United States General Accounting Office

GAO

Report to Congressional Requesters

March 2000

NUCLEAR NONPROLIFERATION

Limited Progress in Improving Nuclear Material Security in Russia and the Newly Independent States

GAO/RCED/NSIAD-00-82

Contents

Abbreviations

DOE	Department of Energy
MINATOM	Ministry of Atomic Energy (Russia)
MPC&A	Material Protection, Control, and Accounting (program)
NIS	newly independent states

United States General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-284730

March 6, 2000

The Honorable John Warner
Chairman, Committee on Armed Services
United States Senate

The Honorable Pat Roberts
Chairman, Subcommittee on Emerging Threats
and Capabilities
Committee on Armed Services
United States Senate

Safeguarding nuclear material that can be used in nuclear weapons is a primary national security concern of the United States, Russia, and other newly independent states of the former Soviet Union. Terrorists and countries seeking nuclear weapons could use as little as 25 kilograms of highly enriched uranium or 8 kilograms of plutonium to build a nuclear weapon. With the dissolution of the Soviet Union, Russia and other newly independent states inherited about 650 metric tons of highly enriched uranium and plutonium in forms that are highly attractive to theft. This amount of material is enough to produce 40,000 nuclear bombs. The breakdown of Soviet-era control systems, coupled with social and economic deterioration within the newly independent states, has increased the threat of theft or diversion of this material.

Since 1993, the United States has been working cooperatively with Russia and seven other newly independent states to install nuclear security systems at their nuclear sites.[1] In 1995, the Department of Energy established the Material Protection, Control, and Accounting program.[2] As we reported in 1996, when the program was established, the Department estimated that it would require $400 million and 7 years to improve nuclear material security at 80 to 100 buildings in Russia and the newly independent states where weapons-usable material was known to be located.[3] Since then, the number of buildings identified as needing improved security systems has increased, as have the program's costs. In addition, worsening economic conditions in Russia and the newly independent states have raised questions about their ability to operate and maintain these new systems. As requested, this report discusses

- the number of buildings that have received nuclear material security systems and the amount of nuclear material that is protected under the systems; and
- the program's costs to date, including a breakdown of program expenditures, the amount of program funds that did not go directly to program activities but have been paid in Russian taxes, and the estimated cost to complete the program.

As agreed with your offices, in a follow-on report, we will address the effectiveness of the Department's Material Protection, Control, and Accounting program in reducing the proliferation risk posed by the theft or diversion of nuclear material and the ability of Russia and the newly independent states to operate and maintain the improved security systems.

[1]Other newly independent states include Belarus, Georgia, Kazakstan, Latvia, Lithuania, Ukraine, and Uzbekistan.

[2]The Department established this program as a task force, and in 1999, the Department created the Office of International Materials Protection and Emergency Cooperation, which assumed the responsibilities of the task force. In fiscal year 1999, the Department transferred program responsibilities for the newly independent states out of the Office of International Materials Protection and Emergency Cooperation. This office now only has responsibility for the Russian sites.

[3]*Nuclear Nonproliferation: Status of U.S. Efforts to Improve Nuclear Material Controls in Newly Independent States* (GAO/NSIAD/RCED-96-89, Mar. 8, 1996).

Results in Brief

The Department of Energy has identified 332 buildings that require nuclear security systems in Russia and the other newly independent states. As of February 2000, the Department had completed the installation of security systems in 113 buildings that mostly contain small quantities of weapons-usable nuclear material. About 50 metric tons of nuclear material, or about 7 percent of the 650 metric tons of material that has been identified as being at risk for theft or diversion, are stored in buildings with installed security systems. The Department is currently installing systems at an additional 72 buildings. This work is scheduled for completion in 2006 and will increase the total amount of nuclear material in buildings with security systems to 400 metric tons, or 60 percent of the total amount of nuclear material identified in Russia and the newly independent states. However, the Department has not started work on the remaining 147 buildings and has also suspended work on buildings at a number of sites. Most of the buildings where the Department has not started or has suspended work are in Russia's nuclear weapons complex, and Russia has limited the Department's access to these buildings because of security concerns. The Department is negotiating with Russia to gain better access to its nuclear weapons complex.

From fiscal year 1993 through 1999, the Department of Energy received $590.7 million in appropriations and spent $481.2 million to improve the security of nuclear material in Russia and the newly independent states. The Department carried over about $86 million in unspent funds into fiscal year 2000 and reprogrammed $23.8 million to other programs. According to Department officials, the inability to spend funds in a timely manner is due, in part, to the inherent difficulties associated with doing work in Russia, such as limitations on access to buildings, that delay the completion of projects. The Department does not know how much of the program funds provided to the sites has been paid in Russian taxes because the Russian tax authorities do not directly tax the program. Instead, they tax the Russian sites and sites' subcontractors who receive the program funds. In 1999, Russia passed a new tax law that, according to the Department, should relieve the program from paying taxes. The Department has not estimated how much funding it needs to complete the program given the increase in the number of buildings that require security improvements and new initiatives that have increased the scope of the program. This report contains a recommendation to the Secretary of Energy to develop a cost estimate and a time frame for completing the Material Protection, Control, and Accounting program.

Background

Nuclear material security systems are designed to prevent or detect the theft of nuclear material by individuals or groups and consist of three overlapping components:

- physical protection systems such as fences, metal doors, locks, bricked windows, concrete blocks, steel cages, cameras, sensors, armed guards, and nuclear material monitors designed to limit access to material and prevent its unauthorized removal;
- material control systems such as secure storage vaults; containers equipped with tamper-resistant seals; badges and personnel identification systems to control who has access to the material; and material monitoring procedures designed to contain, monitor, and establish custody over the material; and
- material accounting systems, which maintain information on the quantity of nuclear material within specified areas and on material transferred in and out of those areas.

The Department of Energy (DOE) provides assistance to install different combinations of these three components at buildings in Russia and the newly independent states (NIS) based on the threat of theft of weapons-usable nuclear material contained in the buildings. DOE assists with designing and installing the improved systems and training Russian and NIS personnel at the sites on how to use the systems. DOE classifies the sites that receive assistance into three sectors in Russia—civilian, naval, and the nuclear weapons complex—and one sector covering the other NIS countries, which have only civilian sites.[4] DOE's assistance to Russia's civilian sites includes a project to consolidate weapons-usable material into fewer sites and buildings and, where possible, to convert highly enriched uranium to low enriched uranium that cannot be used for weapons. According to DOE, sites in other sectors may participate in the consolidation and conversion of nuclear material in the future. DOE is providing security improvements to Russian naval land sites as well as to vessels used for refueling nuclear-powered naval ships and civilian icebreakers. In addition, DOE is helping Russia to develop a national nuclear security infrastructure, which includes regulatory and enforcement

[4]According to DOE, sites are nuclear facilities with a guarded perimeter and have one or more buildings with weapons-usable nuclear material. In the Russian naval sector, sites include ships and other floating facilities used for the storage of nuclear fuel. In the nuclear weapons complex, sites include 10 nuclear cities located throughout Russia.

capabilities as well as improving the security of trucks and railcars used to transport weapons-usable nuclear material.

DOE is implementing the program through its national laboratories, which provide design and installation expertise and funding for the improvements by directly contracting with the sites in Russia and the NIS to conduct the work. Project teams, consisting of nuclear material security experts from the national laboratories, work with their Russian and NIS counterparts at the sites to determine the threat of theft or diversion of nuclear material and to design improvements in accordance with DOE's guidelines. Once the project teams and officials at the sites reach agreement on the necessary improvements, the national laboratories sign contracts with officials at the sites to pay for the labor and equipment costs of installing the nuclear material security systems. The sites use either their own labor or subcontract for it and purchase equipment from either within Russia and the NIS or from Europe or the United States. After the improved systems are installed, the national laboratories continue to monitor the sites to provide assurance that the systems are being used as intended and to provide ongoing assistance for operating and maintaining the systems.

DOE Has Completed the Installation of Security Systems in 113 Buildings Containing 7 Percent of Weapons-Usable Nuclear Material in Russia and the NIS

As of February 2000, DOE had helped Russia and the NIS install security systems in 113 out of 332 buildings.[5] About 50 metric tons, or about 7 percent of the approximately 650 metric tons of the weapons-usable nuclear material, are in buildings with installed security systems. Most of the buildings with installed security systems are at Russian civilian sites, Russian Navy sites, or civilian sites in other NIS countries. Little progress has been made in installing nuclear security systems in Russia's nuclear weapons complex, where over 90 percent of all of the nuclear material in Russia and the NIS is located. Russia's Ministry of Atomic Energy (MINATOM) has been reluctant to grant DOE access to buildings in the nuclear weapons complex because of Russian national security concerns. As of February 2000, DOE had started installing new security systems in 72 additional buildings. When these buildings are completed in 2006, the program will have installed new security systems in 185 buildings containing 400 metric tons of material. DOE has yet to start work at 147 buildings, most of which are in Russia's nuclear weapons complex. The

[5]The 332 buildings include 206 buildings that contain weapons-usable nuclear materials and 126 that do not contain weapons-usable nuclear materials but support the operations of the other 206 buildings.

Department is negotiating with Russia to gain better access in the nuclear weapons complex. Table 1 shows the number of buildings and types of sites where nuclear security systems have been installed, where work has started but systems have not been installed, and where work has not yet started. (Sites that have buildings with installed security systems are listed in app. I.)

Table 1: Status of Nuclear Security System Installations as of February 2000

Number of buildings

Status	Russian civilian sites	Russian nuclear weapons complex	Russian naval sites	Other NIS countries	Total
Installed systems[a]	59	11	15	28	**113**
Work started	18	45	9	0	**72**
No work started	27	115	5	0	**147**
Total	**104**	**171**	**29**	**28**	**332**

[a]In Russia, buildings have either a complete physical protection system, a complete material control and accounting system, or both. Buildings at sites in the other NIS countries include both physical protection and material control and accounting systems.

Source: DOE.

Most of the Installations Were at Civilian Sites With Small Amounts of Nuclear Material

Most of the buildings that have received security systems are at civilian nuclear research sites in Russia and the NIS. According to DOE, the civilian sites account for only 5 percent of the nuclear material in buildings needing installation of security systems. With the exception of 4 large civilian nuclear fuel sites and the Aktau breeder reactor in Kazakstan, which contain tons of nuclear material, the 23 other civilian sites where security systems have been installed contain only kilogram quantities of nuclear material.

According to DOE officials, the program focused its early efforts on the civilian research sites for the following reasons:

- DOE considered the sites to be more open and vulnerable because of their locations around Moscow and St. Petersburg than sites in the Russian nuclear weapons complex, which are in remote areas of Russia, and because some sites, such as the Podolsk Scientific Production Association at Luch in Russia, had incidents in which nuclear materials had been stolen.

- DOE was granted access more readily to civilian sites than to other sites.
- Although many of the sites had only small amounts of nuclear material, they contained enough material to make a weapon.

DOE has also installed security systems in some buildings at civilian sites that do not contain weapons-usable nuclear material. DOE installed a security system in a building at the Elektrostal fuel fabrication site in Russia as part of the program's early efforts to build trust with the Russians and gain access to sensitive nuclear sites. However, DOE suspended work at this civilian site because the site did not give DOE access to other buildings that contain weapons-usable nuclear material. DOE also installed security systems at three sites in the NIS that do not have any weapons-usable nuclear material (the Ulba Fuel Fabrication site in Kazakstan, the South Ukraine Nuclear Power Plant, and the Ignalina Nuclear Power Plant in Lithuania).[6]

In addition to installing security systems, DOE has started a pilot project in Russia to consolidate nuclear material at civilian sites into fewer buildings and, when possible, to convert highly enriched uranium to low enriched uranium that cannot be used for weapons. As of December 1999, the program had converted 250 kilograms of highly enriched uranium to low enriched uranium. The conversion eliminated the need for installation of a security system at part of a building at the Lytkarino Research Institute of Scientific Instruments in Russia where most of this material was stored. DOE anticipates that it will provide assistance for the conversion of at least an additional 750 kilograms of highly enriched uranium in 2000.

DOE Has Made Progress Installing Security Systems at Sites Operated by the Russian Navy

DOE has assisted the Russian Navy and the Russian civilian icebreaker fleet in installing security systems at 15 of 29 buildings or ships that handle naval reactor fuel. In one case, at Russia's Northern Fleet Site 49 in Murmansk, DOE completed the installation of security systems in September 1999 that will allow the Russian Navy to use the site as the

[6]DOE improved the security of buildings at these sites because the nuclear security systems would assist the sites in implementing International Atomic Energy Agency safeguards. Safeguards are systems designed to limit the risk of proliferation through the diversion of nuclear materials and assist efforts to reduce global nuclear weapons stockpiles. The Treaty on the Non-Proliferation of Nuclear Weapons requires nonnuclear weapons states, including the NIS (except Russia), to accept International Atomic Energy Agency safeguards on all nuclear activities.

primary Northern Fleet land-based storage site for its highly enriched uranium reactor fuel. According to DOE, the Russian Navy will consolidate all of its Northern Fleet fuel, currently stored at numerous land storage sites, at Site 49. The program has also almost completed the installation of security systems for a similar site that will consolidate all Pacific Fleet reactor fuel from several sites to one building. DOE has also installed security systems on three ships used to refuel Russia's nuclear-powered naval ships and one ship used to refuel civilian icebreakers. According to DOE's project manager, the program currently protects naval land fuel storage sites and refueling ships but not nuclear material on submarines.

According to DOE officials, they made progress with the Russian Navy in installing security systems because the Navy made a commitment to improving nuclear security systems after several incidents involving sailors led it to take the threat of theft seriously. For example, in 1993, two sailors stole 4.5 kilograms of highly enriched uranium, which was subsequently recovered, from Sevmorput shipyard in Murmansk. According to DOE's program manager for the naval sector, by limiting the number of DOE and national laboratory personnel working on projects to four, DOE has forged close working relationships with officials of the Russian Navy, overcome security concerns about the location of the naval fuels, and been granted access to install security systems at these sensitive sites.

Few Buildings Have Received Security Systems at Sites in Russia's Nuclear Weapons Complex

Russia's nuclear weapons complex contains over half of the buildings requiring nuclear security systems and over 90 percent of the weapons-usable nuclear material in Russia and the NIS. Because the complex designs, produces, and manufactures nuclear weapons and the material for their components, it also contains the nuclear material most attractive to theft. As of February 2000, only 11 out of 171 buildings in Russia's nuclear weapons complex had completed the installation of nuclear security systems, and an additional 45 buildings had received some improvements. DOE and national laboratory officials gave two reasons for the small number of buildings with installed systems:

- the reluctance of Russia's MINATOM to grant DOE access to buildings and to information about materials in the weapons complex, and
- delays in installing systems at buildings where work is in progress.

Under Russian law, information on the design, operation, construction, or security provisions of facilities in the nuclear weapons complex, as well as information on materials used in nuclear weapons, is considered a state secret.[7] Although MINATOM has given DOE permission to install nuclear material security systems at buildings in the nuclear weapons complex, it has been reluctant to provide U.S. project teams with physical access to buildings where the installations are to be made or to provide information on the types of materials in the buildings. According to DOE's Technical Survey Team, which conducts peer reviews of material security installation projects, the lack of access has hampered the work of the project teams. Without access to the sites and information on the materials they contain, project teams have difficulty planning, prioritizing, implementing, and monitoring work on security system installations. For several highly classified sites, such as Arzamas-16, Chelyabinsk-70, and the four nuclear weapons assembly and disassembly sites, MINATOM has provided DOE with rough estimates on the number of buildings containing nuclear materials. However, DOE does not know how many buildings will require security systems at the sites or what type of material will be protected. Additionally, because of the lack of access at Arzamas-16, the project team is not able to identify which buildings have received security systems using DOE funds. In September 1999, DOE suspended new work at Arzamas-16 and Chelyabinsk-70 and at the four nuclear weapons assembly and disassembly sites because U.S. project teams had insufficient access to the sites.

DOE project teams have also experienced delays in installing security systems in the nuclear weapons complex. Because of the lack of access to the sites, the project teams rely on site personnel to install the systems. At one site, the project team said delays occurred because Russian workers were not being paid, while at another site, the team attributed delays to Russian personnel working on security system installations only in their spare time. Also, at one site, delays occurred because MINATOM rejected the suppliers for equipment that had been proposed by the project team. In addition, a Russian contractor hired to design security systems took 22 months to produce an incomplete design for a building.

Notwithstanding the limited number of buildings that have received security systems, the program has had some success in the nuclear weapons complex. Specifically, DOE installed 1-ton cement blocks over

[7]Law of the Russian Federation on State Secrets, July 23, 1993.

trenches that store 15 metric tons of plutonium at the Mayak Production Association, a Russian defense site. This is an example of an improvement that quickly reduced the threat of theft for a large quantity of weapons-usable nuclear material.

Insufficient Access Prevents DOE From Working at Many Buildings in Russia's Nuclear Weapons Complex

DOE has not yet started work on 147 buildings. Some of these buildings are in the civilian and naval fuels sectors and, according to DOE officials, contain lower-priority materials. But 115 of the buildings are in the nuclear weapons complex, and according to DOE and national laboratory officials, some of them may contain large amounts of material that is highly attractive to theft. According to the Deputy Director of the program, DOE currently does not have sufficient access to complete work at all the buildings in the nuclear weapons complex.

DOE and MINATOM are discussing ways to improve access in the weapons complex, modeled after procedures used by the program with the Russian Navy. DOE has proposed setting up a small team of about 30 experts who would be the only people from the United States allowed to visit the sensitive facilities in the Russian nuclear weapons complex. DOE would select no more than five people from the team to go on any one visit to sensitive parts of the complex. In addition, the program's Director suggested that DOE would host a workshop at a DOE facility to demonstrate the type of access the team would need to meet DOE's assurance requirements. MINATOM has not yet responded to the proposal.

In January 2000, DOE issued new guidance to the project teams on access to sites. In the past, project teams entered into contracts for work at buildings in the weapons complex even though they did not have physical access. DOE provided assistance for work at some of these buildings in an attempt to build trust with Russia and obtain the necessary access. Under the new guidelines, project teams are to request physical access to Russian buildings and access to information on the category of nuclear material in the buildings so that the teams can plan specific improvements and ensure the proper installation, functioning, and operation of the new systems. If project teams cannot obtain access, they are to notify DOE headquarters to discuss how to resolve the issues preventing the required access.

DOE Spent $481.2 Million Improving Nuclear Material Security in Russia and the NIS

Based on DOE's budget data, from fiscal year 1993 through 1999, DOE received $590.7 million in appropriations and spent $481.2 million to improve the security of nuclear material in Russia and the NIS through the Material Protection, Control, and Accounting (MPC&A) program.[8] Of the $109.5 million in unspent funds, DOE carried over $85.7 million into fiscal year 2000 and reprogrammed $23.8 million to other programs. DOE's national laboratories reported spending about 57 percent of the program's funds in the United States. DOE does not know how much of the nuclear security assistance provided to the sites has gone to Russian taxes. In addition, DOE does not have an estimate on the funding required to complete the program.

DOE Carried Over Unspent Funds Into Fiscal Year 2000 and Reprogrammed MPC&A Funds to Other Programs

As table 2 shows, from fiscal year 1993 through 1999, DOE spent $481.2 million of MPC&A program funds. The difference between the program's appropriations of $590.7 million and the amount spent consists of (1) the funds carried over into the program's fiscal year 2000 budget and (2) the reprogramming of funds to other DOE programs. As of September 30, 1999, DOE had not spent $85.7 million in program funds that it carried over into fiscal year 2000. Of the $85.7 million, DOE had obligated $60.4 million through its national laboratories as of the end of fiscal year 1999. DOE had plans for the national laboratories to use the remaining $25.3 million to implement specific nuclear security projects, but the laboratories had not yet obligated these funds as of the end of the fiscal year. According to DOE officials, the inability to spend these funds in a timely manner is due, in part, to the inherent difficulties associated with doing work in Russia, such as limited access to buildings, that delay the completion of projects. In addition, according to DOE, the national laboratories do not make payments for contracts until the end of a project when deliverables are received, reviewed, and determined to be acceptable, and this accounts for some of the lag time in spending funds.

[8]These amounts include appropriations and expenditures for nuclear material security prior to the creation of the MPC&A program in 1995 as well as funds that the Department of Defense transferred to DOE for nuclear material security in Russia and the NIS.

Table 2: Funding for MPC&A Activities, Fiscal Years 1993 Through 1999

Dollars in millions

Fiscal year	New funding	Budgeted	Spent	Carried over
1993 – 1995	$86.0	-	$32.0	$54.0
1996	99.3	153.3	58.8	94.5
1997	115.9	210.4	105.1	105.2
1998	129.0	234.1	148.3	85.8
1999	136.7	222.6	136.9	85.7
Total	**$590.7[a]**	**-**	**$481.2**	**-**

Note: The amount budgeted is equal to new funding plus the prior year's carryover. Carryover funding includes obligated and unobligated funds.

[a]This amount includes the $23.8 million that DOE reprogrammed.

Source: DOE.

DOE also reprogrammed $23.8 million of the MPC&A program's appropriations for fiscal years 1998 and 1999 to other DOE nonproliferation programs, including $12.2 million to the Initiatives for Proliferation Prevention program and the Nuclear Cities Initiative in an effort to create jobs for weapons scientists in Russia and the NIS and in Russia's closed nuclear cities.[9] DOE also reprogrammed

- $6 million for the Second Line of Defense, a program to assist Russia in establishing export controls on nuclear material;
- $5 million for disposing of spent nuclear fuel at the Aktau site in Kazakstan;
- $328,500 for counterintelligence activities; and
- $250,000 as part of the transfer of responsibility for the other NIS countries to DOE's safeguards office, which assists the sites in maintaining compliance with International Atomic Energy Agency safeguards.

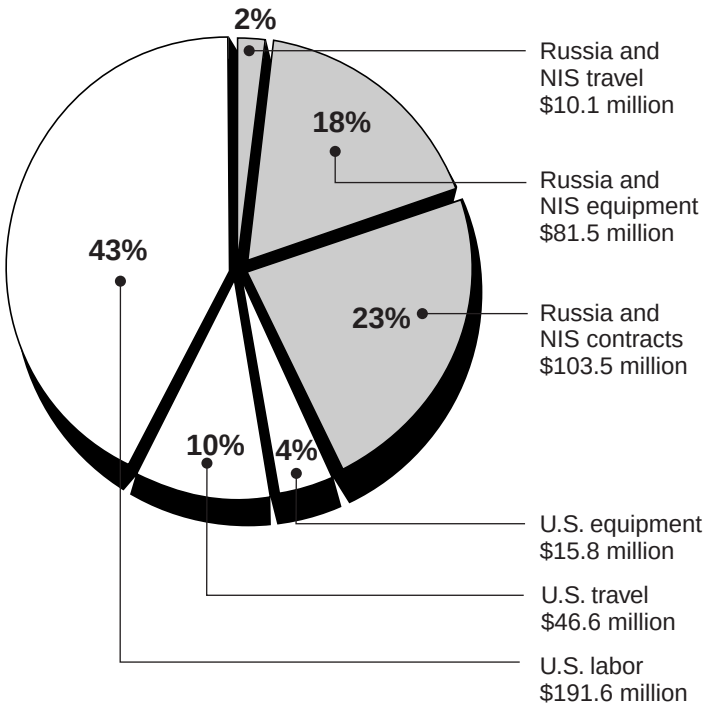
[9]DOE reprogrammed most of the funds in accordance with the appropriations committees' conference reports on the MPC&A program's fiscal year 1998 and 1999 appropriations.

DOE's National Laboratories Spent About 57 Percent of the Program's Funds in the United States

As figure 1 shows, DOE reported that for fiscal years 1996 through 1999, its national laboratories spent about $254 million, or 57 percent of program funds, in the United States and $195.2 million, or 43 percent, in Russia and the NIS.[10] The funds spent in the United States covered the laboratories' costs of implementing the program, including labor, equipment that stays in the United States such as computers, and domestic and foreign travel of laboratory personnel. The funds spent in Russia and the NIS covered the cost of contracts at sites where improvements are being made, including labor and equipment purchased from vendors in Russia and the NIS as well as from vendors in Europe or the United States and shipped to the sites. It also included travel of Russian and NIS site personnel associated with making the nuclear security improvements.

[10]We attempted to collect data on the breakdown of program expenditures between the United States and Russia and the NIS from the program's inception in fiscal year 1993. However, DOE has this information only from fiscal year 1996.

Figure 1: Breakdown of the $449.2 Million Spent on Nuclear Material Security, From Fiscal Year 1996 Through 1999



Note: Amount spent in Russia and the NIS does not total $195.2 million because of rounding.

Source: DOE.

The proportion of funds spent in Russia and the NIS has increased over time, from 29 percent in fiscal year 1996 to 49 percent in fiscal year 1999. The Deputy Director of the MPC&A program told us that he would like the proportion spent in Russia to increase even more.

Each category of expenditures shown in figure 1 includes some laboratory overhead charges. As reported by the national laboratories, the costs shown in figure 1 include $121.9 million in laboratory overhead charges, or about 27 percent of the $449.2 million expended from fiscal year 1996 through 1999. The overhead charges cover a variety of laboratory expenses that are not specific to the MPC&A program, including site maintenance at Argonne, Brookhaven, Lawrence Livermore, Los Alamos, Oak Ridge, Pacific Northwest, and Sandia national laboratories and at other smaller DOE facilities; information security and physical security; personnel costs not attributable to specific projects such as general training; general and

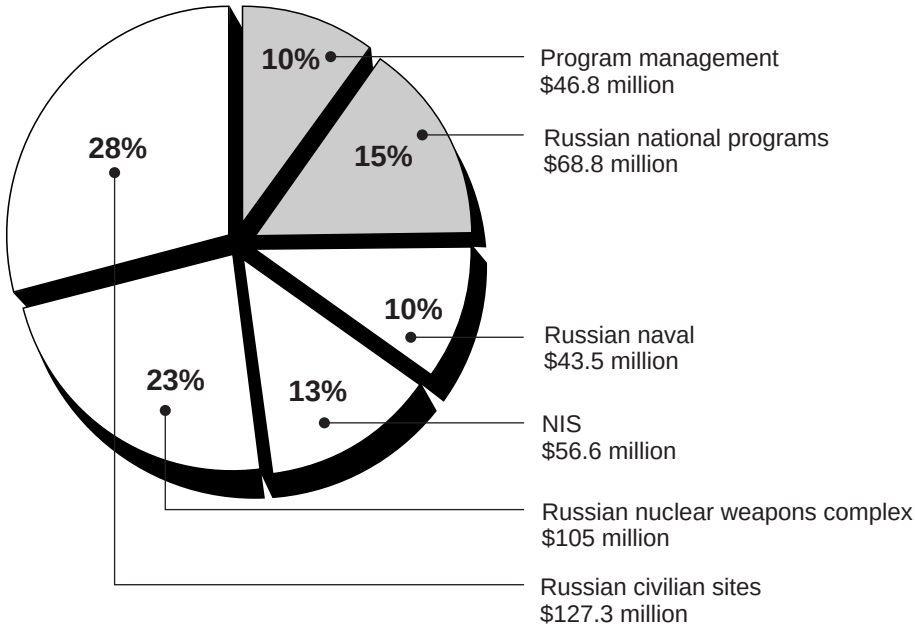
administrative costs; and laboratory-specific costs such as an assessment at Pacific Northwest National Laboratory for being part of a hazardous nuclear waste site. (For expenditures broken out by individual national laboratories, see app. II.)

Because the amounts reported by DOE as having been spent in Russia and the NIS also include laboratory overhead charges, the actual proportion of funds spent in the United States from fiscal year 1996 through 1999 is higher than the 57 percent shown in figure 1. DOE did not separate out overhead charges from expenditures in Russia and the NIS from fiscal year 1996 through 1999, and therefore, we were unable to determine the actual proportion. In fiscal year 2000, DOE began tracking overhead separately to more accurately report the proportion of funds spent in the United States and in Russia.

In addition to collecting data on the breakdown of the program's expenditures in the United States versus Russia and the NIS, we asked DOE how the $449.2 million that the program spent between fiscal year 1996 and 1999 was divided among the program sectors.[11] As figure 2 shows, the laboratories spent $332.5 million, or 74 percent of the $449.2 million, on the four program sectors that installed nuclear security systems at the sites—the Russian civilian, naval, and weapons program sectors and the program sector that installed security systems in other NIS countries. The amount spent in the Russian civilian sector also includes new initiatives to consolidate weapons-usable material into fewer sites and buildings and, where possible, to convert it to material that cannot be used for weapons.

[11]Each program sector spent funds in the United States, Russia, and the NIS, including overhead.

Figure 2: Breakdown of the $449.2 Million Spent on Nuclear Material Security, by Program Sector, From Fiscal Year 1996 Through 1999



Notes: The total expenditures of $449.2 million include a $1.1 million adjustment that is not shown on the chart. The adjustment reconciles discrepancies in DOE's data on expenditures between fiscal years 1996 and 1997. The MPC&A program did not have a centralized system for tracking financial information until the beginning of fiscal year 1998. Although DOE spent $105 million, or 23 percent of the $449.2 million, on the weapons complex, a large amount of work remains to be done in this sector.

The total does not equal 100 percent because of rounding.

Source: DOE.

The remaining expenditures from fiscal year 1996 through 1999 went to two additional program sectors: $68.8 million, or 15 percent of expenditures, went to Russian national programs, and $46.8 million, or 10 percent of expenditures, to program management. The program sector that focuses on Russian national programs assists with developing nuclear security regulations, enhancing nuclear security inspection and enforcement capabilities, securing the trucks and railcars used to transport weapons-usable nuclear material between and within sites, and training Russian personnel in the use of nuclear security systems. Program management supports the laboratories' management and oversight of the program and is different from laboratory overhead charges. Whereas laboratory overhead charges cover costs not directly associated with implementing the MPC&A program such as building maintenance costs, program management charges cover direct costs such as the program's cost reporting and

financial management. Program management also includes compliance with export controls, contracts management, travel coordination, administrative and secretarial support, the program's Technical Survey Team, and laboratory employees assigned to DOE headquarters to support the federal managers who are in charge of the program.

DOE Does Not Know How Much Has Been Paid in Russian Taxes on MPC&A Assistance

Under the MPC&A program, DOE has provided funds to Russia with the expectation that work performed or goods purchased using such funds would be exempt from Russian taxes because the United States and Russia signed agreements in 1992 to exempt U.S. assistance from Russian taxes. However, the Russian legislature never ratified the two 1992 agreements with the United States.[12] Because Russia never ratified these agreements, the United States and Russia signed an interim agreement in 1996, known as the Panskov-Pickering agreement, which allowed Russian sites receiving U.S. nuclear security assistance to defer taxes.[13] The purpose of the Panskov-Pickering agreement was to provide a temporary solution until Russia permanently changed the tax laws to exempt U.S. assistance from taxation in accordance with the 1992 agreements. However, Russia canceled the Panskov-Pickering agreement in June 1998 before changing the tax laws.

[12]Agreement Between the Government of the United States of America and the Government of the Russian Federation Regarding Cooperation to Facilitate the Provision of Assistance, Apr. 4, 1992; and Agreement Between the United States of America and the Russian Federation Concerning the Safe and Secure Transportation, Storage, and Destruction of Weapons and the Prevention of Weapons Proliferation, June 17, 1992.

[13]The Panskov-Pickering agreement is formally titled the Agreement on the Implementation of Tax Postponements Under the Gratuitous Assistance Rendered to the Russian Federation by the United States Government, Apr. 17, 1996.

After Russia canceled the Panskov-Pickering agreement, the MPC&A program, through its contracts with Russian sites, was charged an unknown amount in Russian taxes on assistance provided to the sites. DOE has been unable to determine how much the program has paid in Russian taxes because the tax authorities do not directly tax the MPC&A program. Instead, they tax the Russian sites and the sites' subcontractors. In our examination of contracts between two of DOE's national laboratories and the Russian sites, we found several cases in which the MPC&A program agreed to include taxes in the cost of a contract, including one $6 million contract with close to $1 million in taxes.[14] In general, program officials would have negotiated the taxes out of the cost of the contract, but because Russia had canceled the Panskov-Pickering agreement to defer taxes, the program officials included the nearly $1 million in the contract to cover taxes so that the site could continue to install nuclear security systems. The other contracts we found allowed for the payment of approximately $200,000 in taxes.

In May 1999, the Russian legislature passed a new law that exempted U.S. assistance from most taxes.[15] According to program officials, the tax law should relieve the program from being charged for Russian taxes, with the exception of personal income and payroll taxes, which are not exempt. The law requires that foreign assistance programs be registered with the Russian tax authorities to qualify for tax-exempt status. DOE submitted its registration application for the MPC&A program on January 21, 2000, and was notified on February 4 that the program is now registered with the Russian tax authority. After the program is registered, the law also requires that the Russian recipients certify that particular funds and equipment are being used in conjunction with a registered foreign assistance program. Because DOE has only recently registered the MPC&A program and Russian sites have not yet certified any funds or equipment, it is too early to tell whether the new law will successfully address the issue of taxation. Table 3 lists the Russian taxes and the exemption status of U.S. aid under the new law.

[14]Although the contracts generally do not identify taxes, in some cases, the sites identify the taxes in price quotations for various tasks associated with a contract.

[15]The new law is called Federal Law on Gratuitous Aid/Assistance to the Russian Federation and Amending Certain Tax Legislative Acts of the Russian Federation and on Introducing Privileges on Payments Into State Non-Budgetary Funds in Connection With the Provision of Gratuitous Aid/Assistance to the Russian Federation.

Table 3: Tax Rates and Exemptions Under the New Russian Law on Gratuitous Aid

Tax	Rate	Exempted
Profits tax	Up to 35.0%	Yes
Value added tax (VAT)	20.0	Yes
VAT on services	20.0	Yes
Subcontractor VAT	20.0	Yes
Road fund tax	2.5	Yes
Assets tax	2.5	Yes[a]
Gross receipts tax	4.0	Yes
Customs duties	Up to 35.0	Yes
Personal income tax	12-35.0[b]	No
Payroll taxes	40.5	No

[a]Exempt for the first 2 years, then tax applies.

[b]A range is given because the personal income tax is progressive.

Source: DOE.

DOE Does Not Have a Current Estimate of the Cost to Complete the Program

Since 1996, DOE has developed better information on the number of buildings in Russia and the NIS that need improved security systems. As a result, DOE's estimate of the number of buildings requiring improvements has increased from about 100 to 332. DOE has also developed new initiatives to assist sites with the operation and maintenance of systems after they are installed and to reduce the number of buildings that require improvements by consolidating weapons-usable nuclear material into fewer buildings and converting highly enriched uranium to low enriched uranium that cannot be used for weapons. According to the Deputy Assistant Secretary for the MPC&A program, DOE has not developed a new cost estimate for completing the program because of the program's expanding scope and the program's recent reorganization. However, the Deputy Assistant Secretary told us that DOE has the information necessary to develop a revised estimate and is planning to do so in the near future.

Conclusion

In 1996, DOE estimated that the Material Protection, Control, and Accounting program would require $400 million to complete nuclear security improvements for about 100 buildings by fiscal year 2002. DOE has already spent more than it originally estimated, and the total number of buildings requiring improvements has more than tripled. In addition, DOE

has developed new initiatives that expand the scope of the program. Despite these changes, DOE has not developed an overall cost estimate or time frame for completing the program. Without these estimates, the Congress does not know how much funding it will have to commit to complete the program objectives.

Recommendation

We recommend that the Secretary of Energy develop, and update annually, a cost estimate and a time frame for the completion of all elements of the Material Protection, Control, and Accounting program. The estimate should include the cost for improving security at all buildings identified as requiring improved nuclear security systems, for efforts to consolidate weapons-usable nuclear material into fewer sites and buildings and to convert it into material that cannot be used for weapons, and for providing assistance to operate and maintain the improved nuclear security systems.

Agency Comments

We requested comments on a draft of this report from the Department of Energy. The Department generally agreed with our findings and provided comments to improve the technical accuracy of the report that we incorporated as appropriate. In response to our recommendation to develop a cost estimate and time frame to complete its work on the Material Protection, Control, and Accounting program, the Department noted that it is currently developing these estimates and anticipates having them completed in 2 months.

Scope and Methodology

The scope of our review included DOE's assistance to improve the security of weapons-usable nuclear material controlled by civilian authorities in Russia and other NIS countries, Russia's nuclear weapons complex, and the Russian Navy. To meet our objectives, we analyzed DOE's assessment of the number of buildings that received nuclear material security systems, the number of buildings at which systems are currently being installed, and the number of buildings at which work has yet to be initiated; pertinent program documents, including the program's guidance on initiating and conducting work at these sites; and the DOE Technical Survey Team's assessment of the status of efforts at the sites and their compliance with the program's guidelines. In addition, we discussed site status with DOE headquarters program managers and laboratory project teams.

We analyzed data on program costs and expenditures in Russia and the NIS versus the United States; obtained overhead costs from each of the participating national laboratories; examined U.S. and Russian cooperative and tax agreements; and randomly sampled program contracts at two national laboratories to identify tax burdens. We also obtained the program's budget, obligation, and expenditure data from DOE program managers and laboratory personnel. We did not independently verify the quality or accuracy of the financial data provided to us by program managers and laboratory personnel, but we compared the data with DOE's Program Management Information System. In making these comparisons, we found errors in the data that we shared with DOE officials, who corrected the data.

We interviewed officials from DOE's Office of International Materials Protection and Emergency Cooperation and from the national laboratories, including Argonne, Brookhaven, Lawrence Livermore, Los Alamos, Oak Ridge, Pacific Northwest, and Sandia.

Our review was conducted between August 1999 and March 2000 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Honorable Bill Richardson, Secretary of Energy; the Office of Management and Budget; and interested congressional committees. We will also make copies available to others on request.

If you have any questions concerning this report, we can be reached at (202) 512-3841 and (202) 512-4128, respectively. Major contributors to this report include Gene Aloise, F. James Shafer, Charles Bolton, Joseph Cook, Julie Hirshen, and José Peña.

(Ms.) Gary Jones
Associate Director, Energy, Resources,
and Science Issues
Resources, Community, and
Economic Development Division

Harold J. Johnson
Associate Director, International Relations
and Trade Issues
National Security and International
Affairs Division

Sites in Russia and Other Newly Independent States Where the Installation of Nuclear Material Security Systems Is Complete

Table 4: Installed Sitewide Nuclear Security Systems in Russia

Site	Number of buildings	Date completed
Joint Institute of Nuclear Research, Dubna	5	2/98
Moscow Scientific Research and Design Institute of Power Technology	2	2/98
Moscow Institute of Theoretical and Experimental Physics	3	2/98
Karpov Institute of Physical Chemistry	3	2/98
Beloyarsk Nuclear Power Plant	3	5/98
Sverdlovsk Branch of Scientific and Design Institute of Power Technology	5	5/98
Khlopin Radium Institute	4	5/98
Petersburg Nuclear Physics Institute	5	5/98
Moscow State Engineering Physics Institute	4	6/98
Tomsk Polytechnical University	4	7/98
Krylov Shipbuilding Institute	3	11/98
Navy Site 49	4	9/99
Navy Refueling Ship PM-63	1	9/99
Icebreaker Fleet, Imandra	2	9/99

Source: DOE.

Table 5: Installed Sitewide Nuclear Security Systems in Other NIS Countries

Site	Country	Number of buildings	Date completed
Kiev Institute of Nuclear Research	Ukraine	2	10/97
Kharkiv Institute of Physics and Technology	Ukraine	2	1/99
Sevastopol Naval Institute	Ukraine	2	1/99
South Ukraine Nuclear Power Plant	Ukraine	2	1/99
Institute of Atomic Energy, Kurchatov	Kazakstan	4	9/97
Ulba Fuel Fabrication Plant, Ust-Kamenogorsk	Kazakstan	2	9/97
Aktau BN-350 Breeder Reactor	Kazakstan	3	11/98
Alatau Research Reactor, Almaty	Kazakstan	2	10/98
Sosny Institute of Nuclear Power Engineering, Minsk	Belarus	3	4/98
Tbilisi Institute of Nuclear Physics	Georgia	1	10/97
Salaspils Institute of Nuclear Physics	Latvia	2	10/97
Ignalina Nuclear Power Plant	Lithuania	1	10/97
Tashkent Institute of Nuclear Physics	Uzbekistan	2	4/98

Source: DOE.

Table 6: Installed Systems at Individual Buildings at Sites

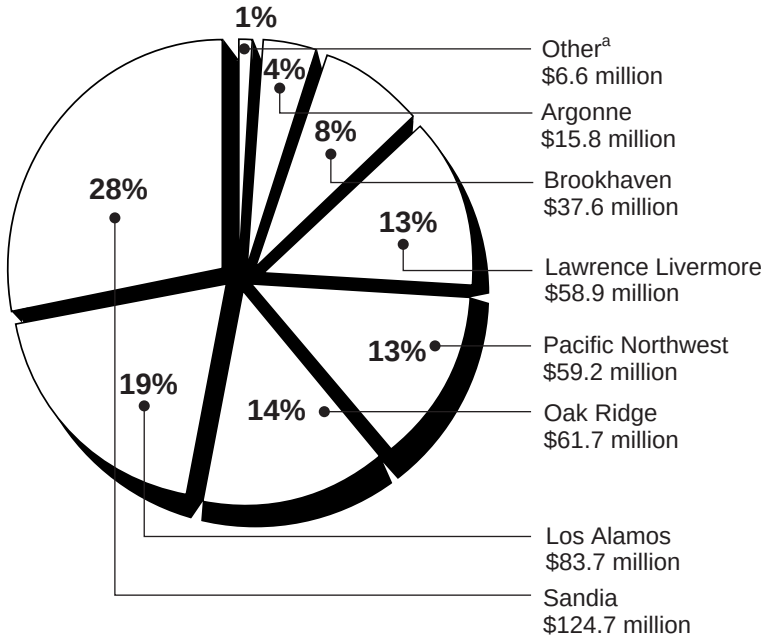
Site	Program sector	Total number of buildings on site	Number of buildings with installed systems
Arzamas-16	Nuclear weapons complex	71	4
Tomsk-7	Nuclear weapons complex	24	3
Krasnoyarsk-26	Nuclear weapons complex	6	1
Chelyabinsk-65, Mayak	Nuclear weapons complex	23	1
Chelyabinsk-70	Nuclear weapons complex	24	2
Dmitrovgrad	Civilian research	10	4
Elektrostal	Civilian research	12	3
Luch	Civilian research	6	4
Novosibirsk	Civilian research	3	1
Obninsk	Civilian research	15	6
Navy Site 32	Naval fuel	1	1
Navy Site 34	Naval fuel	2	1
Navy Refueling Ship PM-12	Naval fuel	1	1
Navy Refueling Ship PM-74	Naval fuel	1	1
Kurchatov Institute, Moscow	Naval fuel	13	4

Source: DOE.

Analysis of DOE National Laboratories' Spending on the MPC&A Program

The Department of Energy's (DOE) national laboratories spent $449.2 million from fiscal years 1996 through 1999 to implement the Material Protection, Control, and Accounting (MPC&A) program. As figure 3 shows, six laboratories—Sandia, Los Alamos, Oak Ridge, Pacific Northwest, Lawrence Livermore, and Brookhaven—accounted for $425.7 million, or 95 percent of the funds spent during the 4-year period.

Figure 3: Breakdown of $449.2 Million Spent on the MPC&A Program, by DOE National Laboratory, From Fiscal Year 1996 Through 1999



Note: The total expenditures of $449.2 million include a $1.1 million adjustment that is not shown on the chart. The adjustment reconciles discrepancies in DOE's data on expenditures between fiscal years 1996 and 1997. The MPC&A program did not have a centralized system for tracking financial information until the beginning of fiscal year 1998.

[a]"Other" includes the Non-Proliferation and National Security Institute, New Brunswick Laboratory, Pantex, and Savannah River Site.

Source: DOE.

The percentage of MPC&A expenditures from fiscal years 1996 through 1999 that each DOE national laboratory charged to overhead ranged from 13 to 41 percent. Each laboratory uses a different method to apply overhead charges to the MPC&A program. For example, while some laboratories charge flat rates for procuring contracts with sites in Russia

and the newly independent states, other laboratories provide discounts, through lower procurement overhead rates, as the dollar amounts of the contracts increase. In addition, the laboratories do not always consider the same types of costs as overhead. For example, while some laboratories recover the cost of their staff who procure contracts through the procurement overhead charge, other laboratories directly charge the MPC&A program for their procurement labor costs. Similarly, some laboratories consider annual leave and other fringe benefits as direct costs, and other laboratories categorize these costs as overhead. Because each laboratory applies its overhead differently, direct comparisons of the percentage of MPC&A expenditures that each laboratory charged to overhead are not possible.

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