangement that facilitates access to the closed nuclear cities and will accelerate the implementation of NCI projects.

**Program Future and Exit Strategy.** The portfolio of IPP projects has a collective exit strategy -- namely, the establishment of commercially viable activities that provide long-term income and employment to former Soviet weapons scientists, engineers, and technicians. Each IPP project has a U.S. industry partner responsible for commercializing project results. These industry partners match DOE/NNSA funds on each project, and, on average, contribute \$1.40 for every DOE/NNSA dollar.

NCI program strategy is to assist with downsizing of those facilities that are excess to the needs of a reduced Russian nuclear weapons program. Once NCI has completed its programs to improve the basic physical and business infrastructure in Sarov, Snezhinsk, and Zheleznogorsk, which will support economic diversification in these three cities, it will move into new cities to support Minatom's downsizing priorities. NCI's current focus is on Sarov's immediate downsizing, and then on Zheleznogorsk. Subsequent cities in which NCI will work are Zarechnyy (the second weapons production facility slated for closure) and Seversk (the only remaining plutonium-production city). As programs are completed in these cities, funding priorities will shift to the remaining closed nuclear cities until Minatom's downsizing is complete. At currently planned funding levels, this process will conclude in 2010. The European Nuclear Cities Initiative has promised additional support, and NCI is coordinating closely with that program as it develops. In addition, nongovernmental sources of funding have emerged, such as the funding of projects at nonproliferation centers in the closed cities, and NCI is working closely with these projects as well.

**Funding.** The total funding for the RTI through FY02 is \$280.1 million. This total includes the amounts spent for both IPP and NCI, which were separate programs in FY99-FY01. The appropriation for FY03 is \$39 million.

**VIII. PROGRAM DESCRIPTION:  
PREVENT PROLIFERATION OF WMD EXPERTISE**

## 1. Science Centers - State

**Program Description.** The Science Centers help prevent the proliferation of WMD-related scientific and technical knowledge to proliferant states and terrorist groups by providing grants for peaceful research to former Soviet weapons scientists in Russia and other states of the former Soviet Union. The Science Centers were developed in response to WMD proliferation threats created by the dissolution of the Soviet Union, which left 30,000 - 75,000 weapons scientists without support. The program is managed by the Department of State's Bureau of Nonproliferation and implemented through two multilateral organizations: the International Science and Technology Center (ISTC) in Moscow and the Science and Technology Center of Ukraine (STCU).

The program's objectives are to gain access to the total population of former-Soviet WMD scientists and engineers, to engage them in open, transparent, and peaceful R&D activities, and to redirect as many as possible to sustainable, peaceful civilian careers. These objectives are accomplished through: increasing the number of program contacts with weapon scientists and institutes; expanding those contacts into all WMD scientific technology areas (e.g., chemical weapon scientists, missile system engineers); implementing training, commercialization, and technology development activities within the Science Centers; and facilitating strategic industrial partnering between the scientists and western companies.

**Accomplishments and Key Milestones.** Since 1994, the funding countries, (the United States, European Union, Japan, Canada, Korea, and Norway) have supported more than 2,000 civilian research projects totaling more than \$480 million. These projects have provided employment to more than 50,000 scientists, of whom more than half are categorized as former WMD or WMD delivery system scientists. In addition to direct funding by governments, the Science Centers have received more than \$80 million from almost 200 commercial and government organizations through various partner programs.

The effectiveness of this program can be gauged by increases in the number of WMD scientists and engineers engaged in peaceful research through the Science Centers and, within that overall metric, of former chemical weapon scientists and missile system engineers engaged in Science Center research projects. Other metrics of success include: the number of former WMD scientists and engineers who are able to adopt civilian careers; former WMD scientists engaged in Science Center research who are enrolled in business training, commercialization activities, technology

application and development training; former WMD institutes able to convert to civilian commercial enterprises; former WMD institutes engaging in partnerships with industry and the international research community; and patents filed as a result of research through the Science Centers.

The United States has responded to the continuing threat of proliferation of WMD expertise by increasing the number of Science Center projects it funds and by promoting sustainability activities. Current program priorities are to direct a portion of U.S. spending in the Science Centers to complement the United States Government's Biological-Engagement program focusing on former biological weapon (BW) scientists and to initiate a similar engagement effort with former-Soviet chemical weapon (CW) scientists. Future priorities may include a component dedicated to cooperation on antiterrorism.

**Program Future and Exit Strategy.** The United States and other countries funding the Science Centers have always intended that this nonproliferation assistance to former Soviet WMD scientists not become permanent. The intention is to use the Science Centers to address an immediate proliferation threat and to serve as a bridge until economic conditions allow former Soviet WMD scientists to sustain themselves in civilian enterprises. Economic instability aggravated by the 1998 Russian ruble collapse, fragile legal institutions and rule of law, and vestiges of a culture that discouraged initiative have so far delayed the transition to self-sufficiency. As a consequence, there remains a significant risk of the proliferation of WMD expertise.

There is broad support among Science Centers parties that a transition strategy requires two "sea changes." First, the governments of the former Soviet states must generally increase their own investments in science and technology R&D, through the Science Centers and other mechanisms, thereby reducing direct reliance of their scientific communities on funding from the United States and other countries. Second, existing Science Center sustainability programs, including partner programs, business training, commercialization, and patent support, must be intensified to successfully promote market-driven, private-sector solutions to civilian sustainability of weapons scientists. The Science Centers parties are working with the governments of the former Soviet states to develop more of a shared partnership in the objectives and implementation of the sustainability programs and are promoting progress in indigenous investment in nonmilitary R&D. Although no specific transition time frame is defined, the Science Centers parties will be working diligently on achieving these "sea changes" over the next decade.

**Funding.** United States funding for this program through FY02 is \$203.4 million. The estimated appropriation for FY03 is \$32 million.

## **2. Biological-Chemical Engagement Program - Interagency**

**Project Description.** Under the direction of the NSC, DOS coordinates an interagency United States Government effort to redirect the expertise of scientists and engineers formerly associated with the Soviet Union's offensive BW program into civilian research areas. Following the Administration's 2001 nonproliferation assistance review, DOS initiated a parallel effort to engage former Soviet CW scientists in Russia and Ukraine. DOS seeks to expand this effort to include former CW scientists in Central Asia and the Caucasus. United States agencies that support these efforts include DOD, DOE, the Department of Agriculture (USDA), the Department of Health and Human Services (HHS), the Environmental Protection Agency (EPA), and others.

The focus of the Biological-Chemical Engagement Program is to develop and implement joint research projects that help transition former BW/CW scientists to legitimate civilian research. United States agencies identify the institutes of potential proliferation concern, work with former BW/CW scientists to develop project proposals of mutual interest, and fund the projects of greatest U.S. interest. United States agencies complete a rigorous technical, scientific, and policy review for each project to determine its suitability, and to ensure the projects would not inadvertently contribute to development of offensive BW/CW expertise. As projects are developed and implemented, U.S. collaborators (from both the public and private sectors) establish close relationships with former weapons scientists by visiting their institutes and interacting closely throughout all stages of project implementation. Close U.S. collaborator involvement, along with financial and technical audits, ensures that U.S. funds are not diverted from activities agreed in the work plan for each project. The engagement program also funds business planning and business development training for the institutes in question, and funds travel by former weapons scientists to international seminars and workshops to strengthen the scientists' ties to the international civilian research community.

The appropriation of \$30 million in the June 2002 supplemental for conversion of former bio-weapons production facilities to civilian uses, especially advanced drug and vaccine research, gives the State Department significantly greater resources for the commercialization effort. The funds will be used to assist targeted institutes to market their research, develop viable

business strategies, and foster mutually beneficial cooperation with western businesses and academic institutions.

**Accomplishments and Key Milestones.** Under the Biological-Chemical Engagement Program, the United States has engaged more than 45 former BW/CW institutes in Russia, Ukraine, Central Asia and the Caucasus. Among its many successes are:

- A joint U.S.-Russian project to discover new anti-viral drugs to combat smallpox;
- Projects for HIV/AIDS drugs and vaccines;
- Development of micro-chip technologies for rapid detection of multi-drug resistant tuberculosis;
- A project to develop diagnostic methods for West Nile Virus;
- Production and certification of hepatitis A and measles vaccines for use in Russia;
- A project to develop safer and more effective foot and mouth vaccine;
- First-ever visits by U.S./ISTC delegations to a premier Soviet CW institute, the State Institute for the Technology of Organic Synthesis (GITOS) in Russia, to establish a working relationship with GITOS scientists.

**Program Future and Exit Strategy.** In FY03 and FY04, the Biological-Chemical Engagement Program will continue to support nonproliferation activities through the HHS/Biotechnology Engagement Program, USDA/Agricultural Research Service, and EPA. The program will also expand to engage an increasing number of former CW scientists at priority facilities, first in Russia and Ukraine, and then in Central Asia and the Caucasus, in accordance with potential proliferation risk.

The program will continue to foster commercialization and the development of self-sustainability as these activities transition out of the assistance phase.

**Funding Profile.** The funding for these programs through FY02 is \$86.4 million. The estimated appropriation for FY03 is \$20 million.

### **3. Biological Weapons Proliferation Prevention - DOD**

**Project Description.** The DOD CTR Biological Weapons Proliferation Prevention (BWPP) program began in 1997 with cooperative biological research pilot projects involving the U.S. National Academy of Science and former Soviet BW scientists. Since 1997, the BWPP program has expanded in scope, budget, number of projects, and number of former Soviet institutes and scientists involved.

The BWPP program's cooperative biological research projects with former Soviet BW scientists help prevent proliferation of BW expertise, science, and technology to countries of proliferation concern and terrorist groups. These projects also help increase transparency at former Soviet BW facilities, steer former-Soviet weapons scientists away from BW-related projects, redirect research priorities and projects at former-Soviet biological research and production centers to focus on peaceful purposes, and employ former-Soviet BW scientists and technical experts in research useful to the U.S. biodefense research program. The events of September 11 and the anthrax mailing of October 2001 have increased awareness of the need to prevent the proliferation of the BW scientific and technology base of the former Soviet Union to terrorist groups.

An important goal of this activity is to bring former Soviet BW scientists and technical experts into the mainstream of scientific inquiry within the western scientific community. The enhanced prominence of former-Soviet bio research will enable these researchers to compete on an international scale for research funding and personnel, which in turn will open up former Soviet biological institutes to international collaboration.

Risk management, strict accountability, and active supervision are key elements of all BWPP-sponsored projects. The supervision of future BWPP-sponsored projects will be enhanced through efforts to expand the on-site presence of DOD or DOD-designated collaborators. Both scientific and bio-security personnel are involved in the approval process.

**Accomplishments and Key Milestones.** Fourteen BWPP collaborative research projects are completed or currently under way at five Russian biological research and production centers. New collaborative research proposals for 2003 will bring the total of engaged biological research and production centers to ten in Russia, Kazakhstan, and Uzbekistan. Some examples of specific projects with significant DOD interests are: the development of a DNA vaccine against hantaviral infection; an analysis of the genomic structure of Crimean Congo Hemorrhagic Fever Virus; and the study of *Yersinia pestis* lipopolysaccharides for developing plague vaccines. In addition, four joint DOD/HHS smallpox projects are underway at the State Research Center of Virology

and Biotechnology (Vector). These projects involve: the sequencing of the Variola virus genome; the development of antivirals for Orthopox infection; the creation of combinatorial antibody libraries to Orthopox viruses; and the development of rapid diagnostics systems for human-pathogenic Orthopox viruses.

**Program Future and Exit Strategy.** This program plans to add, within available budget, four new cooperative biological research projects per year. There are at least 30 biological research and production centers in the former Soviet states that have not yet been engaged through DOD cooperative biological research projects. It is planned to expand these projects to include former BW scientists in Ukraine and Georgia. A biological threat reduction implementing agreement has been concluded with Georgia and a final draft agreement is being coordinated in Ukraine. In addition, DOD is undertaking a new initiative to provide advice, equipment, and training to establish a system in Central Asia for bio-warfare-agent diseases to enhance national and international BW surveillance and outbreak response capabilities. Work is slated to begin in Kazakhstan and Uzbekistan, then may be expanded to other former Soviet states. This project will employ former BW scientists and afford the United States Government sustained access to them, expose them to the standards and ethics of the western scientific community, while providing the United States and host nations the capability to detect outbreaks of BW-related diseases.

The end-state of this program will be reached with compliance to a professional code of conduct and permanent institute transparency through a private western scientific presence at formerly closed Soviet-legacy biological research and production facilities.

**Funding.** The total funding for this program through FY02 is \$22.3 million. The FY03 appropriation includes \$10.0 million for this assistance.

#### **4. Civilian Research and Development Foundation - State**

**Program Description.** The Civilian Research and Development Foundation (CRDF) is a private nonprofit organization authorized in the Freedom Support Act of 1992 (Section 503) and established by the National Science Foundation in 1995. This program helps achieve U.S. nonproliferation objectives by supporting former-Soviet weapons scientists in exclusively civilian R&D through collaborations with U.S. scientists and engineers that increase their opportunities for obtaining sustainable jobs in the civilian R&D sector in Russia and other former Soviet states. This program also provides support for civilian R&D groups and institutions to help ensure that there will be a civilian science

sector in former Soviet states into which former weapons scientists can transition.

**Accomplishments and Key Milestones.** CRDF works to achieve its goals primarily through competitive grants programs. The most salient among these are:

- Cooperative Grants, which has supported 704 projects involving small grants, with five to ten former Soviet Union scientists each;
- Regional Experimental Support Centers, which has made 18 awards for experimental equipment that can form the nucleus for centers of excellence linking a civilian institute and former weapons scientists.
- Next Steps to Market, which has made 40 awards allowing U.S. industry-former Soviet institute/company teams to work together on projects designed to demonstrate whether or not a specific technology or process has commercial potential.

More than 50 percent of the Cooperative Grants projects, 100 percent of the Regional Experimental Support Centers projects, and 80 percent of the Next Steps to Market projects involve one or more weapons scientists.

CRDF also supports "institution building" projects that have created nonprofit R&D support organizations in Armenia, Moldova, and Georgia, with another under development in Azerbaijan. Working with these organizations as partners, CRDF helps to establish in each country a transparent competitive process for the allocation of R&D resources, an activity that has dramatically raised the engagement of former Soviet weapons scientists in jointly administered R&D competitions. For example, CRDF is engaging several Moldovan weapons companies (command and control, guidance electronics) in civilian R&D. These organizations hold promise to be excellent vehicles for cooperative work among Armenian, Georgian, and Azeri scientists to address problems of common concern in the Caucasus.

Another major accomplishment for CRDF has been facilitating DOE's IPP efforts to provide funds to supported scientists free of tax and customs duties.

**Program Future and Exit Strategy.** CRDF regularly adapts its work to respond to the needs of government clients. Changes in U.S. policies and/or successful conclusion of collaborative work in former Soviet states would result in changes in the CRDF activities described here. Given the current climate, CRDF

expects to continue its programs in institution building in the smaller countries, commercialization assistance and job building in former Soviet states, and in education. CRDF also expects to expand its contract-based support to nonproliferation programs and its assistance to high-leverage, low-cost activities (e.g., work with the U.S. Department of Commerce in assisting Russia's efforts to develop a venture capital industry by helping build links to U.S. expertise).

**Funding.** U.S. funding for CRDF was \$85.6 million through FY02. No decision has been taken on the budget for FY03.

## IX. SUMMARY OF ACCOMPLISHMENTS

United States cooperative security programs with Russia and other former Soviet states have strengthened mutual security and the global nuclear nonproliferation regime by significantly upgrading the protection against unauthorized diversion of Soviet-legacy nuclear weapons, materials, and expertise to states of proliferation concern or terrorist groups. Through this suite of programs, significant progress has been made toward U.S. nonproliferation goals. For example:

- More than 6,000 Russian nuclear warheads have been removed from deployment.
- Comprehensive MPC&A upgrades have been completed at 41 of 95 sites where weapons-usable nuclear materials are produced, used, or stored in Russia.
- Rapid MPC&A upgrades have been completed for 40 percent of the approximately 600 MT of at-risk HEU and plutonium in Russia.
- Rapid MPC&A upgrades have been completed for 99 percent of the 4,000 at-risk Russian Navy nuclear warheads, and comprehensive upgrades for 18 percent.
- Quick-fix sensor fencing has been installed around more than another 40 nuclear weapons storage bunkers.
- The Fissile Material Storage Facility is more than 90 percent complete.
- Over 2500 nuclear warheads have been transported to dismantlement facilities.
- Two hundred fifty radiation detection equipment systems have been installed at 22 international ports and border crossings.
- All spent fuel assemblies at the BN-350 fast breeder reactor in Kazakhstan have been securely packaged and placed under IAEA safeguards.
- More than 171 MT of HEU (approximately 34 percent of the 500-MT total and enough for more than 6,850 nuclear warheads) have been converted to LEU and delivered to USEC for sale as commercial nuclear reactor fuel.

- Some 40,000 weapons scientists in Russia and other former Soviet states have received support to pursue nonmilitary research or projects with commercial potential.
- Russian Transition Initiative programs have resulted in the creation of almost 1,000 new civilian jobs for former Russian weapons scientists, engineers, and technicians.
- More than 500,000 square feet of Russian weapons facilities have been converted to civilian use.

### **Program Progress and Exit Strategies**

In the year since the Administration completed its review of cooperative U.S.-Russian nonproliferation programs, the programs have worked assiduously to implement the review's recommendations. Programs have been accelerated, consolidated, and refocused as described earlier. All programs have given increased attention to appropriate means by which they can measure their accomplishments and to transition and exit strategies (Tables 3 and 4).

As these tables show, the programs are in widely ranging stages of progress. Some require no further U.S. support, others will be finished within a few years, and others are expected to take decades to complete.

The U.S.-Russian programs aimed at improving the security and protection of nuclear warheads and weapons-usable nuclear materials will be largely completed by the end of the decade. These programs are focused on physical actions and have well-defined measures of accomplishment and completion.

The programs aimed at disposing of HEU and plutonium will take longer to complete. The HEU program is projected to extend into the next decade and the plutonium disposition program into the decade after that. These programs require industrial-scale activities and, in the case of plutonium disposition, the construction of new plants. The same is true of the program to eliminate Russian production of new plutonium. Considerable effort is being given to finding ways to expedite these programs, as discussed below in the section on new initiatives.

Those programs aimed at preventing the outflow of WMD expertise are harder to measure progress and do not have definite termination dates. They are expected to reduce their reliance on United States Government funding as they transition to commercial or domestic sources of support.

It is important to note that termination of U.S. financial assistance to a project does not necessarily mean the termination of cooperative relationships. In some instances, cooperative programs will continue with other foreign or domestic sources of funding. In others, cooperation may continue with each party paying for its own activities. We look for many assistance programs to evolve over time into joint cooperative science and technology efforts that continue to meet U.S. nonproliferation objectives. In addition, cooperative projects can have important lasting consequences in the development of personal relationships and channels of communication among scientific and governmental experts that can serve the mutual security interests of the United States and its partners in Russia and the other former Soviet states.

**Table 3. Metrics for Cooperative Nonproliferation Programs**

<b>Reduce Weapons-Grade Nuclear Material - Russia</b>	<b>Metrics</b>	<b>Comments</b>
<ul style="list-style-type: none"> <li>• End to Weapons-Grade Plutonium Production</li> </ul>	Shutdown of plutonium-producing reactors, monitoring of stored material	Final reactor should be shut-down by 2011
<ul style="list-style-type: none"> <li>• Plutonium Disposition</li> </ul>	Progress in facility construction, tons of material stored and converted	More than two decades to program completion
<ul style="list-style-type: none"> <li>• Highly-Enriched Uranium Agreement</li> </ul>	Tons of HEU converted, tons of LEU delivered to the U.S.	Conversion of full 500 tons by 2013
<ul style="list-style-type: none"> <li>• Accelerated Material Disposition</li> </ul>	Same metrics as existing programs	Discussions are only beginning
<b>Reduce Weapons-Grade Nuclear Material - Other States</b>		
<ul style="list-style-type: none"> <li>• Research Reactor Fuel Return</li> </ul>	Return agreements signed, amount of HEU returned	All HEU returned by 2009
<b>Secure Weapons-Grade Nuclear Material - Russia</b>		
<ul style="list-style-type: none"> <li>• Material Protection, Control and Accounting</li> </ul>	Upgrades completed, tons of material secured, equipment installed, personnel trained	Completion dates shortened, focus on sustainability
<ul style="list-style-type: none"> <li>• Fissile Material Storage Facility</li> </ul>	Tons of material stored, number of warheads stored	Construction due to be completed in 2003
<b>Secure Weapons-Grade Nuclear Material - Other States</b>		
<ul style="list-style-type: none"> <li>• Material Protection, Control and Accounting</li> </ul>	Upgrades completed, tons of material secured, equipment installed, personnel trained	Focus is on cost reduction, sustainability
<ul style="list-style-type: none"> <li>• BN-350 Spent Fuel Disposition</li> </ul>	Number of canisters and assemblies secured	All materials in dry storage by 2004

<b>Facilitate Nuclear Warhead Dismantlement</b>		
• Nuclear Weapons Transportation	Number of train shipments, number of warheads shipped	Requirement to transport weapons evaluated annually by DOD and Russian MOD
<b>Secure Remaining Warheads</b>		
• Warhead Storage Security	Sites secured, training completed.	Training, equipment, services and material are all provided. Adding sites might lengthen program.
• Warhead Transport Security	Safe, secure capability to transport nuclear warheads to dismantlement or consolidated storage facilities	Assessing railcar life extension vice procurement of new rail cars
• Warhead Safety and Security Exchange Agreement	Cooperative projects completed, technical interchange meetings conducted	Agreement requires extension in 2005
<b>Downsize Nuclear Weapons Complex</b>		
• Russian Transition Initiatives	Scientists employed, projects under way, areas converted	NCI exit by 2010, IPP exit as commercialization progresses
<b>Prevent Proliferation of WMD Expertise</b>		
• Science Centers	Number of projects underway , number of scientists employed	Program focus on sustainability
• Biological/Chemical Engagement	Number of institutes engaged and projects started	Program is expanding
• Biological Weapons Proliferation Prevention	Number of projects under way, number of scientists employed	Terminate when professional standards, transparency achieved
• Civilian Research and Development Foundation	Number of projects under way, number of scientists employed	No requirement for termination

**Table 4. Projected Termination Dates for Nonproliferation Programs**

<b>Reduce Weapons-Grade Nuclear Material - Russia</b>	<b>Termination Date</b>	<b>Comments</b>
<ul style="list-style-type: none"> <li>• End to Weapons-Grade Plutonium Production</li> </ul>	2011 estimated	Monitoring of fuel will continue after reactor shutdown
<ul style="list-style-type: none"> <li>• Plutonium Disposition</li> </ul>	2007 for facility construction, plant operation for two decades	More than two decades to program completion
<ul style="list-style-type: none"> <li>• Highly-Enriched Uranium Agreement</li> </ul>	2013 for 500 MT	Adding more HEU would extend the program
<ul style="list-style-type: none"> <li>• Accelerated Material Disposition</li> </ul>	Program is still being developed	Discussions are on-going
<b>Reduce Weapons-Grade Nuclear Material - Other States</b>		
<ul style="list-style-type: none"> <li>• Research Reactor Fuel Return</li> </ul>	2009 estimated	Program complete when all fuel is returned to Russia
<b>Secure Weapons-Grade Nuclear Material - Russia</b>		
<ul style="list-style-type: none"> <li>• Material Protection, Control and Accounting</li> </ul>	2008 for 53 sites	Program completion has been moved up. Adding sites might extend program
<ul style="list-style-type: none"> <li>• Fissile Material Storage Facility</li> </ul>	2003 for construction	Working relationship between DOD and MOD to continue
<b>Secure Weapons-Grade Nuclear Material - Other States</b>		
<ul style="list-style-type: none"> <li>• Material Protection, Control and Accounting</li> </ul>	Uncertain	Program is in early stages
<ul style="list-style-type: none"> <li>• BN-350 Spent Fuel Disposition</li> </ul>	2004-2005	Program complete when all material is in dry storage

<b>Facilitate Nuclear Warhead Dismantlement</b>		
• Nuclear Weapons Transportation	Plans through at least 2007	DOD and MOD will determine when to terminate program
<b>Secure Remaining Warheads</b>		
• Warhead Storage Security	Plans through at least 2008	DOD/DOE and MOD will determine when to terminate program. Adding sites could extend program.
• Warhead Transport Security	Plans through at least 2007	DOD and MOD will determine when to terminate program.
• Warhead Safety and Security Exchange Agreement	Current agreement expires in 2005	Agreement may be extended
<b>Downsize Nuclear Weapons Complex</b>		
• Russian Transition Initiatives	2010 for NCI, IPP Uncertain	IPP program will draw down as more projects become commercially sustainable
<b>Prevent Proliferation of WMD Expertise</b>		
• Science Centers	Uncertain	Support must transition to domestic sources
• Biological/Chemical Engagement	Uncertain	Program will expand to other high priority facilities and foster commercialization
• Biological Weapons Proliferation Prevention	Number of projects under way, number of scientists employed	Terminate when professional standards, transparency achieved
• Civilian Research and Development Foundation	Indefinite, no requirement to terminate	Support must transition to private funding

## **X. LOOKING TO THE FUTURE**

More than ten years have elapsed since the first U.S.-Russian cooperative nonproliferation programs were established. The overall effort has grown significantly since then, with a progressive expansion and deepening of nuclear and other WMD reduction and nonproliferation programs in Russia and other former Soviet states. Although the various programs were started at different times, together they comprise a comprehensive effort addressing the most critical issues and vulnerabilities related to the protection of Soviet-legacy weapons, weapons-usable materials, and WMD-related expertise.

Effective interagency, and increasingly international, coordination is vital to the success of these programs, some of which are near completion (e.g., Fissile Material Storage Facility) and others of which are far from completion (e.g., plutonium disposition). New or expanded programs are being developed -- for example, to dispose of more excess Russian HEU and plutonium, and to confront the increasingly salient threat of radiological weapons. The Proliferation Strategy PCC will play an essential role in coordinating this suite of evolving programs. Such coordination will continue to be critical as programs transition to long-term sustainability by Russia and the other former Soviet states.

Ten years of cooperation have led to a level of openness that would have been inconceivable a generation ago. The successful MPC&A activities with the Russian Navy are a case in point, and similar opportunities may well arise in the years to come. Other ideas that have been put forward include cooperation on spent fuel management, a nuclear energy initiative addressing advanced reactor and fuel cycle technologies, and increased collaboration in basic science. Such new initiatives could provide additional revenue to Russia that could be earmarked for sustainable WMD security and, additionally, could encourage the implementation of more consistent Russian export-control policies. By building on the successes and lessons learned in current cooperative U.S.-Russian nonproliferation programs, the United States can seize upon and exploit opportunities as they arise to further mutual nonproliferation objectives.

In addition to U.S. efforts, the leaders of the G-8 made a very significant commitment on June 27, 2002, to a Global Partnership Against the Spread of Weapons and Materials of Mass Destruction. The G-8 have committed to spend up to \$20 billion over the next ten years for Global Partnership projects, initially focused in Russia. The United States intends to provide half of the funds. This development can substantially increase the pace at which we can reduce weapons of mass destruction, materials and expertise

and secure that which remains. The United States will work to assure that these international efforts are coordinated with ongoing U.S. programs and with each other.