



Testimony

Before the Subcommittee on National Security,
Emerging Threats, and International Relations,
Committee on Government Reform, House of
Representatives

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**NUCLEAR
NONPROLIFERATION**

**IAEA Safeguards and Other
Measures to Halt the Spread
of Nuclear Weapons and
Material**

Statement of Gene Aloise, Director
Natural Resources and Environment





Highlights of [GAO-06-1128T](#), testimony before the Subcommittee on National Security, Emerging Threats, and International Relations, Committee on Government Reform, House of Representatives

Why GAO Did This Study

The International Atomic Energy Agency's (IAEA) safeguards system has been a cornerstone of U.S. efforts to prevent nuclear weapons proliferation since the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was adopted in 1970. Safeguards allow IAEA to verify countries' compliance with the NPT. Since the discovery in 1991 of a clandestine nuclear weapons program in Iraq, IAEA has strengthened its safeguards system. In addition to IAEA's strengthened safeguards program, there are other U.S. and international efforts that have helped stem the spread of nuclear materials and technology that could be used for nuclear weapons programs. This testimony is based on GAO's report on IAEA safeguards issued in October 2005 (*Nuclear Nonproliferation: IAEA Has Strengthened Its Safeguards and Nuclear Security Programs, but Weaknesses Need to Be Addressed*, GAO-06-93 [Washington, D.C.: Oct. 7, 2005]). This testimony is also based on previous GAO work related to the Nuclear Suppliers Group—a group of more than 40 countries that have pledged to limit trade in nuclear materials, equipment, and technology to only countries that are engaged in peaceful nuclear activities—and U.S. assistance to Russia and other countries of the former Soviet Union for the destruction, protection, and detection of nuclear material and weapons.

www.gao.gov/cgi-bin/getrpt?GAO-06-1128T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Gene Aloise at (202) 512-3841 or aloisee@gao.gov.

NUCLEAR NONPROLIFERATION

IAEA Safeguards and Other Measures to Halt the Spread of Nuclear Weapons and Material

What GAO Found

IAEA has taken steps to strengthen safeguards, including conducting more intrusive inspections, to seek assurances that countries are not developing clandestine weapons programs. IAEA has begun to develop the capability to independently evaluate all aspects of a country's nuclear activities. This is a radical departure from the past practice of only verifying the peaceful use of a country's declared nuclear material. However, despite successes in uncovering some countries' undeclared nuclear activities, safeguards experts cautioned that a determined country can still conceal a nuclear weapons program. In addition, there are a number of weaknesses that limit IAEA's ability to implement strengthened safeguards. First, IAEA has a limited ability to assess the nuclear activities of 4 key countries that are not NPT members—India, Israel, North Korea, and Pakistan. Second, more than half of the NPT signatories have not yet brought the Additional Protocol, which is designed to give IAEA new authority to search for clandestine nuclear activities, into force. Third, safeguards are significantly limited or not applied to about 60 percent of NPT signatories because they possess small quantities of nuclear material, and are exempt from inspections, or they have not concluded a comprehensive safeguards agreement. Finally, IAEA faces a looming human capital crisis caused by the large number of inspectors and safeguards management personnel expected to retire in the next 5 years.

In addition to IAEA's strengthened safeguards program, there are other U.S. and international efforts that have helped stem the spread of nuclear materials and technology. The Nuclear Suppliers Group has helped to constrain trade in nuclear material and technology that could be used to develop nuclear weapons. However, there are a number of weaknesses that could limit the Nuclear Suppliers Group's ability to curb proliferation. For example, members of the Suppliers Group do not always share information about licenses they have approved or denied for the sale of controversial items to nonmember states. Without this shared information, a member country could inadvertently license a controversial item to a country that has already been denied a license from another member state.

Since the early 1990s, U.S. nonproliferation programs have helped Russia and other former Soviet countries to, among other things, secure nuclear material and warheads, detect illicitly trafficked nuclear material, and eliminate excess stockpiles of weapons-usable nuclear material. However, these programs face a number of challenges which could compromise their ongoing effectiveness. For example, a lack of access to many sites in Russia's nuclear weapons complex has significantly impeded the Department of Energy's progress in helping Russia secure its nuclear material. U.S. radiation detection assistance efforts also face challenges, including corruption of some foreign border security officials, technical limitations of some radiation detection equipment, and inadequate maintenance of some equipment.

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss the International Atomic Energy Agency's (IAEA) safeguards program and other measures to halt the spread of nuclear weapons and material. Revelations about the clandestine nuclear programs of North Korea, Iran, and Libya, as well as clandestine nuclear trafficking networks, have significantly increased international concerns about the spread of weapons of mass destruction. Since the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) came into force in 1970, IAEA's safeguards system has been a cornerstone of U.S. and international efforts to prevent nuclear weapons proliferation. The NPT expanded IAEA's original inspection responsibilities by requiring signatory non-nuclear weapons states—countries that had not manufactured and detonated a nuclear device before January 1, 1967—to agree not to acquire nuclear weapons and to accept IAEA safeguards on all nuclear material used in peaceful activities.¹ Most countries have negotiated an agreement with IAEA, known as a comprehensive safeguards agreement.

Safeguards allow the agency to independently verify that non-nuclear weapons states that signed the NPT are complying with its requirements. Under the safeguards system, IAEA, among other things, inspects all facilities and locations containing nuclear material, as declared by each country, to verify its peaceful use. However, the discovery in 1991 of a clandestine nuclear weapons program in Iraq confirmed the need for a broader and more effective approach to safeguards. As a result, IAEA began to strengthen its safeguards system in the mid-1990s to provide assurance that non-nuclear weapons states were not engaged in undeclared nuclear activities.

In addition to IAEA's strengthened safeguards program, other U.S. and international efforts to prevent nuclear weapons proliferation have included the Nuclear Supplier's Group—a group of more than 40 countries that have pledged to limit trade in nuclear materials, equipment, and technology to only countries that are engaged in peaceful nuclear activities—and U.S. assistance to Russia and other states of the former

¹Under the NPT, nuclear weapons states pledged to facilitate the transfer of peaceful nuclear technology to non-nuclear weapons states, but not to assist them in acquiring nuclear weapons.

Soviet Union to, among other things, secure nuclear material and warheads.

My remarks will focus on our report on IAEA safeguards issued in October 2005.² I will also address issues related to previous GAO work on the Nuclear Suppliers Group's restrictions on nuclear trade³ and U.S. assistance to Russia and other countries of the former Soviet Union for the destruction, protection, and detection of nuclear weapons and material.

Summary

IAEA has taken steps to strengthen safeguards by more aggressively seeking assurances that countries have not engaged in clandestine nuclear activities, but the agency still cannot be certain that countries are not developing secret weapons programs. In a radical departure from the past practice of only verifying the peaceful use of a country's declared nuclear material at declared facilities, IAEA has begun to develop the capability to independently evaluate all aspects of a country's nuclear activities by, among other things, conducting more intrusive inspections and collecting and analyzing environmental samples to detect traces of nuclear material at facilities and other locations. Department of State and IAEA officials told us that IAEA's strengthened safeguards measures have successfully revealed previously undisclosed nuclear activities in Iran, South Korea, and Egypt. In the case of Iran, IAEA and Department of State officials noted that strengthened safeguards measures, such as collecting and analyzing environmental samples, helped the agency verify some of Iran's nuclear activities. The measures also allowed IAEA to conclude in September 2005 that Iran was not complying with its safeguards obligations because it failed to report all of its nuclear activities to IAEA. As a result, in July 2006, Iran was referred to the U.N. Security Council, which in turn demanded that Iran suspend its uranium enrichment activities or face possible diplomatic and economic sanctions. Despite these successes, a group of safeguards experts recently cautioned that a determined country can still conceal a nuclear weapons program. For example, IAEA does not have unfettered inspection rights and cannot make visits to suspected sites anywhere at any time.

²GAO, *Nuclear Nonproliferation: IAEA Has Strengthened Its Safeguards and Nuclear Security Programs, but Weaknesses Need to Be Addressed*, [GAO-06-93](#) (Washington, D.C.: Oct. 7, 2005).

³GAO, *Nonproliferation: Strategy Needed to Strengthen Multilateral Export Control Regimes*, [GAO-03-43](#) (Washington, D.C.: Oct. 25, 2002).

There are a number of weaknesses that hamper IAEA's ability to effectively implement strengthened safeguards. First, IAEA has a limited ability to assess the nuclear activities of 4 key countries that are not NPT members—India, Israel, North Korea, and Pakistan. Second, more than half, or 111 out of 189, of the NPT signatories have not yet brought the Additional Protocol into force, including the United States. A third weakness in implementing strengthened safeguards is that safeguards are significantly limited or not applied in about 60 percent, or 112 out of 189, of the NPT signatory countries—either because they have an agreement (known as a small quantities protocol) with IAEA, and are not subject to most safeguards measures, or because they have not concluded a comprehensive safeguards agreement with IAEA. IAEA cannot verify that these countries are not diverting nuclear material for nonpeaceful purposes or engaging in secret nuclear activities. Fourth, while IAEA is increasingly relying on the analytical skills of its staff to detect countries' undeclared nuclear activities, the agency is facing a looming human capital crisis. In the next 5 years, IAEA will experience a large turnover of senior safeguards inspectors and high-level management officials. Delays in filling critical safeguards positions limit IAEA's ability to implement strengthened safeguards.

In addition to IAEA's strengthened safeguards program, there are other U.S. and international efforts that have helped stem the spread of nuclear materials and technology. The Nuclear Suppliers Group has helped to constrain the trade in nuclear material and technology that could be used to develop nuclear weapons. There are currently 45 countries that participate in this voluntary, nonbinding regime and they have pledged to limit trade in nuclear materials, equipment, and technology to only countries that are engaged in peaceful nuclear activities. The Nuclear Suppliers Group has also helped IAEA verify compliance with the NPT. For example, it helped convince Argentina and Brazil to place their nuclear programs under IAEA safeguards in exchange for international cooperation to enhance their nuclear programs for peaceful purposes. Since 1992, the Nuclear Suppliers Group has required that other countries have comprehensive safeguards agreements with IAEA as a condition of supply for nuclear-related items. Despite these benefits, there are a number of weaknesses that could limit the Nuclear Suppliers Group's ability to curb proliferation. We found that members of the Nuclear Suppliers Group do not always share information about licenses they have approved or denied for the sale of controversial items to nonmember states. Without this shared information, a member country could inadvertently license a controversial item to a country that has already been denied a license from another Nuclear Suppliers Group member

state. We also found that Nuclear Suppliers Group members did not promptly review and agree upon common lists of items to control and approaches to controlling them. Without this agreement, sensitive items may still be traded to countries of concern.

Since the early 1990s, U.S. nonproliferation programs have helped Russia and other former Soviet countries secure nuclear material and warheads, detect illicitly trafficked nuclear material, eliminate excess stockpiles of weapons-usable nuclear material,⁴ and halt the continued production of weapons-grade plutonium.⁵ While these programs have had some successes, they also face a number of challenges which could compromise their ongoing effectiveness. For example, a lack of access to many sites in Russia's nuclear weapons complex has significantly impeded the Department of Energy's (DOE) progress in helping Russia secure its nuclear material. We reported in 2003 that DOE had completed work at only a limited number of buildings in Russia's nuclear weapons complex, a network of sites involved in the construction of nuclear weapons where most of the nuclear material in Russia is stored. While DOE has reported progress on gaining access to many of these sites, we are currently re-examining DOE's efforts in this area and the challenges the agency faces in completing its program. Furthermore, to combat nuclear smuggling, since 1994, the Departments of Energy, Defense, and State have provided radiation detection equipment to 36 countries, including many countries of the former Soviet Union. However, as we reported in March 2006, U.S. radiation detection assistance efforts also face challenges, including corruption of some foreign border security officials, technical limitations of some radiation detection equipment, and inadequate maintenance of some equipment.

Background

IAEA is an independent organization affiliated with the United Nations. Its governing bodies include the General Conference, composed of representatives of the 138 IAEA member states, and the 35-member Board of Governors, which provides overall policy direction and oversight. The Secretariat, headed by the Director General, is responsible for

⁴Weapons-usable nuclear material is uranium enriched to 20 percent or greater in uranium-235 or uranium-233 and any plutonium containing less than 80 percent of the isotope plutonium-238 and less than 10 percent of the isotopes plutonium-241 and plutonium-242. These types of material are of the quality used to make nuclear weapons.

⁵A listing of relevant U.S. nuclear nonproliferation programs can be found in appendix III.

implementing the policies and programs of the General Conference and Board of Governors. The United States is a permanent member of the Board of Governors.

IAEA derives its authority to establish and administer safeguards from its statute, the Treaty on the Non-proliferation of Nuclear Weapons and regional nonproliferation treaties, bilateral commitments between states, and project agreements with states.⁶ Since the NPT came into force in 1970, it has been subject to review by signatory states every 5 years. The 1995 NPT Review and Extension conference extended the life of the treaty indefinitely, and the latest review conference occurred in May 2005. Article III of the NPT binds each of the treaty's 184 signatory states that had not manufactured and exploded a nuclear device prior to January 1, 1967 (referred to in the treaty as non-nuclear weapon states) to conclude an agreement with IAEA that applies safeguards to all source and special nuclear material in all peaceful nuclear activities within the state's territory, under its jurisdiction, or carried out anywhere under its control.⁷

The five nuclear weapons states that are parties to the NPT—China, France, the Russian Federation, the United Kingdom, and the United States—are not obligated by the NPT to accept IAEA safeguards. However, each nuclear weapons state has voluntarily entered into legally binding safeguards agreements with IAEA, and has submitted designated nuclear materials and facilities to IAEA safeguards to demonstrate to the non-nuclear weapon states their willingness to share in the administrative and commercial costs of safeguards. (App. I lists states that are subject to safeguards, as of August 2006.)

India, Israel, and Pakistan are not parties to the NPT or other regional nonproliferation treaties. India and Pakistan are known to have nuclear weapons programs and to have detonated several nuclear devices during

⁶Regional treaties, including the Treaty for the Prohibition of Nuclear Weapons in Latin America (the 1967 Treaty of Tlatelolco), the South Pacific Nuclear Free Zone Treaty (the 1985 Treaty of Rarotonga), the African Nuclear-Weapon-Free Zone Treaty (the 1995 Treaty of Pelindaba), and the Southeast Asia Nuclear-Weapon-Free Treaty (the 1995 Bangkok Treaty) require each participating country to conclude a comprehensive safeguards agreement with IAEA. Additionally, in February 2005, five Central Asian states announced that they had reached agreement on the text of a treaty to establish a nuclear-weapon-free zone.

⁷Nuclear materials include source materials, such as natural uranium, depleted uranium, and thorium, and special fissionable materials, such as enriched uranium and plutonium.

May 1998. Israel is also believed to have produced nuclear weapons. Additionally, North Korea joined the NPT in 1985 and briefly accepted safeguards in 1992 and 1993, but expelled inspectors and threatened to withdraw from the NPT when IAEA inspections uncovered evidence of undeclared plutonium production. North Korea announced its withdrawal from the NPT in early 2003, which under the terms of the treaty, terminated its comprehensive safeguards agreement.

IAEA's safeguards objectives, as traditionally applied under comprehensive safeguards agreements, are to account for the amount of a specific type of material necessary to produce a nuclear weapon, and the time it would take a state to divert this material from peaceful use and produce a nuclear weapon. IAEA attempts to meet these objectives by using a set of activities by which it seeks to verify that nuclear material subject to safeguards is not diverted to nuclear weapons or other proscribed purposes. For example, IAEA inspectors visit a facility at certain intervals to ensure that any diversion of nuclear material is detected before a state has had time to produce a nuclear weapon. IAEA also uses material-accounting measures to verify quantities of nuclear material declared to the agency and any changes in the quantities over time. Additionally, containment measures are used to control access to and the movement of nuclear material. Finally, IAEA deploys surveillance devices, such as video cameras, to detect the movements of nuclear material and discourage tampering with IAEA's containment measures.

The Nuclear Suppliers Group was established in 1975 after India tested a nuclear explosive device. In 1978, the Suppliers Group published its first set of guidelines governing the exports of nuclear materials and equipment. These guidelines established several requirements for Suppliers Group members, including the acceptance of IAEA safeguards at facilities using controlled nuclear-related items. In 1992, the Suppliers Group broadened its guidelines by requiring countries receiving nuclear exports to agree to IAEA's safeguards as a condition of supply. As of August 2006, the Nuclear Suppliers Group had 45 members, including the United States. (See app. II for a list of signatory countries.)

IAEA Has Strengthened Its Safeguards Program, but Weaknesses Need to Be Addressed

IAEA has taken steps to strengthen safeguards by more aggressively seeking assurances that a country is not pursuing a clandestine nuclear program. In a radical departure from past practices of only verifying the peaceful use of a country's declared nuclear material at declared facilities, IAEA has begun to develop the capability to independently evaluate all aspects of a country's nuclear activities. The first strengthened safeguards steps, which began in the early 1990s, increased the agency's ability to monitor declared and undeclared activities at nuclear facilities. These measures were implemented under the agency's existing legal authority under comprehensive safeguards agreements and include (1) conducting short notice and unannounced inspections, (2) collecting and analyzing environmental samples to detect traces of nuclear material, and (3) using measurement and surveillance systems that operate unattended and can be used to transmit data about the status of nuclear materials directly to IAEA headquarters.

The second series of steps began in 1997 when IAEA's Board of Governors approved the Additional Protocol.⁸ Under the Additional Protocol, IAEA has the right, among other things, to (1) receive more comprehensive information about a country's nuclear activities, such as research and development activities, and (2) conduct "complementary access," which enables IAEA to expand its inspection rights for the purpose of ensuring the absence of undeclared nuclear material and activities. Because the Additional Protocol broadens IAEA's authority and the requirements on countries under existing safeguards agreements, each country must take certain actions to bring it into force.

For each country with a safeguards agreement, IAEA independently evaluates all information available about the country's nuclear activities and draws conclusions regarding a country's compliance with its safeguards commitments. A major source of information available to the agency is data submitted by countries to IAEA under their safeguards agreements, referred to as state declarations. Countries are required to provide an expanded declaration of their nuclear activities within 180 days of bringing the Additional Protocol into force. Examples of information provided in an Additional Protocol declaration include the manufacturing of key nuclear-related equipment; research and development activities related to the nuclear fuel cycle; the use and contents of buildings on a

⁸Model Protocol Additional to the Agreement(s) Between State(s) and the International Atomic Energy Agency for the Application of Safeguards.

nuclear site; and the location and operational status of uranium mines. The agency uses the state declarations as a starting point to determine if the information provided by the country is consistent and accurate with all other information available based on its own review.

IAEA uses various types of information to verify the state declaration. Inspections of nuclear facilities and other locations with nuclear material are the cornerstone of the agency's data collection efforts. Under the Additional Protocol, IAEA has the authority to conduct complementary access at any place on a site or other location with nuclear material in order to ensure the absence of undeclared nuclear material and activities, confirm the decommissioned status of facilities where nuclear material was used or stored, and resolve questions or inconsistencies related to the correctness and completeness of the information provided by a country on activities at other declared or undeclared locations. During complementary access, IAEA inspectors may carry out a number of activities, including (1) making visual observations, (2) collecting environmental samples, (3) using radiation detection equipment and measurement devices, and (4) applying seals. In 2004, IAEA conducted 124 complementary access in 27 countries.

In addition to its verification activities, IAEA uses other sources of information to evaluate countries' declarations. These sources include information from the agency's internal databases, open sources, satellite imagery, and outside groups. The agency established two new offices within the Department of Safeguards to focus primarily on open source and satellite imagery data collection. Analysts use Internet searches to acquire information generally available to the public from open sources, such as scientific literature, trade and export publications, commercial companies, and the news media. In addition, the agency uses commercially available satellite imagery to supplement the information it receives through its open source information. Satellite imagery is used to monitor the status and condition of declared nuclear facilities and verify state declarations of certain sites. The agency also uses its own databases, such as those for nuclear safety, nuclear waste, and technical cooperation, to expand its general knowledge about countries' nuclear and nuclear-related activities. In some cases, IAEA receives information from third parties, including other countries.

IAEA Has Taken Steps to Strengthen Safeguards, but Detection of Clandestine Nuclear Weapons Programs is Not Assured

Department of State and IAEA officials told us that strengthened safeguards measures have successfully revealed previously undisclosed nuclear activities in Iran, South Korea, and Egypt. Specifically,

- IAEA and Department of State officials noted that strengthened safeguards measures, such as collecting and analyzing environmental samples, helped the agency verify some of Iran's nuclear activities. The measures also allowed IAEA to conclude in September 2005 that Iran was not complying with its safeguards obligations because it failed to report all of its nuclear activities to IAEA. As a result, in July 2006, Iran was referred to the U.N. Security Council, which in turn demanded that Iran suspend its uranium enrichment activities or face possible diplomatic and economic sanctions.
- In August 2004, as a result of preparations to submit its initial declaration under the Additional Protocol, South Korea notified IAEA that it had not previously disclosed nuclear experiments involving the enrichment of uranium and plutonium separation. IAEA sent a team of inspectors to South Korea to investigate this case. In November 2004, IAEA's Director General reported to the Board of Governors that although the quantities of nuclear material involved were not significant, the nature of the activities and South Korea's failure to report these activities in a timely manner posed a serious concern. IAEA is continuing to verify the correctness and completeness of South Korea's declarations.
- IAEA inspectors have investigated evidence of past undeclared nuclear activities in Egypt based on the agency's review of open source information that had been published by current and former Egyptian nuclear officials. Specifically, in late 2004, the agency found evidence that Egypt had engaged in undeclared activities at least 20 years ago by using small amounts of nuclear material to conduct experiments related to producing plutonium and highly enriched uranium. In January 2005, the Egyptian government announced that it was fully cooperating with IAEA and that the matter was limited in scope. IAEA inspectors have made several visits to Egypt to investigate this matter. IAEA's Secretariat reported these activities to its Board of Governors.

Despite these successes, a group of safeguards experts recently cautioned that a determined country can still conceal a nuclear weapons program. IAEA faces a number of limitations that impact its ability to draw conclusions—with absolute assurance—about whether a country is developing a clandestine nuclear weapons program. For example, IAEA does not have unfettered inspection rights and cannot make visits to

suspected sites anywhere at any time. According to the Additional Protocol, complementary access to resolve questions related to the correctness and completeness of the information provided by the country or to resolve inconsistencies must usually be arranged with at least 24-hours advanced notice. Complementary access to buildings on sites where IAEA inspectors are already present are usually conducted with a 2-hour advanced notice. Furthermore, IAEA officials told us that there are practical problems that restrict access. For example, inspectors must be issued a visa to visit certain countries, a process which cannot normally be completed in less than 24 hours. In some cases, nuclear sites are in remote locations and IAEA inspectors need to make travel arrangements, such as helicopter transportation, in advance, which requires that the country be notified prior to the visit.

A November 2004 study by a group of safeguards experts appointed by IAEA's Director General evaluated the agency's safeguards program to examine how effectively and efficiently strengthened safeguards measures were being implemented. Specifically, the group's mission was to evaluate the progress, effectiveness, and impact of implementing measures to enhance the agency's ability to draw conclusions about the non-diversion of nuclear material placed under safeguards and, for relevant countries, the absence of undeclared nuclear material and activities. The group concluded that generally IAEA had done a very good job implementing strengthened safeguards despite budgetary and other constraints. However, the group noted that IAEA's ability to detect undeclared activities remains largely untested. If a country decides to divert nuclear material or conduct undeclared activities, it will deliberately work to prevent IAEA from discovering this. Furthermore, IAEA and member states should be clear that the conclusions drawn by the agency cannot be regarded as absolute. This view has been reinforced by the former Deputy Director General for Safeguards who has stated that even for countries with strengthened safeguards in force, there are limitations on the types of information and locations accessible to IAEA inspectors.

A Number of Weaknesses Impede IAEA's Ability to Effectively Implement Strengthened Safeguards

There are a number of weaknesses that hamper IAEA's ability to effectively implement strengthened safeguards. IAEA has only limited information about the nuclear activities of 4 key countries that are not members of the NPT—India, Israel, North Korea, and Pakistan. India, Israel, and Pakistan have special agreements with IAEA that limit the agency's activities to monitoring only specific material, equipment, and facilities. However, since these countries are not signatories to the NPT, they do not have comprehensive safeguards agreements with IAEA, and

are not required to declare all of their nuclear material to the agency. In addition, these countries are only required to declare exports of nuclear material previously declared to IAEA. With the recent revelations of the illicit international trade in nuclear material and equipment, IAEA officials stated that they need more information on these countries' nuclear exports. For North Korea, IAEA has even less information, since the country expelled IAEA inspectors and removed surveillance equipment at nuclear facilities in December 2002 and withdrew from the NPT in January 2003. These actions have raised widespread concern that North Korea diverted some of its nuclear material to produce nuclear weapons.

Another major weakness is that more than half, or 111 out of 189, of the NPT signatories have not yet brought the Additional Protocol into force, as of August 2006. (App. I lists the status of countries' safeguards agreements with IAEA). Without the Additional Protocol, IAEA must limit its inspection efforts to declared nuclear material and facilities, making it harder to detect clandestine nuclear programs. Of the 111 countries that have not adopted the Additional Protocol, 21 are engaged in significant nuclear activities,⁹ including Egypt, North Korea, and Syria.

In addition, safeguards are significantly limited or not applied in about 60 percent, or 112 out of 189, of the NPT signatory countries—either because they have an agreement (known as a small quantities protocol) with IAEA, and are not subject to most safeguards measures, or because they have not concluded a comprehensive safeguards agreement with IAEA. Countries with small quantities of nuclear material make up about 41 percent of the NPT signatories and about one-third of the countries that have the Additional Protocol in force. Since 1971, IAEA's Board of Governors has authorized the Director General to conclude an agreement, known as a small quantities protocol, with 90 countries and, as of August 2006, 78 of these agreements were in force. IAEA's Board of Governors has approved the protocols for these countries without having IAEA verify that they met the requirements for it. Even if these countries bring the Additional Protocol into force, IAEA does not have the right to conduct inspections or install surveillance equipment at certain nuclear facilities. According to IAEA and Department of State officials, this is a weakness in the agency's ability to detect clandestine nuclear activities or transshipments of nuclear material and equipment through the country. In September 2005, the

⁹IAEA defines a country with significant nuclear activities as one that has declared nuclear material in a facility or a location outside facilities.

Board of Governors directed IAEA to negotiate with countries to make changes to the protocols, including reinstating the agency's right to conduct inspections. As of August 2006, IAEA amended the protocols for 4 countries—Ecuador, Mali, Palau, and Tajikistan.

The application of safeguards is further limited because 31 countries that have signed the NPT have not brought into force a comprehensive safeguards agreement with IAEA. The NPT requires non-nuclear weapons states to conclude comprehensive safeguards agreements with IAEA within 18 months of becoming a party to the Treaty. However, IAEA's Director General has stated that these 31 countries have failed to fulfill their legal obligations. Moreover, 27 of the 31 have not yet brought comprehensive safeguards agreements into force more than 10 years after becoming party to the NPT, including Chad, Kenya, and Saudi Arabia.

Last, IAEA is facing a looming human capital crisis that may hamper the agency's ability to meet its safeguards mission. In 2005, we reported that about 51 percent, or 38 out of 75, of IAEA's senior safeguards inspectors and high-level management officials, such as the head of the Department of Safeguards and the directors responsible for overseeing all inspection activities of nuclear programs, are retiring in the next 5 years.¹⁰ According to U.S. officials, this significant loss of knowledge and expertise could compromise the quality of analysis of countries' nuclear programs. For example, several inspectors with expertise in uranium enrichment techniques, which is a primary means to produce nuclear weapons material, are retiring at a time when demand for their skills in detecting clandestine nuclear activities is growing. While IAEA has taken a number of steps to address these human capital issues, officials from the Department of State and the U.S. Mission to the U.N. System Organizations in Vienna have expressed concern that IAEA is not adequately planning to replace staff with critical skills needed to fulfill its strengthened safeguards mission.

¹⁰In 2004, the Department of Safeguards had 552 staff members. Of these, 251 were safeguards inspectors.

The Nuclear Suppliers Group Has Helped Stem Nuclear Proliferation, but Lack of Information Sharing on Nuclear Exports Between Members Could Undermine Its Efforts

The Nuclear Suppliers Group, along with other multilateral export control groups, has helped stop, slow, or raise the costs of nuclear proliferation, according to nonproliferation experts. For example, as we reported in 2002, the Suppliers Group helped convince Argentina and Brazil to accept IAEA safeguards on their nuclear programs in exchange for expanded access to international cooperation for peaceful nuclear purposes.¹¹ The Suppliers Group, along with other multilateral export control groups, has significantly reduced the availability of technology and equipment available to countries of concern, according to a State Department official. Moreover, nuclear export controls have made it more difficult, more costly, and more time consuming for proliferators to obtain the expertise and material needed to advance their nuclear program.

The Nuclear Suppliers Group has also helped IAEA verify compliance with the NPT. In 1978, the Suppliers Group published the first guidelines governing exports of nuclear materials and equipment. These guidelines established several member requirements, including the requirement that members adhere to IAEA safeguards standards at facilities using controlled nuclear-related items. Subsequently, in 1992, the Nuclear Suppliers Group broadened its guidelines by requiring that members insist that non-member states have IAEA safeguards on all nuclear material and facilities as a condition of supply for their nuclear exports. With the revelation of Iraq's nuclear weapons program, the Suppliers Group also created an export control system for dual-use items that established new controls for items that did not automatically fall under IAEA safeguards requirements.¹²

Despite these benefits, there are a number of weaknesses that could limit the Nuclear Suppliers Group's ability to curb nuclear proliferation. Members of the Suppliers Group do not share complete export licensing information. Specifically, members do not always share information about licenses they have approved or denied for the sale of controversial items to nonmember states. Without this shared information, a member country could inadvertently license a controversial item to a country that has already been denied a license from another Suppliers Group member state.

¹¹GAO, *Nonproliferation: Strategy Needed to Strengthen Multilateral Export Control Regimes*, GAO-03-43 (Washington, D.C.: Oct. 25, 2002).

¹²Previously, the Nuclear Suppliers Group control list included nuclear equipment and material, the export of which would trigger a requirement that IAEA safeguards apply to the recipient facility.

Furthermore, Suppliers Group members did not promptly review and agree upon common lists of items to control and approaches to controlling them. Each member must make changes to its national export control policies after members agree to change items on the control list. If agreed-upon changes to control lists are not adopted at the same time by all members, proliferators could exploit these time lags to obtain sensitive technologies by focusing on members that are slowest to incorporate the changes and sensitive items may still be traded to countries of concern.

In addition, there are a number of obstacles to efforts aimed at strengthening the Nuclear Suppliers Group and other multilateral export control regimes. First, efforts to strengthen export controls have been hampered by a requirement that all members reach consensus about every decision made. Under the current process, a single member can block new reforms. U.S. and foreign government officials and nonproliferation experts all stressed that the regimes are consensus-based organizations and depend on the like-mindedness or cohesion of their members to be effective. However, members have found it especially difficult to reach consensus on such issues as making changes to procedures and control lists. The Suppliers Group reliance on consensus decision making will be tested by the United States request to exempt India from the Suppliers Group requirements to accept IAEA safeguards at all nuclear facilities. Second, since membership with the Suppliers Group is voluntary and nonbinding, there are no means to enforce compliance with members' nonproliferation commitments. For example, the Suppliers Group has no direct means to impede Russia's export of nuclear fuel to India, an act that the U.S. government said violated Russia's commitment. Third, the rapid pace of nuclear technological change and the growing trade of sensitive items among proliferators complicate efforts to keep control lists current because these lists need to be updated more frequently.

To help strengthen these regimes, GAO recommended in October 2002, that the Secretary of State establish a strategy that includes ways for Nuclear Suppliers Group members to improve information sharing, implement changes to export controls more consistently, and identify organizational changes that could help reform its activities. As of June 2006, the Nuclear Suppliers Group announced that it has revised its guidelines to improve information sharing. However, despite our recommendation, it has not yet agreed to share greater and more detailed information on approved exports of sensitive transfers to nonmember countries.

Nevertheless, the Suppliers Group is examining changes to its procedures that assist IAEA's efforts to strengthen safeguards. For example, at the 2005 Nuclear Suppliers Group plenary meeting, members discussed changing the requirements for exporting nuclear material and equipment by requiring nonmember countries to adopt IAEA's Additional Protocol as a condition of supply. If approved by the Suppliers Group, the action would complement IAEA's efforts to verify compliance with the NPT.

U.S. Bilateral Assistance Programs Are Working to Secure Nuclear Materials and Warheads, Detect Nuclear Smuggling, Eliminate Excess Nuclear Material, and Halt Production of Plutonium, but Challenges Remain

Reducing the formidable proliferation risks posed by former Soviet weapons of mass destruction (WMD) assets is a U.S. national security interest. Since the fall of the Soviet Union, the United States, through a variety of programs, managed by the Departments of Energy, Defense (DOD), and State, has helped Russia and other former Soviet countries to secure nuclear material and warheads, detect illicitly trafficked nuclear material, eliminate excess stockpiles of weapons-usable nuclear material, and halt the continued production of weapons-grade plutonium. From fiscal year 1992 through fiscal year 2006, the Congress appropriated about \$7 billion for nuclear nonproliferation efforts.¹³ However, U.S. assistance programs have faced a number of challenges, such as a lack of access to key sites and corruption of foreign officials, which could compromise the effectiveness of U.S. assistance.

DOE's Material Protection, Control, and Accounting (MPC&A) program has worked with Russia and other former Soviet countries since 1994 to provide enhanced physical protection systems at sites with weapons-usable nuclear material and warheads, implement material control and accounting upgrades to help keep track of the quantities of nuclear materials at sites, and consolidate material into fewer, more secure buildings. GAO last reported on the MPC&A program in 2003.¹⁴ At that time, a lack of access to many sites in Russia's nuclear weapons complex had significantly impeded DOE's progress in helping Russia to secure its nuclear material. We reported that DOE had completed work at only a limited number of buildings in Russia's nuclear weapons complex, a

¹³This includes funding for nuclear security programs, but does not include funding for parts of DOD's Cooperative Threat Reduction program that work on demilitarization, chemical or biological weapons issues, or the destruction and dismantlement of weapons delivery systems.

¹⁴GAO, *Weapons of Mass Destruction: Additional Russian Cooperation Needed to Facilitate U.S. Efforts to Improve Security at Russian Sites*, [GAO-03-482](#) (Washington, D.C.: Mar. 24, 2003).

network of sites involved in the construction of nuclear weapons where most of the nuclear material in Russia is stored. According to DOE, by the end of September 2006, the agency will have helped to secure 175 buildings with weapons-usable nuclear material in Russia and the former Soviet Union and 39 Russian Navy nuclear warhead sites. GAO is currently re-examining DOE's efforts, including the progress DOE has made since 2003 in securing nuclear material and warheads in Russia and other countries and the challenges DOE faces in completing its work.

While securing nuclear materials and warheads where they are stored is considered to be the first layer of defense against nuclear theft, there is no guarantee that such items will not be stolen or lost. Recognizing this fact, DOE, DOD, and State, through seven different programs, have provided radiation detection equipment since 1994 to 36 countries, including many countries of the former Soviet Union. These programs seek to combat nuclear smuggling and are seen as a second line of defense against nuclear theft. The largest and most successful of these efforts is DOE's Second Line of Defense program (SLD). We reported in March 2006 that, through the SLD program, DOE had provided radiation detection equipment and training at 83 sites in Russia, Greece, and Lithuania since 1998. However, we also noted that U.S. radiation detection assistance efforts faced challenges, including corruption of some foreign border security officials, technical limitations of some radiation detection equipment, and inadequate maintenance of some equipment. To address these challenges, U.S. agencies plan to take a number of steps, including combating corruption by installing communications links between individual border sites and national command centers so that detection alarm data can be simultaneously evaluated by multiple officials.

The United States is also helping Russia to eliminate excess stockpiles of nuclear material (highly enriched uranium and plutonium). In February 1993, the United States agreed to purchase from Russia 500 metric tons of highly enriched uranium (HEU) extracted from dismantled Russian nuclear weapons over a 20-year period. Russia agreed to dilute, or blend-down, the material into low enriched uranium (LEU), which is of significantly less proliferation risk, so that it could be made into fuel for commercial nuclear power reactors before shipping it to the United States.¹⁵ As of June 27, 2006, 276 metric tons of Russian HEU—derived

¹⁵Formally known as "The Agreement Between the Government of the United States of America and the Government of the Russian Federation Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons" (Feb. 18, 1993).

from more than 11,000 dismantled nuclear weapons—have been downblended into LEU for use in U.S. commercial nuclear reactors. Similarly, in 2000, the United States and Russia committed to the transparent disposition of 34 metric tons each of weapon-grade plutonium. The plutonium will be converted into a more proliferation-resistant form called mixed-oxide (MOX) fuel that will be used in commercial nuclear power plants. In addition to constructing a MOX fuel fabrication plant at its Savannah River Site, DOE is also assisting Russia in constructing a similar facility for the Russian plutonium.

Russia's continued operation of three plutonium production reactors poses a serious proliferation threat. These reactors produce about 1.2 metric tons of plutonium each year—enough for about 300 nuclear weapons. DOE's Elimination of Weapons-Grade Plutonium Production program seeks to facilitate the reactors' closure by building or refurbishing two fossil fuel plants that will replace the heat and electricity that will be lost with the shutdown of Russia's three plutonium production reactors. DOE plans to complete the first of the two replacement plants in 2008 and the second in 2011. When we reported on this program in June 2004,¹⁶ we noted that DOE faced challenges in implementing its program, including ensuring Russia's commitment to shutting down the reactors, the rising cost of building the replacement fossil fuel plants, and concerns about the thousands of Russian nuclear workers who will lose their jobs when the reactors are shut down. We made a number of recommendations, which DOE has implemented, including reaching agreement with Russia on the specific steps to be taken to shut down the reactors and development of a plan to work with other U.S. government programs to assist Russia in finding alternate employment for the skilled nuclear workers who will lose their jobs when the reactors are shut down.

Mr. Chairman, this concludes my prepared statement. I would be pleased to respond to any questions you or other Members of the Subcommittee may have at this time.

¹⁶GAO, *Nuclear Nonproliferation: DOE's Effort to Close Russia's Plutonium Production Reactors Faces Challenges, and Final Shutdown Is Uncertain*, GAO-04-662 (Washington, D.C.: June 4, 2004).

Contacts and Staff Acknowledgments

For future contacts regarding this testimony, please contact Gene Aloise at (202) 512-3841 or Joseph Christoff at (202) 512-8979. R. Stockton Butler, Miriam A. Carroll, Leland Cogliani, Lynn Cothorn, Muriel J. Forster, Jeffrey Phillips, and Jim Shafer made key contributions to this testimony. Beth Hoffman León, Stephen Lord, Audrey Solis, and Pierre Toureille provided technical assistance.

Appendix I: Countries' Safeguards Agreements with IAEA, as of August 2006

State	Comprehensive Safeguards Agreement	Additional Protocol	Small Quantities Protocol
Non-nuclear weapons state			
Afghanistan	X	X	X
Albania	X		
Algeria	X		
Andorra			
Angola			
Antigua and Barbuda	X		X
Argentina	X		
Armenia	X	X	
Australia	X	X	
Austria	X	X	
Azerbaijan	X	X	X
Bahamas	X		X
Bahrain			
Bangladesh	X	X	
Barbados	X		X
Belarus	X		
Belgium	X	X	
Belize	X		X
Benin			
Bhutan	X		X
Bolivia	X		X
Bosnia and Herzegovina	X		
Botswana	X	X	
Brazil	X		
Brunei Darussalam	X		X
Bulgaria	X	X	
Burkina Faso	X	X	X
Burundi			
Cambodia	X		X
Cameroon	X		X
Canada	X	X	
Cape Verde			
Central African Republic			
Chad			

State	Comprehensive Safeguards Agreement	Additional Protocol	Small Quantities Protocol
Chile	X	X	
Colombia	X		
Comoros			
Costa Rica	X		X
Cote d'Ivoire	X		
Croatia	X	X	X
Cuba	X	X	
Cyprus	X	X	X
Czech Republic	X	X	
Democratic People's Republic of Korea ^a	X		
Democratic Republic of the Congo	X	X	
Denmark	X	X	
Djibouti			
Dominica	X		X
Dominican Republic	X		X
Ecuador	X	X	X
Egypt	X		
El Salvador	X	X	X
Equatorial Guinea			
Eritrea			
Estonia	X	X	
Ethiopia	X		X
Federated States of Micronesia			
Fiji	X	X	X
Finland	X	X	
The Former Yugoslav Republic of Macedonia	X		X
Gabon			
Gambia	X		X
Georgia	X	X	
Germany	X	X	
Ghana	X	X	
Greece	X	X	
Grenada	X		X
Guatemala	X		X
Guinea			
Guinea-Bissau			

State	Comprehensive Safeguards Agreement	Additional Protocol	Small Quantities Protocol
Guyana	X		X
Haiti	X	X	X
Holy See	X	X	X
Honduras	X		X
Hungary	X	X	
Iceland	X	X	X
Indonesia	X	X	
Iraq	X		
Ireland	X	X	
Islamic Republic of Iran	X		
Italy	X	X	
Jamaica	X	X	
Japan	X	X	
Jordan	X	X	X
Kazakhstan	X		
Kenya			
Kiribati	X		X
Kuwait	X	X	X
Kyrgyzstan	X		X
Latvia	X	X	
Lebanon	X		X
Lesotho	X		X
Liberia			
Libyan Arab Jamahiriya	X	X	
Liechtenstein	X		
Lithuania	X	X	
Luxembourg	X	X	
Madagascar	X	X	X
Malawi	X		X
Malaysia	X		
Maldives	X		X
Mali	X	X	X
Malta	X	X	X
Marshall Islands	X	X	
Mauritania			
Mauritius	X		X

State	Comprehensive Safeguards Agreement	Additional Protocol	Small Quantities Protocol
Mexico	X		
Monaco	X	X	X
Mongolia	X	X	X
Montenegro			
Morocco	X		
Mozambique			
Myanmar	X		X
Namibia	X		X
Nauru	X		X
Nepal	X		X
Netherlands	X	X	
New Zealand	X	X	X
Nicaragua	X	X	X
Niger	X		
Nigeria	X		
Norway	X	X	
Oman			
Palau	X	X	X
Panama	X	X	X
Papua New Guinea	X		X
Paraguay	X	X	X
People's Democratic Republic of Laos	X		X
Peru	X	X	
Philippines	X		
Poland	X	X	
Portugal	X	X	
Qatar			
Republic of the Congo			
Republic of Korea	X	X	
Republic of Moldova	X		X
Republic of Yemen	X		X
Romania	X	X	
Rwanda			
St. Kitts and Nevis	X		X
St. Lucia	X		X
St. Vincent and the Grenadines	X		X

State	Comprehensive Safeguards Agreement	Additional Protocol	Small Quantities Protocol
Samoa	X		X
San Marino	X		X
Sao Tome and Principe			
Saudi Arabia			
Senegal	X		X
Serbia	X		
Seychelles	X	X	X
Sierra Leone			
Singapore	X		X
Slovakia	X	X	
Slovenia	X	X	
Solomon Islands	X		X
Somalia			
South Africa	X	X	
Spain	X	X	
Sri Lanka	X		
Sudan	X		X
Suriname	X		X
Swaziland	X		X
Sweden	X	X	
Switzerland	X	X	
Syrian Arab Republic	X		
Tajikistan	X	X	X
Thailand	X		
Timor-Leste			
Togo			
Tonga	X		X
Trinidad and Tobago	X		X
Tunisia	X		
Turkey	X	X	
Turkmenistan	X	X	
Tuvalu	X		X
Uganda	X	X	X
Ukraine	X	X	
United Arab Emirates	X		X
United Republic of Tanzania	X	X	X

State	Comprehensive Safeguards Agreement	Additional Protocol	Small Quantities Protocol
Uruguay	X	X	
Uzbekistan	X	X	
Vanuatu			
Venezuela	X		
Vietnam	X		
Zambia	X		X
Zimbabwe	X		X
Nuclear weapons states with safeguards agreements in force			
China	X	X	
France	X	X	
Russian Federation	X		
United Kingdom	X	X	
United States of America	X		
States with special safeguards agreements			
India			
Israel			
Pakistan			

^aAlthough North Korea concluded a comprehensive safeguards agreement with IAEA in 1992, it announced its withdrawal from the NPT in January 2003.

Appendix II: Members of the Nuclear Suppliers Group, as of June 2006

1	Argentina	24	Latvia
2	Australia	25	Lithuania
3	Austria	26	Luxembourg
4	Belarus	27	Malta
5	Belgium	28	Netherlands
6	Brazil	29	New Zealand
7	Bulgaria	30	Norway
8	Canada	31	Poland
9	China	32	Portugal
10	Croatia	33	Romania
11	Cyprus	34	Russia
12	Czech Republic	35	Slovakia
13	Denmark	36	Slovenia
14	Estonia	37	South Africa
15	Finland	38	South Korea
16	France	39	Spain
17	Germany	40	Sweden
18	Greece	41	Switzerland
19	Hungary	42	Turkey
20	Ireland	43	Ukraine
21	Italy	44	United Kingdom
22	Japan	45	United States
23	Kazakhstan		

Source: Nuclear Suppliers Group Statement, Nuclear Suppliers Group Strengthening the Nuclear Non-Proliferation Regime, Brasilia, June 2, 2006.

Appendix III: Additional Information on U.S. Nuclear Nonproliferation Programs

Project	Description
Department of Energy Projects	
Global Radiological Threat Reduction	Secures radiological sources no longer needed in the U.S. and locates, identifies, recovers, consolidates, and enhances the security of radioactive materials outside the U.S.
Global Nuclear Material Threat Reduction	Eliminates Russia's use of highly enriched uranium (HEU) in civilian nuclear facilities; returns U.S. and Russian-origin HEU and spent nuclear fuel from research reactors around the world; secures plutonium-bearing spent nuclear fuel from reactors in Kazakhstan; and addresses nuclear and radiological materials at vulnerable locations throughout the world.
Elimination of Weapons-Grade Plutonium Production project	Provides replacement fossil-fuel energy that will allow Russia to shutdown its three remaining weapons-grade plutonium production reactors.
International Safeguards project	Develops and delivers technology applications to strengthen capabilities to detect and verify undeclared nuclear programs; enhances the physical protection and proper accounting of nuclear material; and assists foreign national partners to meet safeguards commitments.
Russian Transition Initiatives project	Provides meaningful employment for former weapons of mass destruction weapons scientists.
Nuclear Warhead Protection project	Provides material protection, control, and accounting upgrades to enhance the security of Navy HEU fuel and nuclear material.
Weapons Material Protection project	Provides material protection, control, and accounting upgrades to nuclear weapons, uranium enrichment, and material processing and storage sites.
Material Consolidation & Civilian Sites project	Enhances the security of proliferation-attractive nuclear material in Russia by supporting material protection, control, and accounting upgrade projects at Russian civilian nuclear facilities.
National Infrastructure & Sustainability project	Develops national and regional resources in the Russian Federation to help establish and sustain effective operation of upgraded nuclear material protection, control and accounting systems.
Second Line of Defense & Megaports Initiative project	Negotiates cooperative efforts with the Russian Federation and other key countries to strengthen the capability of enforcement officials to detect and deter illicit trafficking of nuclear and radiological material across international borders. This is accomplished through the detection, location and identification of nuclear and nuclear related materials, the development of response procedures and capabilities, and the establishment of required infrastructure elements to support the control of these materials.
HEU Transparency Implementation project	Monitors Russia to ensure that low enriched uranium (LEU) sold to the U.S. for civilian nuclear power plants is derived from weapons-usable HEU removed from dismantled Russian nuclear weapons.
Surplus U.S. HEU Disposition project	Disposes of surplus domestic HEU by down-blending it.
Surplus U.S. Plutonium Disposition project	Disposes of surplus domestic plutonium by fabricating it into mixed oxide (MOX) fuel for irradiation in existing, commercial nuclear reactors.
Surplus Russian Plutonium Disposition project	Supports Russia's efforts to dispose of its weapons-grade plutonium by working with the international community to help pay for Russia's program.

Project	Description
Department of Defense Projects	
Personnel Reliability and Safety	Provides training and equipment to assist Russia in determining the reliability of its guard forces.
Site Security Enhancements	Enhances the safety and security of Russian nuclear weapons storage sites through the use of vulnerability assessments to determine specific requirements for upgrades. DOD will develop security designs to address those vulnerabilities and install equipment necessary to bring security standards consistent with those at U.S. nuclear weapons storage facilities.
Nuclear Weapons Transportation	Assists Russia in shipping nuclear warheads to more secure sites or dismantlement locations.
Railcar Maintenance and Procurement	Assists Russia in maintaining nuclear weapons cargo railcars. Funds maintenance of railcars until no longer feasible, then purchases replacement railcars to maintain 100 cars in service. DOD will procure 15 guard railcars to replace those retired from service. Guard railcars will be capable of monitoring security systems in the cargo railcars and transporting security force personnel.
Weapons Transportation Safety Enhancements	Provides emergency response vehicles containing hydraulic cutting tools, pneumatic jacks, and safety gear to enhance Russia's ability to respond to possible accidents in transporting nuclear weapons. Meteorological, radiation detection and monitoring, and communications equipment is also included.

Source: GAO analysis.

Related GAO Products

Combating Nuclear Smuggling: Challenges Facing U.S. Efforts to Deploy Radiation Detection Equipment in Other Countries and in the United States. [GAO-06-558T](#). Washington, D.C.: March 28, 2006.

Combating Nuclear Smuggling: Corruption, Maintenance, and Coordination Problems Challenge U.S. Efforts to Provide Radiation Detection Equipment to Other Countries. [GAO-06-311](#). Washington, D.C.: March 14, 2006.

Nuclear Nonproliferation: IAEA Has Strengthened Its Safeguards and Nuclear Security Programs, but Weaknesses Need to Be Addressed. [GAO-06-93](#). Washington, D.C.: October 7, 2005.

Preventing Nuclear Smuggling: DOE Has Made Limited Progress in Installing Radiation Detection Equipment at Highest Priority Foreign Seaports. [GAO-05-375](#). Washington, D.C.: March 31, 2005.

Nuclear Nonproliferation: DOE's Effort to Close Russia's Plutonium Production Reactors Faces Challenges, and Final Shutdown is Uncertain. [GAO-04-662](#). Washington, D.C.: June 4, 2004.

Weapons of Mass Destruction: Additional Russian Cooperation Needed to Facilitate U.S. Efforts to Improve Security at Russian Sites. [GAO-03-482](#). Washington, D.C.: March 24, 2003.

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Nuclear Nonproliferation: Implications of the U.S. Purchase of Russian Highly Enriched Uranium. [GAO-01-148](#). Washington, D.C.: December 15, 2000.

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