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NUCLEAR NONPROLIFERATION

IAEA Has Strengthened Its Safeguards and Nuclear Security Programs, but Weaknesses Need to Be Addressed



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Highlights

Highlights of [GAO-06-93](#), a report to congressional requesters

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. IAEA has strengthened its safeguards system and increased efforts to combat nuclear terrorism by helping countries secure nuclear and radioactive material and facilities. This report (1) identifies the steps IAEA has taken to strengthen safeguards, (2) assesses the challenges in implementing strengthened safeguards, (3) identifies U.S. financial support for safeguards, and (4) describes IAEA's efforts to help secure nuclear material and facilities.

What GAO Recommends

GAO recommends, among other things, that the Department of State work with IAEA to consider (1) eliminating or reducing the number of agreements that limit IAEA's authority to implement strengthened safeguards in countries with small quantities of nuclear material, (2) establishing better measures to evaluate the effectiveness of safeguards and nuclear security activities, and (3) rectifying human capital practices that negatively impact IAEA's ability to recruit and retain critical safeguards staff. The Department of State generally agreed with our recommendations. IAEA provided technical comments, which we incorporated into the report.

www.gao.gov/cgi-bin/getrpt?GAO-06-93.

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 Has Strengthened Its Safeguards and Nuclear Security Programs, but Weaknesses Need to Be Addressed

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 rather than only verifying the peaceful use of a country's declared nuclear material. IAEA is also taking steps to improve the management of the safeguards program. However, despite successes in uncovering some countries' undeclared nuclear activities, safeguards experts cautioned that a determined country can still conceal a nuclear weapons program.

IAEA faces challenges that limit its ability to implement strengthened safeguards. First, about two-thirds of NPT signatories have not brought the Additional Protocol, which is designed to give the agency new authority to search for clandestine nuclear activities, into force. Second, safeguards are significantly limited or not applied to many NPT signatories because they possess small quantities of nuclear material or they have not concluded a comprehensive safeguards agreement. Third, 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. Finally, IAEA does not have a system in place to measure how effective its strengthened safeguards system is in detecting undeclared nuclear activities.

For 2004, the United States is providing \$45.3 million to support IAEA safeguards in assessed and voluntary cash contributions—over 34 percent of IAEA's safeguards budget. In addition, various U.S. agencies provided an estimated \$27.2 million in technical support. IAEA's reliance on voluntary contributions, particularly from the United States, will continue despite the agency's recent budget increase. Finally, the agency does not have a process in place to systematically evaluate long-term resource requirements.

IAEA has increased its efforts to help countries improve the physical protection of nuclear materials and facilities, secure other radioactive materials, and respond to acts of terrorism. In 2002, IAEA established a Nuclear Security Fund to which countries have voluntarily contributed \$36.7 million. However, IAEA's reliance on these voluntary funds creates budgetary challenges, and State Department officials raised concerns about the agency's inability to measure the results of its efforts.

IAEA Inspectors Performing Safeguards Duties



Source: IAEA.

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Abbreviations

DOD	Department of Defense
DOE	Department of Energy
EURATOM	European Atomic Energy Community
IAEA	International Atomic Energy Agency
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NRC	Nuclear Regulatory Commission
MOX	Mixed plutonium/uranium oxide fuel
POTAS	U.S. Program of Technical Assistance to IAEA Safeguards

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United States Government Accountability Office
Washington, D.C. 20548

October 7, 2005

The Honorable Norm Coleman
Chairman
Permanent Subcommittee on Investigations
Committee on Homeland Security and Governmental Affairs
United States Senate

The Honorable Bennie Thompson
Ranking Member
Committee on Homeland Security
House of Representatives

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. In February 2004, President Bush highlighted the proliferation dangers of nuclear weapons and called on the international community to support the International Atomic Energy Agency's (IAEA) strengthened safeguards measures.¹ 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.²

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

¹IAEA, an autonomous international organization affiliated with the United Nations, was established in Vienna, Austria, in 1957. The agency has the dual role of promoting the peaceful uses of nuclear energy by transferring nuclear science and technology through its nuclear science and applications and technical cooperation programs, and verifying, through its safeguards program, that nuclear materials subject to safeguards are not diverted to nuclear weapons or other proscribed purposes.

²Under 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.

facilities and locations containing nuclear material declared by countries to verify its peaceful use. Inspectors from IAEA's Department of Safeguards verify that the quantities of nuclear material that these non-nuclear weapons states declared to the agency have not been diverted for other uses. In addition, the agency installs containment and surveillance measures, such as video cameras, to detect movement of nuclear material and tampering with agency equipment. As of December 2004, 923 facilities and other locations containing about 164,000 metric tons of nuclear material were under safeguards. In 2004, IAEA's safeguards budget was approximately \$115.2 million, or about 38 percent of IAEA's total budget.

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 a two-stage process of strengthening its safeguards system to provide assurance that non-nuclear weapons states were not engaged in undeclared nuclear activities. First, in the early 1990s, IAEA began using its existing authority under safeguards agreements with individual countries to obtain additional information about states' nuclear and nuclear-related activities. Most countries have negotiated an agreement with IAEA, known as a comprehensive safeguards agreement. Second, in 1997, IAEA's Board of Governors approved what it called the "Model Additional Protocol," which, when brought into force, requires countries to provide the agency with a broader range of information on its nuclear and nuclear-related activities. It also gives the agency's inspectors access to an expanded range of declared activities and locations, including buildings at nuclear sites, and locations where undeclared activities are suspected. The Additional Protocol is a separate agreement, which supplements each country's existing safeguards agreement with IAEA.

In addition to its safeguards activities, IAEA has been called upon by its member states to confront the threat of nuclear terrorism. For example, since 1995, IAEA's nuclear security program has helped member states improve the security of their nuclear material by assessing the vulnerability of their nuclear facilities. Additionally, IAEA has helped states to meet their responsibilities under the Convention on the Physical Protection of Nuclear Material, which entered into force in 1987 and, among other things, binds its signatories to ensure certain levels of physical protection while transporting nuclear materials internationally. In light of the September 11, 2001 attacks, IAEA increased its nuclear security efforts by developing and updating physical protection guidelines and recommendations to help countries improve the security of their nuclear facilities and helping

countries install radiation detection equipment at their borders to try and prevent illicit trafficking of nuclear materials.

As the largest contributor to IAEA, the United States has a strong interest in supporting and improving IAEA's safeguards system and nuclear security activities to curb the spread of weapons of mass destruction. In July 1998, we reported that IAEA had tested and started to implement strengthened safeguards measures, but that it was too early to assess IAEA's progress.³ In this context, you asked us to review IAEA's safeguards and nuclear security activities. This report (1) identifies the steps IAEA has taken to strengthen its safeguards system, (2) assesses the challenges IAEA faces in implementing its strengthened safeguards measures, (3) identifies the extent to which IAEA relies on the United States for safeguards budgetary support, and (4) describes how IAEA is helping its member states secure their nuclear material and facilities and identifies challenges to implementing the program.

To address these objectives, we collected and analyzed documentation related to IAEA's safeguards and nuclear security programs from IAEA and U.S. agencies, including the Departments of Commerce, Defense (DOD), Energy (DOE), and State and the Nuclear Regulatory Commission (NRC). We also interviewed key IAEA and U.S. agency officials. In addition, we conducted structured interviews based on a nonprobability sample to obtain the views of representatives of nine IAEA member states—Canada, China, Germany, Hungary, Israel, Japan, Russia, the United Kingdom, and the United States—on IAEA's safeguards and nuclear security programs.⁴ This sample included states that belonged to IAEA's Board of Governors, both nuclear and non-nuclear weapons states, and states with special safeguards agreements with IAEA. We also analyzed budgetary information, performed a data reliability assessment of the data we obtained, and interviewed knowledgeable IAEA and U.S. officials on the reliability of the data. We determined that these data were sufficiently reliable for the purposes of this report. We conducted our work from October 2004 to August 2005 in accordance with generally accepted

³GAO, *Nuclear Nonproliferation: Uncertainties With Implementing IAEA's Strengthened Safeguards System*, [GAO/NSIAD/RCED-98-184](#) (Washington, D.C.: July 9, 1998).

⁴Results from nonprobability samples cannot be used to make inferences about a population, because in a nonprobability sample some elements of the population being studied have no chance or an unknown chance of being selected as part of the sample.

government auditing standards. Appendix I provides a more detailed discussion of our methodology.

Results in Brief

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. In addition, IAEA is trying to improve the efficiency of its efforts by applying integrated safeguards, which could result in a reduction in the number of inspections in certain countries. IAEA is also taking a number of steps to strengthen its management of the safeguards program. For example, current initiatives include developing multiyear strategic plans and modernizing the agency's safeguards information management system. Finally, although 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, IAEA's former Deputy Director General for Safeguards and a group of safeguards experts cautioned that a determined country can still conceal a nuclear weapons program.

IAEA faces a number of challenges that hamper its ability to effectively implement strengthened safeguards. First, about two-thirds, or 120 out of 189, of the NPT signatories have not yet brought the Additional Protocol into force, including the United States. Impediments to expanding adoption of the Additional Protocol include, among other things, the financial costs associated with implementing it. A second challenge to implementing strengthened safeguards is that safeguards are significantly limited or not applied in about 60 percent, or 113 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 non-peaceful purposes or engaging in secret nuclear activities. Third, 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 and a shrinking pool of nuclear experts limit IAEA's ability to implement strengthened safeguards. Further, personnel policies, such as a mandatory retirement age, impede IAEA's ability to hire and retain staff with critical safeguards skills. For example, IAEA would not hire one expert with unique skills in environmental sample analysis because he was over the agency's retirement age. Consequently, to retain his skills, the United States hired him as a part-time consultant to IAEA. Finally, IAEA does not have a system in place to measure how effective its strengthened safeguards system is in detecting undeclared nuclear activities.

IAEA relies heavily on the United States to meet its safeguards obligations, and this situation is likely to continue despite IAEA's recent budget increase. For 2004, the United States is providing \$45.3 million to support IAEA's safeguards program in assessed and voluntary cash contributions—over 34 percent of IAEA's total safeguards budget. In addition, in 2004, the U.S. Departments of State, Energy, and Defense and the Nuclear Regulatory Commission provided an estimated \$27.2 million in technical support for activities such as analyzing environmental samples to detect the presence of nuclear material. In 2004, IAEA's safeguards budget was increased for the first time in 20 years (beyond adjustments for inflation and staff salaries) by about \$19 million to be phased in over a 4-year period. However, despite this increase, U.S. and IAEA officials said that IAEA is likely to continue to rely on voluntary contributions—in particular, those from the United States—to meet critical needs because of the agency's growing responsibilities under strengthened safeguards. Finally, IAEA does not have a process to systematically evaluate resource requirements more than 2 years into the future or develop reliable estimates of the costs of all its safeguards activities. Without a systematic process to evaluate requirements and their costs over the long term, IAEA cannot make a convincing case to its member states that the agency requires additional resources.

In the aftermath of September 11, 2001, IAEA increased its efforts to help countries improve the physical protection of nuclear material and facilities, secure other radioactive materials, and respond to malicious acts or threats. However, IAEA's reliance on voluntary funds for these efforts creates challenges, and Department of State officials raised concerns about the agency's inability to measure the results of its efforts. Specifically, to help countries improve their nuclear security, IAEA, among other things,

assesses the vulnerability of facilities to better protect them against sabotage and helps provide radiation detection equipment to prevent illicit trafficking in nuclear and radioactive materials. In 2002, IAEA established a Nuclear Security Fund to support these activities, and countries provided about \$36.7 million as of mid-May 2005. However, IAEA relies on this voluntary support for about 89 percent of its nuclear security funding, which creates a budgetary challenge to long-term planning because funding levels vary from year to year. Furthermore, in 2003, over 94 percent of these funds were earmarked by donors for specific activities. As a result, IAEA does not have the flexibility to allocate contributions to meet its highest priority needs. In addition, Department of State officials raised concerns about IAEA's inability to track the use of nuclear security funds and measure achievements in a systematic way. In response, IAEA developed a system to monitor and report on program expenditures. However, IAEA still does not systematically measure the impact of its nuclear security activities.

To help strengthen IAEA's safeguards system and nuclear security program, this report makes several recommendations. We recommend, among other things, that the Secretary of State, working with IAEA and its member states through the Board of Governors, consider (1) eliminating, or at a minimum, reducing the number of agreements, which limit IAEA's authority to implement strengthened safeguards activities in countries with small quantities of nuclear material; (2) establishing clear and meaningful measures to better evaluate the effectiveness of safeguards and nuclear security activities; and (3) rectifying human capital practices that negatively impact IAEA's ability to recruit and retain critical safeguards staff.

We provided the Department of State and IAEA with draft copies of this report for their review and comment. IAEA provided technical comments, which we incorporated as appropriate. In its written comments, the Department of State generally agreed with our findings, conclusions, and recommendations and noted that our recommendations offered reasonable ways that the administration can continue to work with IAEA to improve its effectiveness. State also noted that the draft report fairly recognized the significant progress IAEA has made, with support from the United States and other member states, in strengthening the safeguards system and in supporting international efforts to improve the physical protection and security of nuclear materials. State also provided technical comments, which we incorporated in the report as appropriate.

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. A Secretariat, headed by the Director General, is responsible for 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 funds its programs through its regular budget, for which all members are assessed, and by voluntary cash contributions and technical support from member states, including the United States. U.S. policy regarding the agency is developed by an interagency process chaired by the Department of State. The U.S. Mission to the U.N. System Organizations in Vienna, Austria, works closely with the department in Washington, D.C., to promote the effective function of the agency, including management reform.

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.⁵ 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.⁶

⁵Regional 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.

⁶Nuclear materials include source materials, such as natural uranium, depleted uranium, and thorium, and special fissionable materials, such as enriched uranium and plutonium.

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 have 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. II lists states that are subject to safeguards, as of July 2005.)

As of July 2005, all but four countries with significant nuclear activities had comprehensive safeguards agreements with IAEA in force. India, Israel, and Pakistan are not parties to the NPT or other regional nonproliferation treaties.⁷ As a result, they do not have comprehensive safeguards agreements with IAEA. Instead, these three states have IAEA safeguards agreements that limit the scope of the agency's safeguards activities to specific material, equipment, and facilities. India and Pakistan are known to have nuclear weapons programs and to have detonated several nuclear devices during 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

⁷Previously, Cuba was included in this group of states; however, Cuba acceded to the NPT, effective November 4, 2002, and to the Tlatelolco Treaty, effective October 23, 2002. Cuba signed a comprehensive safeguards agreement on September 18, 2003, which was brought into force June 3, 2004.

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.

In addition to IAEA's long-standing role in safeguarding nuclear materials, it has undertaken efforts to assist states in better securing their nuclear materials. In 1972, IAEA issued a set of guidelines that outlined the minimum standards for ensuring the physical protection of nuclear materials. Following the breakup of the Soviet Union, concern about smuggling nuclear and other radioactive materials increased. In 1992, IAEA started assisting former Soviet states to enhance the security of their nuclear materials. IAEA also established a database to systematically collect information on reported incidents of trafficking in radioactive materials. Additionally, in 1994, the Board of Governors agreed to enhance the services that IAEA could offer countries to improve the protection of nuclear material and to detect and suppress trafficking of nuclear materials. For example, in 1996, IAEA started conducting advisory missions at states' request that involved assessing the physical protection of nuclear materials at a facility.

IAEA Has Taken Steps to Strengthen Safeguards, but Detecting Clandestine Nuclear Weapons Programs Is Not Assured

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. IAEA is trying to improve the efficiency of its efforts by applying integrated safeguards which could result in a reduction in the number of inspections in countries that have a proven record of complying with safeguards. In addition, the agency is taking a number of steps to strengthen its management of the safeguards program. Finally, 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. However, a group of safeguards experts recently cautioned that a determined country can still conceal a nuclear weapons program.

Strengthened Safeguards Have Broadened IAEA's Focus to Examine All Nuclear Activities in a Country

Over the past decade, IAEA has taken steps to strengthen its safeguards system to detect clandestine nuclear activities. These strengthened safeguards are a radical departure from the agency's traditional safeguards approach, which focused on verifying that declared nuclear material at specific facilities or locations in a country had not been diverted for nuclear weapons. While the strengthened safeguards system continues to rely on traditional nuclear material accountancy, and containment and surveillance measures to ensure declared material is not diverted, IAEA has broadened its focus from declared nuclear materials to a more comprehensive assessment 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 at declared nuclear facilities and include (1) conducting short notice and unannounced inspections, (2) taking location-specific environmental samples inside facilities 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. IAEA reported that in 2004 it performed 2,302 inspections at 598 facilities and other locations and took 590 environmental samples at 90 facilities. In addition, by June 2004, it had installed 91 unattended monitoring systems in 44 nuclear facilities.

The second series of steps under strengthened safeguards began in 1997 when IAEA's Board of Governors approved the Additional Protocol.⁸ The Additional Protocol is designed to supplement countries' safeguards agreements by requiring countries to provide IAEA with broader information on and access to nuclear and nuclear-related activities. Because the Additional Protocol broadens IAEA's authority and the requirements on countries under existing comprehensive safeguards agreements, each country must take certain actions to bring it into force. Under the Additional Protocol, IAEA has the right to

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

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- receive more comprehensive information from a country about all aspects of its nuclear fuel cycle,⁹ including information about research and development on the fuel cycle, the manufacturing and exporting of sensitive and other key nuclear-related equipment, and all buildings on a nuclear site, and compare this information with information from other sources;
 - conduct “complementary access,” which enables IAEA to expand its inspection rights for the purpose of ensuring the absence of undeclared nuclear material and activities; and
 - collect environmental samples beyond declared nuclear facilities, when deemed necessary.

When IAEA can use the full range of strengthened safeguards measures (under a comprehensive safeguards agreement and the Additional Protocol), the agency can provide assurances that all declared nuclear material is being used for peaceful purposes and that a country has declared all of its nuclear material or activities, as required. In 2004, the agency reported that comprehensive safeguards agreements with the Additional Protocol were implemented in 61 countries and Taiwan,¹⁰ and that

- for 21 countries, there was no indication of the diversion of nuclear material placed under safeguards and no indication of undeclared nuclear material or activities for the country as a whole. On this basis, IAEA concluded that all nuclear material in these countries remained in peaceful use or was otherwise adequately accounted for;
- for an additional 37 countries (plus Taiwan), there was no indication of the diversion of nuclear material placed under safeguards, and evaluations aimed at drawing conclusions about the absence of undeclared nuclear material and activities had not been completed; and

⁹There are several steps in the nuclear fuel cycle. The front end of the fuel cycle includes uranium mining and milling, conversion, enrichment, and fuel fabrication. Once uranium becomes spent fuel (after being used to produce electricity), the back end of the cycle follows. This may include temporary storage, reprocessing, recycling, and waste disposal.

¹⁰Although IAEA does not officially recognize Taiwan, the agency applies safeguards there, including measures under a comprehensive safeguards agreement and the Additional Protocol.

-
- three countries (Iran, Libya, and South Korea) were engaged in previously undisclosed nuclear activities and therefore were not complying with their respective safeguards agreements. Although Iran and Libya have not formally brought the Additional Protocol into force, they have informed IAEA that they are acting as if the agreement has been implemented.

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. Major sources of information available to the agency include data submitted by countries to IAEA under their safeguards agreements—referred to as state declarations—and information from internal IAEA databases, open sources, third parties, and IAEA inspections. Countries are required to provide an expanded declaration of their nuclear activities under the Additional Protocol 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 nuclear site; the location and operational status of uranium mines; and the quantities, uses, and locations of nuclear material exempted from safeguards. 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. A confidential document, known as a state evaluation report, serves as the basis of IAEA's assessment of a country's compliance with its safeguards commitments.

State evaluations are central to the process by which safeguards conclusions are drawn. For a state with an Additional Protocol in force, drawing the initial broader conclusion regarding the absence of undeclared nuclear material and activities for the country as a whole can take several years to complete depending on (1) the size of a country's nuclear program, (2) whether there are gaps in the data submitted by the country, and (3) whether there are inconsistencies between the country's declaration and IAEA's independent evaluation of that country's nuclear program. IAEA officials told us that the agency took 5 years to draw the initial broader safeguards conclusion for Japan because of the volume of information contained in Japan's declaration and the magnitude of its nuclear

program.¹¹ Drawing the initial broader safeguards conclusion for Canada is also expected to take a similar amount of time because of the size of its nuclear program. State evaluation reports are updated annually for a country after the Additional Protocol is in force. In 2004, 76 evaluation reports were completed and reviewed, including 55 for countries that had additional protocols in force or were acting as if they did.

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 an 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.

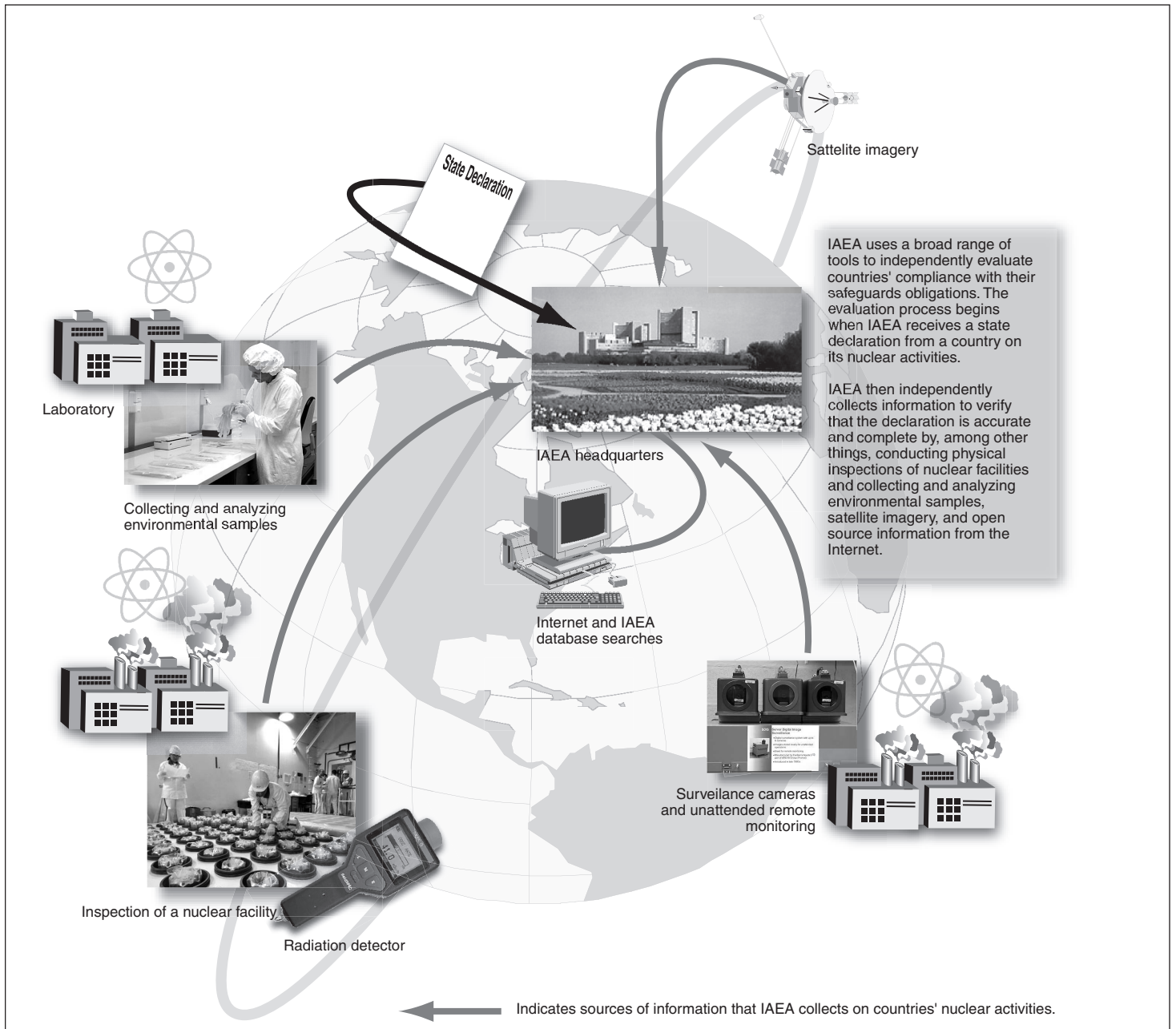
In addition to its verification activities, IAEA uses other sources of information to evaluate countries' declarations. These sources include information from the agency's internal databases, open sources, satellite imagery, and outside groups. The agency established two new offices within the Department 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

¹¹About one-third of Japan's electricity is generated by nuclear power. Japan has been engaged in fuel reprocessing and the recycling of plutonium in mixed plutonium/uranium oxide (MOX) fuel for approximately 20 years to develop its nuclear fuel cycle. Japan is expanding this capability with the construction and commissioning of the commercial-scale Rokkashomura reprocessing plant in northern Japan. This fully integrated nuclear fuel cycle center will perform spent fuel receipt, storage, reprocessing, high-level waste treatment and MOX-fuel fabrication. Uranium enrichment is carried out at the same site.

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 such as other countries.

Figure 1 shows the types of information IAEA uses to verify a country's compliance with its safeguards obligations.

Figure 1: Types of Information Used by IAEA to Verify Countries' Compliance with Their Safeguards Obligations



Source: GAO analysis of IAEA data; photos Dean Calma, IAEA.

To further enhance its capability to detect undeclared nuclear material and activities, IAEA collects information about clandestine networks that are engaged in the illicit trafficking of nuclear material and equipment. In 2004, the agency established the Nuclear Trade Analysis Unit that is responsible for investigating and obtaining information about clandestine networks. The unit's mission includes maintaining institutional memory of nuclear supply networks, centralizing the analysis of covert nuclear technology networks, and supporting IAEA's reviews of state evaluations. Some information used by the unit is derived from safeguards reports routinely submitted to the agency, such as state declarations.

IAEA is seeking to streamline and make the safeguards system more efficient by applying integrated safeguards. Integrated safeguards are applied in countries (1) that have brought the Additional Protocol into force and complied with all its requirements; (2) where IAEA, through complementary access and other means, has resolved any questions or inconsistencies regarding nuclear activity in these countries; and (3) where IAEA has concluded that there has been no diversion of nuclear material and no indication of undeclared nuclear material or activities. As of July 2005, IAEA was applying integrated safeguards in eight countries—Australia, Bulgaria, Hungary, Indonesia, Japan, Norway, Peru, and Uzbekistan. For these countries, IAEA has reduced the number of routine, scheduled inspections at certain types of facilities, such as light water reactors and low enriched uranium conversion plants. Agency officials told us that they anticipate cost-savings resulting from the implementation of integrated safeguards, which will free up resources for increased activities in countries where significant questions and inconsistencies arise.

Although the U.S. government supports the introduction of integrated safeguards, some concerns have been raised about its implementation. According to Department of State officials, it is essential that integrated safeguards not compromise the underlying foundation of safeguards—routine inspections of nuclear facilities. Verifying that declared quantities of nuclear material are accounted for and remain under safeguards continues to be the fundamental basis for reaching safeguards conclusions that countries are not diverting nuclear material for clandestine activities. Department of State officials said that integrated safeguards should be applied slowly and systematically to ensure that the safeguards system remains credible.

IAEA Is Taking Steps to Improve the Management of the Safeguards System

IAEA has several management initiatives under way to support the strengthened safeguards system, including (1) developing multi-year strategic plans, (2) modernizing the agency's safeguards information management system, (3) improving the agency's coordination of efforts to develop and procure equipment and technology, and (4) expanding the inspector training program. IAEA has developed 5-year medium-term strategies that identify specific goals and objectives for critical agency missions, including safeguards. IAEA's strategy for 2006-2011 calls for the agency's safeguards system to be further strengthened and its capability to detect undeclared nuclear material and activities increased. In addition, the strategy calls for IAEA to continue to utilize new sources of information to help ensure that countries are not engaged in clandestine nuclear activities. According to IAEA officials, the strategy requires safeguards program managers to identify how their specific activities fit into the agency's overall strategic objectives and medium term plan. These managers are required to plan and request funding based on the objectives identified in the medium-term strategies.

Another important initiative is IAEA's efforts to re-engineer the agency's information management system. This system serves as the central repository for all safeguards information, and it is used to generate reports for safeguards inspectors and IAEA management. According to U.S. and IAEA officials, the information management system, which started operation in the late 1970s, is outdated and needs to be modernized. As currently configured, IAEA inspectors and safeguards personnel cannot easily use the system for analytical purposes because there is no centralized database. With data stored in over 40 different databases, the agency dedicates significant amounts of time and funds to train staff on how to store and retrieve information. The project to modernize the safeguards information management system is expected to take about 3-1/2 years to complete and cost over \$30 million. IAEA plans to finance the project through its regular budget and member states' voluntary contributions. However, sustained U.S. support for the project, which IAEA expects to amount to at least 50 percent of the total planned voluntary cash contributions, is uncertain. In May 2004, the former U.S. ambassador to the U.S. Mission to the U.N. Systems Organization in Vienna said that the United States could not commit to pledging continued support for the project due to, among other things, the lack of contributions by other countries. He noted that nuclear nonproliferation is a global problem and that the United States expects IAEA to work with other member states to secure funding for the project. However, at the time of our review, only the

United States, Germany, the Czech Republic, and the United Kingdom had pledged voluntary contributions to fund the project.

In 2001, the Department of Safeguards took steps to improve its equipment management process. As part of this initiative, IAEA's equipment coordination committee was reorganized to improve its effectiveness. The committee reviews, prioritizes, and approves equipment and technology needs for all divisions within the department. The committee also reviews and approves any equipment-related research and development projects. IAEA and U.S. government officials told us that the equipment management process has helped the agency improve coordination among member states to better plan for the more efficient use of funds. In addition, IAEA has generated 2-year program plans to help coordinate funding to implement projects and develop equipment. For example, in its most recent plan, IAEA identified major priorities, including developing technology that detects undeclared nuclear activities and re-engineering its safeguards information management system.

Finally, IAEA officials told us they recognize that the expansion of inspectors' responsibilities under strengthened safeguards, in combination with advanced safeguards equipment and new technology, significantly increases the amount of training inspectors need. IAEA's goal is to provide the best training possible to ensure that inspectors' skills are continuously improved to maintain high standards of performance, enhance credibility, and promote a sense of professionalism among the staff. Inspectors must develop expertise in many new areas while maintaining competence in the application of material accountancy measures. As a result, IAEA has updated its training curriculum and continued the development and implementation of advanced and refresher training on strengthened and integrated safeguards measures, the Additional Protocol, and the use of new and upgraded containment and surveillance equipment. In 2005, the agency introduced a qualification process to ensure that all inspectors have the necessary knowledge and skills to perform their jobs at an acceptable level. Training also includes courses to strengthen analytical skills, including enhanced communication, observation, and writing skills. Initially, a new inspector performs verification duties in the field under the supervision of a more experienced inspector. Once an inspector becomes fully qualified to independently conduct inspections, additional training is required to maintain skills.

Despite IAEA's recent efforts to strengthen its training program, it is uncertain the extent to which training alone will adequately prepare

inspectors for their expanding responsibilities under strengthened safeguards. For example, U.S. safeguards experts, including a former IAEA inspector, raised concerns about the adequacy of training. One former inspector told us that all “in-house” training is done in English, the official working language of the agency. However, she noted that this makes it difficult for some inspectors who do not have a good grasp of English to fully absorb and understand the training materials and oral presentations. In addition, this official said that IAEA has not implemented a good system to provide mentors to new inspectors who need practical hands-on experience when they are in the field performing inspections. Brookhaven National Laboratory officials, who are responsible for managing the U.S. Program of Technical Assistance to IAEA Safeguards (POTAS), told us that many of the best qualified training instructors are leaving IAEA either through retirement or attrition. In addition, many of these instructors, who are also full-time inspectors, are facing increased workloads under strengthened safeguards and have less time to teach. Instructor staffing difficulty combined with expanding inspector responsibilities has created a gap in the effective transfer of knowledge and experience provided to entry-level inspectors.

Strengthened Safeguards Result in Discoveries of Some Countries’ Undisclosed Activities but System Has Limitations

IAEA’s strengthened safeguards system has produced tangible benefits as some countries’ previously undeclared nuclear activities have been disclosed. In particular, U.S. and IAEA officials noted that in the cases of Iran, South Korea, and Egypt, strengthened safeguards has surfaced undeclared activities requiring further investigation and clarification by the agency. Specifically:

- IAEA and Department of State officials noted that strengthened safeguards have helped the agency verify Iran’s nuclear activities, although many questions about that country’s nuclear program have not been resolved. In late 2003, Iran agreed to act as if the Additional Protocol were in force. Iran’s acceptance of the Additional Protocol has enabled the agency to gain increased access to Iran’s nuclear activities. Iran subsequently submitted a declaration of its nuclear activities, and IAEA has undertaken numerous inspections, conducted complementary access on numerous occasions, and prepared several status reports of its findings and concerns for its Board of Governors. In 2004, the agency completed four reports on the status of its efforts in Iran. IAEA noted that Iran had been providing information in response to the agency’s requests, but in some cases, the information was presented too slowly and did not fully meet the agency’s needs. IAEA noted that it is not yet

prepared to draw definitive conclusions regarding the correctness and completeness of Iran's declarations, but the agency continues to make steady progress in understanding the program. IAEA also noted that it had been able to verify Iran's suspension of enrichment-related activities at specific facilities and sites, but key issues still remained regarding the extent and nature of Iran's enrichment program. Further, the agency stated in its report to the board that it was important for Iran to support the agency's efforts to gain a full understanding of all remaining issues by continuing to provide access to locations, personnel, and relevant information in order to meet its safeguards obligations.

- 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. Specifically, South Korea told the agency that the experiments had been on a laboratory scale, involved the production of only milligram quantities of enriched uranium, and that these activities had been terminated. Subsequently, 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 involving uranium extraction, conversion, and reprocessing at least 20 years ago. According to available reports, Egypt used 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 to its Board of Governors on these activities in February 2005, but has not drawn any final conclusions or made recommendations.

Although the strengthened safeguards system has helped IAEA obtain information about some countries' previously undisclosed nuclear activities, and provided assurances that other countries are not engaged in clandestine activities, the system has limitations. These limitations impact the agency's 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 that cannot normally be arranged 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.

IAEA's environmental sampling activities, which play a key role in detecting undeclared nuclear material and activities, are limited as well in two main areas. First, IAEA relies on a consortium of laboratories located in eight countries, including the United States, known as the Network of Analytical Laboratories, to analyze environmental samples it obtains. However, according to IAEA and U.S. officials, the network is being used beyond its capacity to analyze the significant increase in the number of samples collected from Iran and Libya. IAEA noted that the number of samples collected from those two countries from 2003 to 2004 increased by about 100 samples during the year. The strain on the network's capacity has had a negative impact on the timely processing and reporting of results from environmental samples being collected. Officials from the Department of Defense and the U.S. Air Force Technical Applications Laboratory, which is responsible for analyzing the majority of environmental samples, told us that some samples received from IAEA have taken as long as 6 months to analyze. Even if a sample is a high priority, it takes at least 3 weeks, and the average time to analyze a sample is 2 to 3 months. As a result, critical, time sensitive analyses are not being completed on a consistent basis. According to IAEA officials, IAEA needs to increase the capacity of the network to analyze more samples as more states bring the Additional Protocol into force.

Second, an environmental sampling technique, which is known as wide area sampling, can only be used when approved by the Board of Governors. Wide area sampling, if implemented, would enable the agency to collect environmental data from soil, rivers, and streams outside of declared nuclear facilities. However, it has not been approved by the board because, among other reasons, wide area sampling requires reductions in cost before it would be practical, according to U.S. and international experts.

Finally, 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 nondiversion 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.

IAEA Faces Challenges That Impede Its Ability to Effectively Implement Strengthened Safeguards

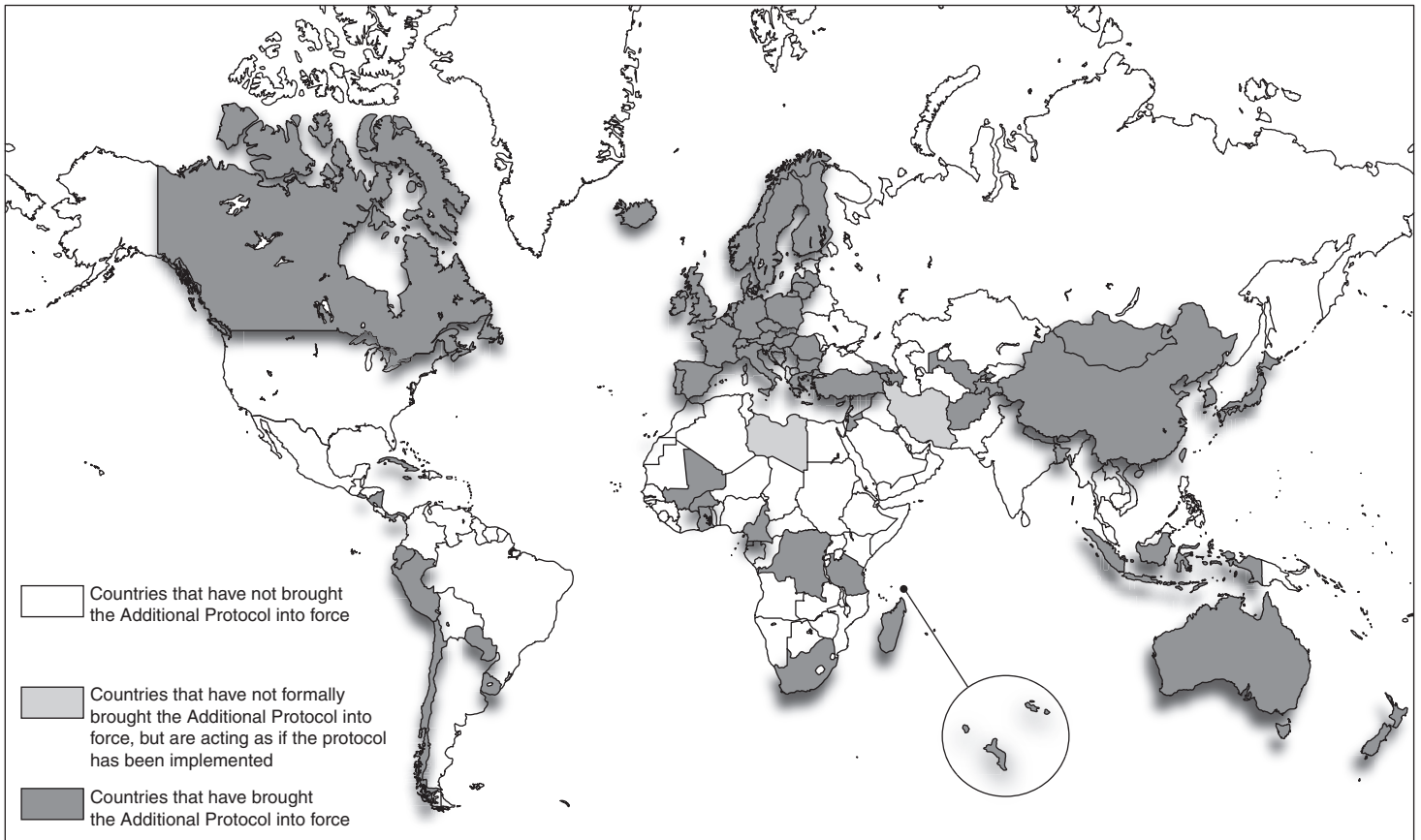
IAEA faces a number of challenges that hamper its ability to effectively implement strengthened safeguards. First, about two-thirds, or 120 out of 189, of the NPT signatories have not yet brought the Additional Protocol into force, including the United States. A second challenge is that safeguards are significantly limited or not applied in about 60 percent, or 113 out of 189, of the NPT signatory countries either because they possess small quantities of nuclear material—and are not subject to most safeguards measures—or 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. Third, IAEA faces 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, a shrinking pool of nuclear experts, and restrictive personnel policies, such as a mandatory retirement age, impede IAEA's ability to hire and retain staff with critical skills. Finally, IAEA does not have a system in place to measure how effective its strengthened safeguards system is in detecting undeclared activities.

IAEA's Ability to Detect Clandestine Nuclear Activities Is Limited because Many Countries Have Not Adopted the Additional Protocol

One of the major challenges IAEA faces in implementing strengthened safeguards is increasing the number of countries that bring the Additional Protocol into force, which would greatly expand the agency's access to countries' nuclear programs. Without the Additional Protocol in force, IAEA has limited ability to detect clandestine nuclear programs, and its inspection efforts remain focused on declared nuclear material and facilities. Of the 189 countries that have signed the NPT, 120 (or 63 percent) have not brought the Additional Protocol into force, including two of the five nuclear weapons states—the United States and Russia. Figure 2 shows the countries that have brought the Additional Protocol into force worldwide.

Figure 2: Status of the Additional Protocol by Country



Source: GAO analysis of IAEA data, MapArt.

Of the 120 countries that have not adopted the Additional Protocol, 28 are engaged in significant nuclear activities,¹² including Argentina, Brazil, Egypt, North Korea, and Syria. Moreover, although Iran and Libya have allowed IAEA to investigate their past nuclear activities as if the Additional Protocol were in force, IAEA cannot fully implement all strengthened safeguards measures, such as unannounced inspections—an important tool in detecting illicit activities. Lastly, while 69 countries have brought the

¹²IAEA defines a country with significant nuclear activities as one that has declared nuclear material in a facility or a location outside facilities.

Protocol into force, U.S. officials said that many of these countries do not pose a significant nuclear proliferation risk.

IAEA has recognized that progress in getting countries to adopt the Additional Protocol since it was approved by the Board of Governors in 1997 has been slow. In response, the agency has increased its efforts to encourage countries to adopt the Additional Protocol. In 2001, IAEA developed and began to implement a strategy to promote the implementation of the Additional Protocol through a number of outreach efforts, which included providing experts to assist countries in preparing their state declarations of nuclear activities and sponsoring technical workshops and seminars. For example, in 2004, IAEA sponsored seven training events at the national, regional, and international levels to improve countries' nuclear material accounting and to explain what countries' obligations would be under the Additional Protocol. Since IAEA implemented its strategy, 51 countries have brought the Additional Protocol into force. Further, in 2004, the United States, with support from the other G-8 group of countries, the European Union, and IAEA, sent demarches (or official requests) to 72 countries to urge them to bring the Additional Protocol into force and provide information on their efforts to bring it into force. The Department of State received responses from 47 countries. Finally, in an effort to draw attention to countries that have not brought the Additional Protocol into force, IAEA has begun to list their names in its yearly safeguards report to the Board of Governors.

Despite these efforts, the agency faces a number of challenges in getting more countries to adopt the Additional Protocol. According to responses to the Department of State's demarches and discussions with U.S. and IAEA officials, some member states are hesitant to implement the Additional Protocol because of (1) concerns about the financial costs associated with it; (2) an unwillingness to submit to an intrusive inspection regime; (3) their inadequate regulatory systems to collect information on all nuclear-related activities; and (4) political factors, such as the time needed for national legislatures to approve the Additional Protocol. For example:

- Brazil has delayed signing, stating that the measures under the Additional Protocol do not need to be universally applied to all countries and that inspections and IAEA requests for information are overly intrusive;

-
- Egypt will not bring the Additional Protocol into force until Israel signs the NPT, concludes a comprehensive safeguards agreement, and implements the Additional Protocol; and
 - Serbia and Montenegro's national legislature has to approve the Additional Protocol before it can proceed with developing an adequate nuclear regulatory system.

In addition, the United States has been slow to bring its Additional Protocol into force. According to IAEA officials, this presents a challenge because it weakens U.S. efforts to encourage other countries to bring their additional protocols into force. Although the United States signed its Additional Protocol in June 1998, the U.S. Senate did not provide its advice and consent until March 2004—a first step toward U.S. ratification of the Protocol.¹³ As a condition for ratifying the Protocol to make it legally binding on the United States, the Senate directed the President to meet certain conditions, including completing vulnerability assessments of U.S. nuclear facilities and developing regulations that limit or exempt certain nuclear facilities from IAEA inspections where those inspections could compromise sensitive proprietary or national security information.

Since March 2004, the Departments of State, Energy, Commerce, and Defense and the Nuclear Regulatory Commission have been involved in outreach, data collection, and other tasks, such as developing regulations for commercial nuclear facilities and completing vulnerability assessments, to meet the Senate's conditions for ratification. Once the conditions are met, the President must ratify the Protocol in order to bring it into force. In addition, before the regulations to implement the Protocol can be published, U.S. officials said that Congress must pass legislation that establishes the legal framework for U.S. agencies to collect information on commercial nuclear activities and facilities, and grant access to IAEA inspectors. U.S. officials told us that adopting the Additional Protocol would underscore U.S. support for IAEA's strengthened safeguards system and make U.S. efforts to encourage more countries to adopt the Additional Protocol more effective and credible. However, according to officials from the Departments of Commerce, Defense, Energy, and State and the Nuclear Regulatory Commission, there is no specific time frame for meeting the Senate's conditions for ratification.

¹³The U.S. Senate must consent to all international treaties before they enter into force.

IAEA Safeguards Are Significantly Limited or Not Applied in More than Half of the NPT Signatories

A second major challenge hampering IAEA's ability to implement strengthened safeguards is that safeguards are significantly limited or not applied to about 60 percent, or 113 out of 189, of the NPT signatories: 76 countries with agreements (known as small quantities protocols) in force that limit the agency's ability to implement most strengthened safeguards measures and 37 countries that have not concluded a comprehensive safeguards agreement with the agency. As a result, IAEA cannot conduct inspections and independently verify that nuclear material has been placed under safeguards and is not being diverted to clandestine nuclear activities. In addition, IAEA has limited information and authority concerning nuclear activities in countries that are not signatories to the NPT—India, Israel, and Pakistan—and in North Korea, which recently withdrew from the NPT.

Countries with Small Quantities of Nuclear Material Pose a Weakness to the Safeguards System

Countries with small quantities of nuclear material make up about 40 percent of the NPT signatories and almost one-third of the countries that have the Additional Protocol in force.¹⁴ 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 76 of these agreements were in force, as of July 2005. 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 February 2005, IAEA's Director General stated that these small quantities protocols pose a challenge to the safeguards program. In response, IAEA submitted a proposal to the Board of Governors recommending that the board stop approving small quantities protocols and give IAEA the authority to negotiate with countries to rescind them. At the very minimum, the proposal recommended that IAEA be allowed to conduct inspections and limit the protocols to countries without any nuclear facilities. In September 2005, the Board of Governors endorsed IAEA's view that small quantities protocols constituted a weakness of the safeguards system and

¹⁴IAEA refers to a small quantity of nuclear material as being, among other things, less than one kilogram of plutonium or uranium with an enrichment of greater than 20 percent Uranium-235.

directed IAEA to negotiate with countries to make changes to the protocols, including reinstating the agency's right to conduct inspections.

Some Countries Do Not Have Comprehensive Safeguards Agreements with IAEA

The application of safeguards is further limited because 37 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 37 countries have failed to fulfill their legal obligations. Moreover, 28 of the 37 have not yet brought comprehensive safeguards agreements into force more than 10 years after becoming party to the NPT, including Kenya, Niger, and Turkmenistan. In 2005, IAEA reported that some countries do not have comprehensive safeguards agreements with the agency because they (1) consider concluding an agreement a low priority compared with other national priorities, (2) have an insufficient understanding of the legal requirements to implement safeguards, and (3) lack a nuclear regulatory system to implement safeguards. As part of its strategy to help countries better understand and prepare for implementation of comprehensive safeguards agreements, IAEA is involved in a number of outreach efforts, such as seminars and workshops. However, according to IAEA officials, the agency is limited in its ability to encourage countries to conclude a comprehensive safeguards agreement because the agency is not responsible for enforcing compliance.

IAEA Has Limited Ability to Assess Nuclear Activities of Countries That Are Not Members of the NPT

Another weakness in the strengthened safeguards system is that IAEA has only limited information about the nuclear activities of India, Israel, and Pakistan, which are not members of the NPT. Since these three 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. Instead, they have special safeguards agreements that limit the scope of the agency's safeguards activities to monitoring only specific material, equipment, and facilities. In addition, under their special safeguards agreements, these countries are required to declare only exports of safeguarded nuclear material. With the recent revelations of the illicit international trade in nuclear material and equipment, IAEA officials told us that they would like more information, in particular, on these countries' nuclear exports.

IAEA also has limited information on the nuclear activities of North Korea. North Korea signed the NPT in 1985 and concluded a comprehensive safeguards agreement with IAEA in 1992. IAEA inspections conducted between 1992 and 1994 uncovered numerous discrepancies in North

Korea's nuclear material declarations. For example, when IAEA inspectors conducted environmental sampling tests of equipment at the declared facilities, they discovered a discrepancy between what North Korea reported and what the inspectors' independent analysis revealed. Based on the analysis of these samples, IAEA determined that North Korea might have continued to reprocess plutonium much later than stated in its declaration and in much larger quantities than reported. In 1993, North Korea restricted IAEA's inspection activities and never allowed the agency to resolve the discrepancies. Beginning in 1994, IAEA's activities in North Korea were limited to verifying the stoppage, or freeze, of North Korea's nuclear activities, as called for in an agreement negotiated between the United States and North Korea. In December 2002, North Korea expelled IAEA inspectors; removed surveillance equipment and seals at nuclear facilities; and, in January 2003, announced its withdrawal from the NPT. These actions have raised widespread concern that North Korea diverted some of its nuclear material to produce nuclear weapons.

IAEA May Lose Critical Skills and Knowledge because of Difficulties in Filling Key Positions and Restrictive Personnel Policies

Another major challenge facing IAEA is a looming human capital crisis that may hamper the agency's ability to meet its safeguards mission. 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.¹⁵ 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.

¹⁵In 2004, the Department of Safeguards had 552 staff members. Of these, 251 were safeguards inspectors.

The loss of this expertise raises concerns for IAEA and U.S. officials because IAEA is finding it increasingly difficult to recruit qualified inspectors. In 2004, less than 10 percent of the applicants applying for inspector positions at IAEA were considered well qualified. IAEA's recruiting difficulties arise because of, among other things, a shrinking pool of people pursuing careers in the nuclear field in most countries and intense competition from the private industry for their services. For example, in 2000, a group of experts from U.S. national laboratories and the Organization for Economic Cooperation and Development's Nuclear Energy Agency warned that an alarmingly sharp downward trend in enrollment in nuclear engineering programs in most countries, and in particular in the United States, placed the availability of future nuclear expertise at risk. This downward trend has continued. As we reported in February 2005, fewer U.S. students were seeking advanced degrees or technical training in areas such as science and engineering.¹⁶ In addition, according to IAEA officials, the pool of qualified candidates that would meet all of the agency's requirements, such as 6 years of experience in the nuclear field and knowledge of uranium enrichment or fuel reprocessing, can be found in only a limited number of countries worldwide.

IAEA officials told us that it is also difficult to hire analysts for critical Department of Safeguards positions. For example, hiring satellite imagery analysts can be complicated because it may require approval by the candidates' national governments because of the sensitive nature of these positions. In addition, in some cases, IAEA cannot provide competitive salaries for analyst positions. To help meet certain critical needs, such as open source analysis, the agency hires consultants, cost-free experts, and interns, primarily from the United States.

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. In 2004, IAEA began to develop a plan that includes (1) determining skills and competencies needed to meet strengthened safeguards objectives, (2) identifying gaps in skills and competencies, (3) implementing human capital strategies that are targeted

¹⁶GAO, *National Nuclear Security Administration: Contractors' Strategies to Recruit and Retain a Critically Skilled Workforce Are Generally Effective*, [GAO-05-164](#) (Washington, D.C.: February 2005).

toward addressing the gaps, and (4) evaluating the success of these strategies. According to IAEA officials, implementing this plan will allow the agency to determine the number of inspectors and support staff needed, and to develop better policies and practices to recruit and retain critical staff. However, at the time of our review, this plan was not in place because it had not yet been reviewed or approved by the Department of Safeguards' management. IAEA has also begun to enhance its recruiting efforts by targeting employees with experience in enrichment and reprocessing activities at nuclear facilities in five countries with major nuclear programs. IAEA officials hope that this new approach will improve the agency's chances of recruiting highly qualified candidates in an increasingly competitive job market. Despite these recruitment efforts, Department of State and U.S. Mission officials expressed concern that IAEA is not acting quickly enough to address the agency's high turnover rate.

Compounding a likely shortage of staff with critical skills, U.S. and IAEA officials identified a number of IAEA personnel policies and practices that hamper the Department of Safeguards' ability to recruit and retain these highly specialized experts, including (1) a mandatory retirement age, (2) limits on the number of support staff who contribute to the analysis of safeguards-related information, and (3) delays in filling critical positions. First, IAEA's mandatory retirement age of 62 has hindered the agency's ability to fill critical skills.¹⁷ For example, former IAEA personnel, now with the Los Alamos National Laboratory, said that the agency is losing senior safeguards inspectors with unique expertise and knowledge about countries' nuclear fuel cycles because of mandatory retirements. In one case, an individual who had worked for IAEA for 25 years and had been a section head in each of the Department of Safeguards' three operations divisions was forced to retire. According to Department of State officials, this policy may be misguided at a time when the agency is having difficulty finding qualified staff. U.S. officials also told us that IAEA's mandatory retirement policy is negatively impacting the United States' ability to provide IAEA with critical technical support. For example, in 2003, IAEA asked the United States to provide an expert with a unique expertise in environmental sample analysis—a critical tool in detecting undeclared nuclear activities—but would not hire him because he was 62 years old. To

¹⁷IAEA's mandatory retirement age is based on the United Nations Joint Staff Pension Fund. The normal retirement age is 60, but 62 for personnel that were hired or rehired on or after January 1, 1990.

prevent losing this expertise, the United States hired him as a part-time consultant to IAEA but at a higher cost. Although Department of State officials have raised these concerns with IAEA officials, IAEA officials have stated that they follow the United Nations retirement policy, which was approved by IAEA's Board of Governors, and generally do not make exceptions, even to hire or retain highly skilled staff.

Second, in 2004, Department of Safeguards officials reported that there was pressure across the agency to reduce the number of support staff. They found that this practice was shortsighted because support staff in the Department of Safeguards include not only secretaries and clerks in administrative positions, but also technicians who install unattended remote monitoring equipment and open source information analysts. According to Department of Safeguards officials who manage support staff, they do not have enough staff to meet growing strengthened safeguards requirements, such as technicians and engineers to test and install new surveillance and remote monitoring equipment. For example, in 2003, IAEA officials reported that they could not adequately test and install new surveillance and unattended monitoring systems at Chernobyl and a facility in Switzerland because of the lack of staff. This shortage increased the risk of failure of agency equipment because of accelerated testing and assembly.¹⁸ IAEA continues to rely heavily on the United States to supply experts and short-term contractors to meet growing demand for these technical services.

Lastly, according to U.S. and IAEA officials, delays in filling critical safeguards positions limit IAEA's ability to implement strengthened safeguards measures and detect clandestine activities. In many cases, a new inspector or support staff member is hired after a position becomes vacant, and since it takes, on average, 6 months to hire new staff, the position is vacant for at least that amount of time. For example, it took more than 2 years to fill a senior technician position to analyze environmental samples at the Safeguards Analytical Laboratory. U.S. Mission officials told us that they are concerned that there may not be

¹⁸In an October 2003 internal written assessment regarding IAEA equipment testing, IAEA officials expressed concern that monitoring systems at a third site—the Iranian enrichment facility at Natanz—was also not thoroughly tested. In reviewing a draft of this report, IAEA officials clarified that there are currently no unattended monitoring systems at the Natanz facility in Iran and that the inclusion of Iran in this written assessment was a mistake. According to these officials, IAEA has installed standard surveillance cameras that were thoroughly tested before deployment at the Natanz facility.

sufficient time to pass on the knowledge and skills of senior safeguards inspectors and other nuclear experts to new recruits before these more experienced safeguards personnel retire. While new staff have advanced degrees and previous work experience, they require additional, job-specific training and mentoring because of IAEA's specialized work. According to IAEA officials, it usually takes 1 to 2 years for inspectors, technicians, and engineers to be fully comfortable and capable on the job. Furthermore, if experienced staff retire before new inspectors are prepared to meet all mission requirements, there may be a gap in skills.

IAEA Lacks a System to Evaluate the Results of Strengthened Safeguards

IAEA does not have a system in place to measure how effective its strengthened safeguards system is in detecting undeclared activities. The performance measures IAEA has in place are output-driven and directed at measuring the agency's ability to detect the diversion of nuclear material at declared facilities. For example, in its annual report to the Board of Governors, IAEA, among other things, reports on the declared quantities of nuclear material it accounted for and whether it met its goal of conducting routine inspections at declared facilities. According to Los Alamos National Laboratory officials, these indicators may be appropriate for measuring progress in detecting the diversion of nuclear material at declared facilities, but are not adequate to measure the effectiveness of strengthened safeguards activities to detect undeclared activities or nuclear material. These officials told us that IAEA should assess the extent to which its strengthened safeguards activities, such as environmental sampling and complementary access, are sufficient to detect clandestine activities and establish specific performance measures to evaluate these efforts. IAEA officials recognized the difficulties of measuring the effectiveness and impact of the agency's strengthened safeguards activities.

In June 2005, IAEA's Board of Governors established an advisory committee, based on a proposal by President Bush in 2004, to consider ways to strengthen IAEA's safeguards system. According to Department of State officials, this committee would, among other things, systematically evaluate lessons learned from strengthened safeguards implementation and illicit trafficking of nuclear material, and then provide recommendations to the Board of Governors to further strengthen the safeguards system by 2007. The committee will have an initial 2-year mandate, which will be reviewed for extension after 2 years.

IAEA Depends Heavily on U.S. Financial Support to Meet Its Safeguards Obligations

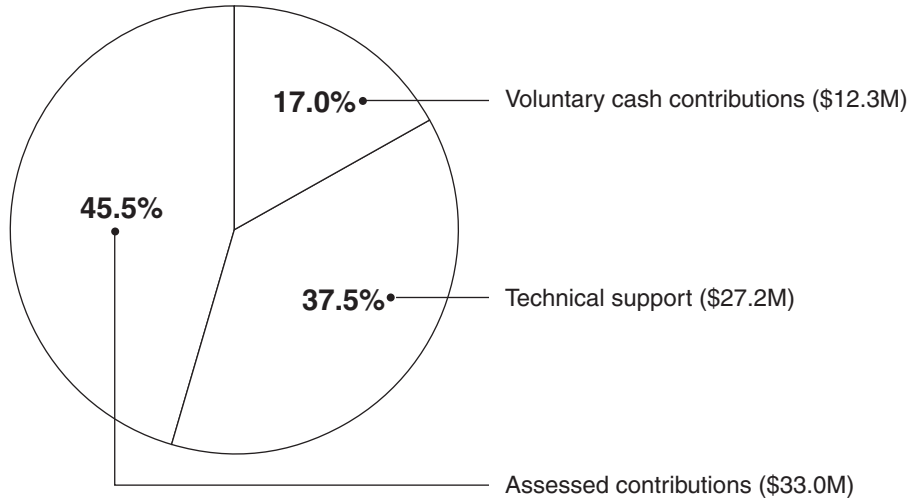
The United States is the largest financial contributor to IAEA's safeguards program, and for 2004, is providing over 34 percent of the agency's total safeguards budget through assessed and voluntary cash contributions. IAEA's reliance on U.S. financial support is likely to continue despite the agency's recent budget increase because, among other reasons, the agency's budget has not kept pace with its increased workload under strengthened safeguards, and cost-savings expected from the application of integrated safeguards have not yet materialized. Further, because the agency's budget has not kept pace with its increased workload, IAEA depends on voluntary annual contributions from the United States and other countries to meet critical safeguards needs, such as equipment and funding for staff with specialized skills. In addition, IAEA's ability to successfully negotiate future budget increases from member states is hampered by the absence of systematic evaluations of long-term resource needs, and its lack of reliable estimates of the costs of its strengthened safeguards activities.

The United States Is the Largest Financial Contributor to IAEA Safeguards

IAEA is heavily dependent on U.S. financial support to meet its safeguards obligations, and historically the United States has been IAEA's primary supporter and its largest contributor. For 2004, the United States is providing \$72.5 million to support IAEA's strengthened safeguards program: \$33.0 million in assessed contributions, \$12.3 million in voluntary cash contributions, and \$27.2 million from various U.S. agencies in technical support, such as analyzing environmental samples to detect the presence of nuclear material.¹⁹ Figure 3 provides a breakdown of U.S. contributions to IAEA's safeguards program for 2004 by funding category.

¹⁹Roughly \$4.1 million of U.S. assessed contributions to IAEA for calendar year 2004 had not been provided as of July 2005.

Figure 3: U.S. Contributions to IAEA's Safeguards Program for 2004



Source: GAO analysis of data provided by IAEA, the Departments of Defense, Energy, and State, and the Nuclear Regulatory Commission.

For 2004, U.S. assessed and voluntary cash contributions represent over 34 percent of IAEA's total safeguards budget. These and other assessed and voluntary contributions provided by the United States to IAEA's safeguards budget since 1998 are shown in table 1.

Table 1: Contributions to IAEA's Safeguards Budget from 1998 through 2004

Dollars in millions

Year ^a	IAEA's total safeguards budget ^b	U.S. contributions to IAEA's total safeguards budget (and percentage of total)	IAEA's assessed safeguards budget ^c	U.S. assessed contributions to IAEA's safeguard's budget ^d (and percentage of total)	Voluntary cash contributions to IAEA's safeguards budget	U.S. voluntary cash contributions ^e (and percentage of total)
1998	\$90.6	\$30.8 (34.0%)	\$80.5	\$23.1 (28.7%)	\$10.2	\$7.7 (75.7%)
1999	89.8	29.5 (32.9)	79.3	20.7 (26.2)	10.5	8.8 (83.4)
2000	84.2	29.5 (35.0)	70.9	17.9 (25.3)	13.3	11.6 (86.8)
2001	88.9	35.3 (39.8)	70.1	18.6 (26.6)	18.7	16.7 (89.2)
2002	95.5	37.7 (39.5)	77.9	22.5 (28.9)	17.6	15.2 (86.2)
2003	111.8	42.7 (38.2)	92.9	26.5 (28.6)	19.0	16.1 (85.2)
2004	132.6	45.3 (34.2)	115.2	33.0 (28.6)	17.4	12.3 (71.0)

Source: GAO analysis of data provided by IAEA and the Department of State.

Note: Numbers may not add due to rounding.

^aIAEA is one of 10 international organizations that the United States makes payments to on a deferred basis. In some cases, U.S. assessed payments to IAEA's budget are not made in the same year for which they are assessed. Table 1 shows U.S. contributions to IAEA's budget based on the year for which they were assessed, not the year in which the funds were actually paid.

^bIAEA's total safeguards budget is calculated using actual exchange rates, rather than IAEA's fixed exchange rate. As a result, changes in IAEA's total safeguards budget, reflected in the table, largely represent inflationary cost increases and fluctuations in exchange rates rather than an actual change in IAEA's budget. The exception is in 2004, when IAEA received the first part of a 4-year increase to its budget.

^cIAEA's budget includes both dollar and non-dollar contributions. Non-dollar contributions are calculated using the annual average exchange rate based on the International Monetary Fund's International Financial Statistics.

^dA portion of the U.S. contribution to IAEA's budget is made in dollars, while a portion is made in euros. Prior to the introduction of the euro in 2002, U.S. non-dollar contributions to IAEA's budget were made in Austrian schillings. The U.S. contribution to IAEA's budget is calculated using the average monthly exchange rate for the month in which the euro/Austrian schilling payment was made to IAEA. Exchange rates are based on the International Monetary Fund's International Financial Statistics.

^eFor purposes of this report, U.S. voluntary contributions to IAEA include only cash contributions, and do not include technical assistance, which is also provided on a voluntary basis.

For 2004, the U.S. assessed contribution to IAEA's safeguards budget is about \$33.0 million, which IAEA uses to fund safeguards inspections, staff salaries, training, and other costs directly related to the operation of IAEA's safeguards program. The U.S. assessment to IAEA's budget is based on a scale used by the United Nations to assess contributions for its members.²⁰ The U.S. assessed safeguards contribution for 2004 is about 35 percent more than IAEA's second largest financial supporter, Japan.

The United States has also been the largest contributor of voluntary funds to IAEA's safeguards program. Our analysis shows that from 1998 through 2004, U.S. voluntary cash contributions, on average, were 83 percent of the total of all such member states' contributions. Other countries making voluntary contributions included Canada, France, Germany, Japan, and the United Kingdom. In 2004, the United States provided over \$12.3 million in voluntary funds to IAEA's safeguards program. These funds were provided by the Department of State and included

- \$4.36 million for the purchase of safeguards equipment;
- \$4 million for the U.S. Program of Technical Assistance to IAEA Safeguards (POTAS)—managed by Brookhaven National Laboratory—to fund safeguards equipment at a nuclear facility in Japan, and paying travel costs for IAEA staff associated with POTAS-funded projects;
- \$2 million to assist IAEA in re-engineering the Department of Safeguards' information management system;
- \$1.2 million to cover IAEA's costs of applying safeguards to excess nuclear material at U.S. facilities; and

²⁰The U.S. assessment is 25 percent of IAEA's budget—the maximum assessment for IAEA member states. IAEA retained this ceiling despite a United Nations' decision in 2000 to reduce its maximum assessment to 22 percent. However, the United States, along with 31 other countries, contributes slightly more than 25 percent of the safeguards budget to compensate for some countries that are assessed at a lower rate. In July 2003, IAEA's Board of Governors decided to require some countries that pay less to contribute more as of January 1, 2006. The remaining countries that pay less will be required to begin contributing more as of January 1, 2008.

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- \$770,500 for high priority safeguards projects.²¹

In addition to U.S. assessed and voluntary safeguards contributions, we estimated that, in 2004, the Departments of State, Energy, and Defense and the Nuclear Regulatory Commission provided IAEA with \$27.2 million in technical support. For example:

- DOE spent almost \$12.7 million on various activities, including applying safeguards at nuclear facilities in other countries, developing technologies to detect and characterize the isotopic composition of uranium and plutonium, and providing training on nuclear material accounting and control;
- the Department of State provided over \$9.2 million for POTAS activities such as funding U.S. national laboratories to develop and implement safeguards technologies and funding Brookhaven National Laboratory officials to support IAEA's safeguards activities, interns and consultants to IAEA, and other high priority safeguards projects;
- the Departments of Energy, State, and Defense spent over \$5.2 million analyzing environmental samples taken by IAEA to detect and characterize the types of nuclear material present at selected locations; and
- NRC spent \$29,500 in staff costs to assist IAEA in developing IAEA safeguards procedures and practices.

For 2005, the United States is expected to contribute almost \$34.3 million to IAEA's regular safeguards budget, or about 33 percent more than Japan. Also, we estimate that for 2005, the Department of State will provide \$11.4 million in voluntary cash contributions to IAEA's safeguards program, and that various U.S. agencies will provide \$23.3 million in technical support.

²¹The U.S. contribution for high priority safeguards projects had not been expended as of September 2005.

IAEA Will Continue to Rely on U.S. Voluntary Support, Despite an Increase in Its Regular Budget

In 2004, IAEA's safeguards budget was increased by \$11.1 million—the first part of a 4-year, \$19.4 million increase agreed to by member states. For almost two decades prior to 2004, member states generally limited growth in IAEA's budget to adjustments for inflation and staff salaries. Additionally, the agency's ability to increase funding for safeguards activities has been limited by some member states' desire to maintain a balance of funding between IAEA's safeguards and technical cooperation programs. As a result, Department of State officials said that a shortfall developed between the growing demands on IAEA from strengthened safeguards activities and its available budget. For example, IAEA was not able to hire additional staff (inspectors and equipment technicians) as its safeguards responsibilities increased. To address this shortfall, the United States led a successful effort to increase IAEA's budget.²² According to Department of State and IAEA officials, the agency has used its budget increase to hire additional staff and purchase new safeguards equipment, such as unattended monitoring systems.

Despite the increase in the agency's safeguards budget, IAEA will continue to rely on U.S. voluntary contributions. Department of State officials said that even with the budget increase, IAEA's safeguards program remains underfunded because its budget has not kept pace with increases in its workload and responsibilities. As part of the U.S.-led effort to increase IAEA's regular budget, a Department of State analysis found that the agency would need around \$30 million—\$10.6 million more than the actual increase—to meet its strengthened safeguards responsibilities. Brookhaven National Laboratory officials also questioned whether the safeguards budget increase will be sufficient to meet future needs because of the agency's growing responsibilities under strengthened safeguards. For example, the officials said it is unclear how IAEA will finance increased activities stemming from the Additional Protocol, such as analyzing environmental samples, or fund improvements to the agency's safeguards information management system.

²²Department of State officials said that the department's policy has been, and continues to be, restricted growth in the budgets of international organizations. The department has made exceptions for substantive policy reasons, such as security-related interests. However, Department of State officials also said that they have tried to maintain pressure on IAEA to identify efficiencies to allow the reallocation of resources to high priority activities such as safeguards.

In addition, IAEA officials said the agency will continue to rely on voluntary funding, primarily from the United States, to purchase equipment and maintain a research and development program. One IAEA official told us that the purpose of the agency's budget increase was, in part, to ensure that the budget covers most of the agency's equipment needs by 2007. However, agency officials responsible for managing and maintaining safeguards equipment told us that while the safeguards budget increase gave IAEA the ability to meet 70 percent of its equipment needs beginning in 2004, the remaining 30 percent will be met almost exclusively using voluntary contributions from the United States. Furthermore, additional equipment requirements resulting from the implementation of strengthened safeguards are likely to increase the agency's reliance on voluntary funds. Finally, IAEA officials stated that the agency cannot maintain a research and development program without member states' voluntary support because it does not have the financial resources or technical expertise.

Country-specific events could also require increased resource commitments by IAEA that may strain the agency's safeguards budget. IAEA officials said that demands on the agency's budget are driven by events in individual countries. For example, IAEA officials said that Japan's new reprocessing plant at Rokkashomura—the largest under agency safeguards—will require a significant investment of safeguards resources, including an on-site laboratory to analyze nuclear material samples and an increase in inspection activity roughly equal to the efforts of 10 inspectors.²³ IAEA indicated that funds for these new inspectors were included in the budget increase, as well as \$727,000 for the on-site laboratory. Further, in the July 2005 agreement between the United States and India, India agreed to place its civilian nuclear facilities under IAEA safeguards. Department of State officials said that the agreement could increase IAEA's resource commitments because of the additional nuclear material that IAEA could be required to safeguard. Also, recent events in Iran and Libya have forced IAEA to commit more safeguards resources for inspections and analyzing an increased quantity of environmental samples.

²³IAEA attempts to quantify the costs of anticipated increased resource commitments in its budget. In part, these estimates are presented as core activities for which the agency expects to receive voluntary contributions, or for which the agency has not identified a funding source.

Additionally, according to IAEA, Department of State, and Brookhaven National Laboratory officials, a change in the European Atomic Energy Community's (EURATOM) participation in safeguards activities could place an additional financial burden on IAEA. In the past, EURATOM has shared the costs of safeguards activities by participating in inspections and maintaining safeguards equipment at its members' facilities. However, in December 2004, EURATOM informed IAEA of its intention to reduce its participation in inspections and the sharing of equipment costs. While EURATOM's decision had not been finalized as of May 2005, an IAEA official estimated EURATOM's withdrawal from safeguards activities could require the agency to hire 5 to 9 additional inspectors and 6 or 7 technicians to conduct inspections and maintain equipment at European Union nuclear facilities. Additionally, Department of State officials said that reduced participation in safeguards by EURATOM would require IAEA to replace safeguards equipment at European Union facilities, and estimated that this would cost around \$1.5 million per year over the next 4 to 5 years.

At the same time, cost-savings that IAEA expected to achieve from integrated safeguards have not yet materialized. In our 1998 report, we questioned IAEA's assumptions about cost-savings from integrated safeguards because at that time, the agency did not know the extent to which its new measures would allow it to reduce inspections. Further, we stated that savings in cost and inspector effort from applying integrated safeguards might not be fully realized. While IAEA has reduced inspection activities in some countries where it has applied integrated safeguards, there has been an increase in headquarters staff needed to analyze data received from unattended monitoring systems installed at nuclear facilities and collected from open source information. Moreover, the time it takes for IAEA staff to prepare for complementary access is double the preparation time for routine inspection activities. For example, IAEA officials estimated that complementary access requires 4 days of preparation and analysis at headquarters for every day of inspection, as opposed to 2 days of preparation and analysis for routine inspections. In addition, even though advanced technologies have reduced the need for physical inspections at certain facilities, IAEA officials told us that the purchase, installation, and maintenance costs of this equipment may exceed savings from fewer inspections. Lastly, under integrated safeguards, IAEA may increase inspection activities at certain locations to ensure that a country is not engaged in clandestine nuclear activities.

IAEA told us that the first few countries where integrated safeguards were being applied had small nuclear programs, which limited the potential cost-

savings. IAEA officials told us that the agency expects to achieve more cost-savings as more countries, such as Canada, Germany, and Japan, apply integrated safeguards. However, a former high-ranking Department of Safeguards official told us that thus far, the increasing costs of complementary access to verify the accuracy and completeness of information contained in countries' declarations, among other factors, have offset cost-savings from reduced inspection activities in countries with integrated safeguards.

We also found that in some instances, IAEA does not make the most efficient use of its safeguards resources. For example:

- Brookhaven National Laboratory officials were concerned that IAEA's use of U.S. voluntary contributions to pay for business class travel, instead of taking advantage of economy class fares, is not cost effective. One Brookhaven official said that this takes resources away from other safeguards priorities such as paying for equipment or training. For example, the official said that for trips from Vienna, Austria, to Albuquerque, New Mexico (near Los Alamos National Laboratory where some training courses are held for IAEA staff), IAEA obtains business class tickets costing \$3,300 or less. However, the official said that these tickets, when purchased in advance at economy class rates, rarely cost more than \$2,000 and are often less. Further, we estimate that economy class rates for these tickets currently average \$1,235.²⁴ IAEA officials acknowledged that in some cases business class tickets are more costly than economy class, but said that most often the difference between business class and economy class tickets is paid by IAEA, not by U.S. voluntary contributions. In reviewing a draft of this report, IAEA officials stated that the agency's policy is to fly economy class whenever practicable. However, the officials said that IAEA's travel regulations allow the agency to use business class travel for trips over 7 hours in duration. IAEA officials emphasized that in such cases, the agency tries to take advantage of reduced business class fares whenever possible.
- In some cases, IAEA's restrictive personnel policies cause agency resources to be used inefficiently. As was mentioned previously, IAEA could not hire an individual as a cost-free expert despite his critical

²⁴Estimates are from SatoTravel, the leading provider of travel services for the U.S. government. Rates are for July through September 2005. The economy class estimate is an average of the government and civilian rates.

expertise in detecting traces of nuclear material contained in environmental samples because he was 62—IAEA's mandatory retirement age. Cost-free experts are hired by IAEA using countries' voluntary contributions to provide short-term skills that IAEA lacks among its regular staff. To retain his expertise, the United States hired and paid this individual as a consultant to IAEA. However, as a consultant, this individual is only working on a part-time basis, and the United States is required to pay him \$56,000 more than his position would cost as a cost-free expert over a 2-year period.

- IAEA's policy of rotating technical staff causes the agency to incur additional costs related to training replacement staff. Although IAEA officials could not quantify these costs, they said that the agency's policy of rotating technical staff every 7 years causes many technicians and engineers to leave early to pursue careers elsewhere. As a result, IAEA is continually faced with having to train new staff to operate and maintain its specialized equipment. In addition, because of the difficulty it has in maintaining sufficient numbers of trained technical staff, IAEA has less time for testing and installing equipment, which increases the risk of failures. A former head of IAEA's unit for unattended monitoring systems said that if this equipment fails, IAEA would have to expend a significant amount of resources to go back and verify all of the nuclear material in that facility.

IAEA Does Not Systematically Evaluate Long-Term Resource Requirements or Reliably Estimate Safeguards Costs

IAEA does not have a process in place to systematically evaluate its long-term resource requirements. Given member states' reluctance over the past 2 decades to increase IAEA's budget, future increases may depend upon the agency's ability to make a convincing case that additional resources are required to meet safeguards obligations. Good strategic planning practices, which would help to make such a case, include describing the relationship between long-term goals and budgetary needs. However, while IAEA has developed 5-year medium-term strategies for its activities, these plans are not linked to longer-term budgetary requirements because IAEA's budget process and research and development plan are only designed to forecast resource needs on a 2-year basis. In 2004, a group of safeguards experts found that IAEA needed to increase linkages between its medium-term strategy, the strategic objectives of the Department of Safeguards, and the agency's program and budget. Department of State officials also stated that although IAEA has substantially improved its planning, the agency could still have better assessments of its long-term budgetary needs. Additionally, Brookhaven National Laboratory officials said that IAEA needs to develop

a long-term plan to better prioritize tasks and tie goals and timeframes to financial resources. Furthermore, a February 2005 report by IAEA's Office of Internal Oversight Services that evaluated the agency's management of member states' voluntary contributions, found that while the Department of Safeguards' biennial research and development plan provides adequate planning for activities 2 to 3 years into the future, IAEA lacks an effective process for identifying and investigating new safeguards technologies for the detection of undeclared nuclear material and activities beyond the 2 to 3 year-timeframe. As a result, the office recommended that IAEA develop a long-term plan for research and development activities.

IAEA has taken steps to improve its short-term budget and planning process. For example, IAEA has implemented results-based budgeting that links objectives, outcomes, and performance indicators to estimates of resource needs in the agency's biennial budget. Furthermore, IAEA officials said that they did detailed resource planning as part of the agency's efforts to negotiate the 2004 budget increase. Specifically, IAEA developed a document that identified each project in the safeguards program, provided information on the project's needs over the 2004-2005 budget period, and indicated how these needs were reflected in the requested budget increase. However, IAEA officials said that this was an effort that required a significant amount of planning and negotiating.

Another impediment to systematically evaluating long-term resource requirements is that IAEA does not have reliable estimates on the costs of all of its strengthened safeguards activities—particularly those costs related to increased activity levels at IAEA headquarters, such as analyses of countries' declarations of their nuclear activities. For example, a 2004 review of the safeguards program by a group of safeguards experts found that one measure of costs IAEA used in the past—person days of inspection—actually accounted for only 30 percent of the safeguards budget in 2003. Therefore, attempting to use this measure to represent the costs of all IAEA's safeguards activities was problematic because the majority of safeguards activities are unrelated to the costs of person days of inspection. Department of State officials also said that IAEA's measures of safeguards costs are inadequate. In particular, they said that the person days of inspection measure does not account for differences in the type of inspection performed and the costs of equipment and technologies used. Additionally, they said that this measure represents the number of 8-hour days spent inspecting a facility. However, even if the inspection lasts less than 8 hours, it still counts as a full day of inspection. Furthermore, without good measures of the costs of all its safeguards activities, IAEA has

difficulty setting benchmarks, which it could use to measure whether alternative approaches to safeguarding nuclear material, such as integrated safeguards, actually result in cost-savings. For example, the 2004 review of the safeguards program found that IAEA's lack of accurate cost information was an impediment in assessing the efficiency of its operations.

One high-ranking Department of Safeguards official told us that the agency has difficulty estimating the costs of safeguards activities. The official noted that while IAEA's Department of Safeguards has introduced a new measure—calendar days in the field—which helps to estimate travel and labor costs, it still does not capture the costs related to other safeguards activities, such as complementary access. The official said that the agency has assigned a staff member and requested a French expert to work on developing a new methodology to calculate the costs of safeguards activities. Additionally, IAEA incorporated a project into its 2004-2005 budget to use statistical information, including the cost of activities related to the Additional Protocol, to achieve more efficient and effective program planning, monitoring, and resource management.

According to Department of State officials, Congress authorizes voluntary funding for IAEA's safeguards program to meet requirements that cannot be met from its assessed budget. The officials said that the purpose of this funding is not to pay for normal agency operating costs. However, without adequate measures of the costs of all its strengthened safeguards activities and a systematic process to use these measures to identify long-term resource needs, IAEA may be unable to convince member states of its budgetary needs. As a result, IAEA will continue to rely on some member states' voluntary contributions—provided in large part by the United States—for recurring and critical costs. For example:

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- IAEA's 2004-2005 budget identified a number of core activities for which no budgetary funds were available, including almost 11 percent of the costs of safeguarding nuclear material in countries with safeguards agreements. IAEA anticipated that member states would provide about \$10.9 million in voluntary support for these activities. However, IAEA's 2004-2005 budget also identified an estimated \$5.75 million in potential safeguards activities, such as applying safeguards at nuclear facilities in North Korea should it agree to resume IAEA inspections, for which the agency did not have budgetary funding and did not anticipate receiving voluntary support.²⁵
 - A 2004 independent review of IAEA's Safeguards Analytical Laboratory found that in some cases, supplies needed for routine maintenance of safeguards equipment were not funded by IAEA's safeguards budget, but instead were included in agency requests for voluntary support. As a result, some instruments were inoperable for up to a year because necessary spare parts were funded through voluntary contributions. The review also found that IAEA's voluntary requests included funding to maintain its laboratory facilities, and recommended that routine maintenance needs of laboratory equipment and facilities should be included in IAEA's budget. IAEA said that all essential and routine equipment needs have been included in the agency's current budget.
 - Department of State officials said that the United States is concerned that in some cases IAEA is relying on cost-free experts—many of which are funded by U.S. voluntary support—on a long-term basis when it should really be creating permanent positions and filling them. According to Brookhaven National Laboratory officials, cost-free experts are intended to provide short-term specialized skills that are not available among IAEA staff. These positions are not intended to be an extension of IAEA's regular staff. As a result, the officials said that the United States is generally reluctant to extend funding for cost-free experts beyond four years. However, without the cost-free experts provided by the United States and other countries, IAEA would have difficulty finding staff to perform key strengthened safeguards activities, such as analyzing open source information and maintaining unattended

²⁵These unfunded core activities primarily represent safeguards activities that IAEA was unsure of implementing. Other unfunded core activities included applying safeguards at a reprocessing plant in India and additional efforts required as a result of EURATOM's final decision.

surveillance equipment. IAEA noted that the agency has taken steps, such as developing a policy and an approval process, to ensure that cost-free experts are not being relied on for routine services.

IAEA Has Increased Efforts to Help Countries Protect Their Nuclear Material and Facilities, but Reliance on Voluntary Contributions Poses a Challenge

Following September 11, 2001, IAEA increased its efforts to assist countries in protecting their nuclear and radiological materials and facilities. To support these activities, IAEA established a Nuclear Security Fund to which countries can provide voluntary budget contributions. However, IAEA's heavy reliance on these voluntary contributions creates challenges in planning and implementing nuclear security activities. Increasing demands on the agency to provide nuclear security assistance could provide further challenges as well. Additionally, the United States has raised concerns about IAEA's ability to track the use of nuclear security funds and measure the results of its activities in a systematic way. In response to these concerns, IAEA developed a system to track the use of Nuclear Security Fund contributions. However, the agency still does not systematically measure the results of its nuclear security efforts.

IAEA Has Increased Its Efforts to Help Countries Secure Their Nuclear Material and Facilities

In March 2002, IAEA's Board of Governors approved an action plan to increase the agency's assistance to prevent, detect, and respond to acts of terrorism against nuclear and radiological materials and facilities. IAEA's nuclear security action plan consisted of eight areas encompassing efforts undertaken by IAEA prior to September 11, 2001, as well as new efforts developed in response to countries' concerns about the potential for nuclear terrorism. These areas included enhancing the physical protection of nuclear material and facilities, improving countries' ability to secure other types of radioactive material, and ensuring that measures are in place to detect and prohibit the illicit trafficking of materials. In order to better manage the implementation of its action plan, IAEA created an Office of Nuclear Security within a new Department of Nuclear Safety and Security.

IAEA's nuclear security action plan has guided the agency's efforts to help countries improve their security by, for example, developing guidance, facilitating advisory missions, providing training, improving response to illicit trafficking and emergencies, and coordinating security assistance. Specifically, since September 11, 2001, IAEA has published a variety of updated or newly drafted security guidelines and recommendations. For example, IAEA developed guidance on securing radioactive materials in transport and a handbook on combating illicit trafficking. In addition, in

January 2004, IAEA published a revised *Code of Conduct on the Safety and Security of Radioactive Sources* to guide countries in developing policies, laws, and regulations on maintaining the safety and security of radioactive sources. The revised code includes, among other things, enhanced requirements for securing radioactive sources. As of June 2005, 73 countries had committed to implementing the code. Further, in September 2004, IAEA's Board of Governors and General Conference approved new guidance on the import and export of radioactive sources, which is designed to help countries ensure that high-risk radioactive sources are supplied only to authorized end-users.

Furthermore, IAEA increased the types of advisory missions it offers countries upon their request, and facilitated over 100 missions to 43 countries, including Argentina, Iran, Mexico, Nigeria, and Ukraine, between 2001 and March 2005. To conduct these advisory missions, IAEA organizes teams of international experts to assess and make recommendations for improving countries' nuclear security measures, such as the physical protection of their nuclear material and facilities, or their regulatory infrastructures. Since 2001, IAEA has also introduced advisory missions that go beyond the physical protection of material and facilities to look at the security of the entire country—including border controls—and assess countries' systems of accounting and control of nuclear material.

In addition, IAEA provided nuclear security training for countries and individual country representatives and conducted almost 80 training courses for about 1,500 participants between 2001 and March 2005. IAEA's training courses include instruction on general topics, such as the fundamental principles and objectives of physical protection, as well as more focused national training opportunities that cover countries' programs and facility-specific needs, such as physical protection system design and the use of radiation detection instruments. IAEA targets some training on a regional basis to meet specific requirements, such as combating illicit trafficking and promoting regional cooperation. IAEA also offers training courses for nuclear operators and government and law enforcement officials on topics such as nuclear security awareness, combating illicit trafficking, and nuclear forensics.

IAEA also increased its efforts to assist countries in improving their capabilities to respond to incidents of illicit trafficking in materials and to nuclear and radiological emergencies. For example, IAEA encouraged countries to contribute data to its Illicit Trafficking Database to help identify trends in illicit trafficking through increased information exchange

on incidents involving unauthorized acquisition, provision, possession, use, transfer, or disposal of nuclear and other radioactive materials. As a result of its outreach efforts, IAEA had increased the number of countries participating in the database from 25 to 81, as of June 2005. Furthermore, IAEA worked to improve countries' abilities to respond to nuclear and radiological emergencies. In June 2004, IAEA's Board of Governors approved efforts to assist countries to develop an international communication system for information on nuclear and radiological emergencies, provide international assistance for emergency response, and establish a sustainable international response infrastructure.

Finally, IAEA worked to improve coordination with member states that provide nuclear security assistance. For example, IAEA began to develop country-specific integrated nuclear security support plans to prioritize measures the agency identifies as necessary to assist countries to strengthen their nuclear security. According to an August 2004 status report on IAEA's nuclear security efforts, these plans will help the agency to coordinate assistance provided by other countries—an important part of IAEA's efforts to improve physical protection measures at facilities and illicit trafficking detection capabilities at international borders. As of December 2004, IAEA was developing integrated nuclear security support plans for 16 countries.

Heavy Reliance on Voluntary Contributions Has Created Challenges for IAEA's Nuclear Security Efforts

In 2002, IAEA established a Nuclear Security Fund to support its nuclear security program, and countries had voluntarily contributed about \$36.7 million through mid-May 2005. However, IAEA's heavy reliance on these voluntary contributions for about 89 percent of its nuclear security funding creates challenges for the agency in planning and implementing its activities. For example, the conditions most donors place on the use of their funds limit IAEA's ability to direct resources to meet program needs. Given IAEA's reliance on voluntary contributions, its ability to plan and implement nuclear security activities could be further challenged by, for instance, changes in the scope of an international security agreement that could increase countries' requests for assistance.

IAEA Established the Nuclear Security Fund to Support Its Efforts

To implement its nuclear security action plan, in 2002, IAEA created the Nuclear Security Fund to which countries could provide voluntary contributions for the agency's nuclear security activities. From 2002 through mid-May 2005, 26 countries, the European Union, and one nongovernmental organization made voluntary contributions totaling about \$36.7 million.²⁶ In addition, a number of countries have contributed to IAEA's nuclear security efforts by providing services, equipment, and the use of facilities.

The United States has made significant contributions to the Nuclear Security Fund. From 2002 through 2004, as shown in table 2, the U.S. Departments of State and Energy contributed approximately \$21.6 million—almost 61 percent of all contributions—to the Nuclear Security Fund. For example:

- DOE provided \$9.95 million for radioactive material security;
- the Department of State provided \$2.1 million to support advisory missions, training courses, and other efforts to improve the physical protection of nuclear materials;
- the Department of State contributed around \$2.25 million to support illicit trafficking advisory missions, training courses, and other efforts to detect malicious activities involving nuclear and radiological materials;
- the Department of State provided \$1.6 million to improve the coordination and management of nuclear security information by, for example, increasing the utility of IAEA's Illicit Trafficking Database; and
- the Department of State also contributed \$5.65 million for such efforts as improving countries' systems of nuclear material accounting and control, providing a cost-free expert, and establishing a reserve fund for unanticipated expenses.

²⁶Countries contributing to the Nuclear Security Fund included Australia, Austria, Bulgaria, Canada, the Czech Republic, Finland, France, Germany, Greece, Hungary, Iran, Ireland, Israel, Italy, Japan, the Republic of Korea, the Netherlands, New Zealand, Norway, Romania, Slovenia, Spain, Sweden, Ukraine, the United Kingdom, and the United States. The nongovernmental organization was the Nuclear Threat Initiative.

Table 2: U.S. Nuclear Security Fund Contributions, 2002–2004

Source of contribution	2002	2003	2004	Total
Department of State	\$3,199,700	\$4,200,300	\$4,200,000	\$11,600,000
Department of Energy	3,001,209	2,500,000	4,450,000	9,951,209
Total	\$6,200,909	\$6,700,300	\$8,650,000	\$21,551,209^a

Source: GAO presentation of IAEA data.

^aThis total does not include interest on U.S. contributions to the Nuclear Security Fund. Also, it does not include \$1.7 million pledged to the fund in 2003, but which IAEA did not receive before December 31, 2004.

The Department of State estimated that it would provide \$4.2 million to the Nuclear Security Fund in 2005, while DOE officials indicated that the Department will not provide direct contributions to the fund in 2005.

Furthermore, in 2004, DOE and NRC provided an estimated \$3.3 million of other technical support for IAEA's nuclear security activities. For example, DOE provided about \$1.4 million for nuclear security experts to participate in IAEA's advisory missions to improve the physical protection of nuclear materials and facilities, and \$1.8 million for training courses for foreign nationals on the physical protection and accounting and control of nuclear materials. In addition, NRC contributed \$59,000 in staff costs to assist IAEA with enhancing radioactive material security and the physical protection of nuclear materials in transit. For 2005, U.S. agencies estimated that they will provide \$2.89 million in technical support for IAEA's nuclear security activities.

IAEA's Heavy Reliance on Voluntary Funding Creates Challenges

IAEA depends on voluntary contributions for about 89 percent of its nuclear security funding, which creates challenges for planning and implementing nuclear security activities because almost all donors place conditions on how their Nuclear Security Fund contributions are to be spent. In 2002 and 2003, respectively, only 2 and 5 percent of the contributions to the fund were provided without conditions. For example, a number of countries contribute to the fund specifically to help secure nuclear and radioactive materials in Russia and other countries of the former Soviet Union. IAEA does not have the flexibility to shift these funds to support activities in other regions with nuclear security concerns and for which limited resources are available, such as Southeast Asia and Latin America. IAEA officials said that as a result, some activity areas have received funding well in excess of levels proposed in the 2002 nuclear security action plan, while other areas have remained under-funded.

According to IAEA's August 2004 report on the status of its nuclear security efforts, this may hamper the comprehensive approach necessary for effective nuclear security.

Another challenge related to IAEA's heavy reliance on voluntary contributions is its restricted ability to recruit and maintain sufficient staff to meet growing obligations. While donors have increased funding for nuclear security activities, IAEA has limited budgetary funds to pay for staff to meet its increased obligations. Only about 11 percent of IAEA's nuclear security resources, or \$1.35 million, comes from its budget. However, DOE officials told us that the agency's financial regulations prohibit voluntary funds from being used to pay for permanent staff costs. The officials said that while these voluntary funds could be used to pay for cost-free experts, this increases IAEA's reliance on cost-free experts, which are funded primarily by the United States. IAEA officials acknowledged that the agency's inability to use voluntary funds to pay for staff costs has been the largest administrative challenge to implementing its nuclear security program. However, according to IAEA's August 2004 nuclear security status report, the agency's administrative procedures are not designed for programs where the majority of funds come from voluntary contributions.

Further, IAEA indicated that the agency has not received sufficient funding to meet the needs of all of its nuclear security efforts. In April 2002, IAEA estimated that annual funding needs for its nuclear security program would be about \$32 million—\$12 million to support advisory missions and other program activities, and \$20 million for security equipment procurements and upgrades such as installing radiation detection equipment at countries' borders. However, IAEA's Board of Governors only approved voluntary funding for the advisory missions and other program activities, not for equipment procurements and upgrades. As a result, IAEA indicated that it has had to ask other countries for assistance in order to provide equipment urgently needed to respond to security problems identified through the agency's advisory missions. IAEA officials said that coordinating assistance between countries has been one of the challenges the agency has faced in improving states' nuclear security because some countries have been unwilling to share information with IAEA regarding the assistance they have received from, or given to, other countries. However, according to DOE officials, the U.S. position is that assistance to procure and upgrade security equipment should be provided on a bilateral basis, not by IAEA. Further, they questioned whether IAEA, through the development of

integrated nuclear security support plans and other initiatives, has effectively coordinated this assistance.

Finally, according to IAEA's 2004 nuclear security report and Department of State officials, unpredictable voluntary contributions by member states restrict the agency's ability to plan nuclear security activities. For example, IAEA data on Nuclear Security Fund pledges and receipts from 2002 through 2004 showed that 30 percent of the funds pledged to the agency were not provided in the same year they were pledged.²⁷ Furthermore, data for 2002 and 2003 indicated that funds were often not provided until later in the year. However, IAEA's financial regulations do not allow it to make expenditures based on pledges and, thus, contributions must be received before expenditures can be approved. One IAEA official said that this restriction prevents the agency from implementing certain activities according to its plan. The official told us that if nuclear security funding were more predictable and received in a more timely fashion, IAEA could hire staff sooner, and that activities such as conducting advisory missions and providing border monitoring equipment could be better planned and delivered. Further, participants at a December 2003 coordination meeting of Nuclear Security Fund donors recognized that IAEA faces a challenge in managing its nuclear security program without predictable resource levels. In an effort to ensure a more systematic approach, IAEA officials said that the agency develops multi-year activity plans as a basis for requesting contributions to the Nuclear Security Fund. However, the officials said that the timing of voluntary contributions still presents a challenge to implementing the nuclear security program.

Increased Assistance Demands Could Further Challenge IAEA's Ability to Plan and Implement Nuclear Security Activities

Future increases in demands for IAEA to provide assistance could further challenge the agency's ability to plan and implement nuclear security activities. For example, in July 2005, 88 countries and EURATOM adopted amendments to the Convention on the Physical Protection of Nuclear Material,²⁸ which could increase requests for IAEA assistance to enhance the security of countries' nuclear material and facilities. The existing convention requires countries who are party to it to protect nuclear

²⁷The United States was more timely with its contributions than other Nuclear Security Fund donors, with almost 74 percent of U.S. contributions arriving in the same year they were pledged, as opposed to about 63 percent of non-U.S. contributions.

²⁸The IAEA Director General, the depositary of the convention, was responsible for convening the group of experts that drafted the amendments and for coordinating the conference for countries to consider the amendments.

material used for peaceful purposes while in international transport, and to criminalize certain acts involving nuclear material. When in force, the adopted amendments will, among other things, expand the scope of the convention to include requirements for securing nuclear materials in peaceful domestic use, storage, and transport and for protecting domestic nuclear facilities against acts of sabotage. IAEA officials stated that the agency may experience a significant increase in requests for security assistance, particularly for advisory missions to assess the vulnerability of countries' material and facilities as a result of the amendments to the convention. Also, according to a Department of State official, IAEA will be responsible for providing leadership, training, and technical assistance, such as guidance in establishing legislative and regulatory infrastructures, to help countries to comply with their obligations under the amended convention. However, IAEA officials questioned whether the agency is planning sufficiently for the potential increase in its activities. Moreover, the officials stated that Nuclear Security Fund resources would be inadequate to meet countries' additional requests for advisory missions and for associated preparatory and follow-up actions.

In addition, IAEA could experience an increase in demand for its nuclear security assistance as a result of agency plans to implement a more comprehensive nuclear security program. According to IAEA's August 2004 nuclear security status report, the agency is developing a new plan of activities to be presented to the Board of Governors for approval in 2005. A primary objective of the plan would be the worldwide application of the agency's services and assistance to comprehensively improve countries' nuclear security. However, IAEA's reliance on voluntary contributions to fund its nuclear security program could create challenges in implementing this plan. For example, countries' conditions on the use of their funds could make it difficult for IAEA to achieve worldwide application of its comprehensive nuclear security approach. Further, IAEA's Deputy Director General of the Department of Nuclear Safety and Security said that for IAEA to meet its nuclear security goals, higher and more predictable resource levels will be required in the future.

IAEA Does Not Systematically Measure the Results of Its Nuclear Security Efforts

In addition to the challenges resulting from the agency's reliance on voluntary contributions, the United States has raised concerns about IAEA's ability to track the use of nuclear security funds and measure results in a systematic way. For example, according to Department of State officials, as a result of concerns over the planning and coordination of IAEA's nuclear security efforts, the United States requested that the Office

of Nuclear Security provide more results-oriented reporting on a systematic basis. In response, the agency created an information management system to track projects financed by the Nuclear Security Fund. According to IAEA officials, this system became operational at the beginning of 2004 and allows IAEA to report to donors on the use of their contributions. A Department of State official said that the United States received its first report in March 2005, and that this report contained adequate information on the use of U.S. contributions to the fund.

However, IAEA still does not systematically measure the results of its nuclear security activities. For example, while the agency is required to report periodically to the Board of Governors and the General Conference on its progress in implementing nuclear security activities, these reports do not indicate the extent to which the agency's efforts have helped to improve the security of nuclear material and facilities. For example, IAEA's 2004 nuclear security status report provided information on the countries for which it conducted physical protection advisory missions since July 2003 but did not report on the extent to which these missions actually improved security at nuclear facilities. Similarly, IAEA reported on its efforts to train member state representatives involved in combating illicit trafficking in materials. However, IAEA's report did not include an assessment of the extent to which the detection capabilities of personnel who attended these training sessions had increased.

Furthermore, while IAEA's 2004-2005 budget identified program objectives, outcomes, and performance indicators for the agency's nuclear security activities, the 2004 nuclear security status report did not always use these performance indicators to measure the agency's results. For example, two performance indicators identified in IAEA's 2004-2005 budget for meeting outcomes related to improving nuclear security and the capability of countries to detect and respond to malicious acts were (1) the number of people trained in agency-sponsored training courses and (2) the number of countries implementing agency-developed nuclear security guidelines and recommendations. However, the 2004 nuclear security report did not provide information on the numbers of country representatives trained, or countries implementing agency-developed guidelines and recommendations. IAEA officials said that the agency will soon begin work to assess program results based on the performance indicators identified in the budget, and that information on the number of country representatives trained will be included in a report to the Board of Governors in September 2005.

IAEA officials said that it is difficult for the agency to link nuclear security efforts, such as recommendations stemming from advisory missions, to results, such as whether recommendations were implemented. Other IAEA officials attributed this difficulty to the agency's limited advisory role, noting that states are not obligated to follow its guidelines or implement its recommendations. Moreover, IAEA officials said that while follow-up advisory missions can help to identify whether previous recommendations were implemented, IAEA has focused on generating new requests for advisory missions, not following up on past activities.

A DOE official who is responsible for developing and tracking nuclear security performance measures stated that it is possible to measure the performance of security activities even where explicit authority to require action does not exist. DOE and other U.S. agencies have implemented programs to improve the security of nuclear material both in the United States and in other countries. For example, DOE's National Nuclear Security Administration directs efforts to secure international borders against illicit trafficking, assist countries in improving the physical protection of their nuclear material and facilities, and enhance the security of radioactive material. The DOE official said that a first step to measure performance would be to develop data on output measures that IAEA can influence and that affect the achievement of outcomes. Such output measures could include the number of facilities where advisory missions are conducted, the number of people trained, or the amount of equipment provided. Subsequently, outcome-oriented measures could be created, such as the percentage of facilities IAEA assessed as having adequate security arrangements based on international standards.

Conclusions

IAEA is being called upon by its member states to assume a greater role in reducing the risks of nuclear proliferation. However, as its responsibilities continue to expand, IAEA faces a broad array of challenges that hamper its ability to fully implement strengthened safeguards measures and nuclear security activities. In order to maximize the impact and effectiveness of strengthened safeguards, most experts we talked to believe that universal compliance with and adherence to the Additional Protocol is needed. Although the United States is in the process of bringing the Protocol into force, the fact that it has not yet done so may provide other countries with an excuse not to do so as well. Progress towards increasing the number of countries that have brought the Additional Protocol into force should increase the political pressure on the remaining countries to do so and could make it more difficult to hide proliferation activities.

Even with the Additional Protocol in force, IAEA's ability to verify compliance with safeguards is limited in 76 countries that have small quantities of nuclear material. The small quantities protocols that IAEA's Board of Governors approves for these countries may increase the risk that nuclear proliferation activities could go undetected. Moreover, IAEA's human capital practices reduce the agency's effectiveness because, in some cases, they are rigidly applied regardless of the agency's overall needs. In light of the looming human capital crisis resulting from the upcoming turnover of senior safeguards staff and a shrinking pool of nuclear experts, ensuring that the agency hires, trains, and retains the most talented staff is critical to meet growing strengthened safeguards requirements.

Further, IAEA's system for funding its safeguards and nuclear security programs faces a number of challenges. Although the agency's recent emergence from a zero real growth budget for its safeguards system is a positive step, it may not be adequate to meet future needs. To make a convincing case to member states of its future resource requirements and ensure that its safeguards budget keeps pace with its changing workload, IAEA will need reliable cost estimates that are linked to resource needs for all its strengthened safeguards activities and a process to systematically evaluate these costs and resources over the long term. In addition, even with IAEA's recent safeguards budget increase, the agency will continue to rely heavily on voluntary contributions, particularly from the United States. While U.S. funding is essential for the program's continued viability, supporting safeguards is a shared responsibility, and the financial burden should be distributed more equitably among as many IAEA member states as possible. At the same time, we are concerned that the agency's reliance on countries' yearly voluntary contributions for the nuclear security program does not provide enough flexibility to effectively plan and implement nuclear security activities. While we recognize that this program is still evolving, member states may need to consider a different approach to funding these efforts so that the agency can plan its activities in a more systematic manner and meet its highest priority needs. Finally, we are concerned that in some instances IAEA may not be using safeguards resources in the most efficient manner given the agency's limited funds and growing responsibilities.

Another major challenge facing IAEA is its limited ability to assess the effectiveness of its strengthened safeguards system and nuclear security activities. The agency does not have systems in place to measure the impact of its strengthened safeguards or nuclear security activities. For example, IAEA reports on the number of inspections performed and the

countries where nuclear security advisory missions are conducted. While these measures are useful in reporting on IAEA's efforts, they do not assess the impact and effectiveness of its safeguards and nuclear security activities. As a result, the agency cannot provide member states assurance that its activities are detecting clandestine nuclear weapons programs or helping to secure nuclear and radioactive materials against sabotage and terrorist threats.

Recommendations for Executive Action

Because safeguards are a cornerstone of U.S. nonproliferation efforts, it is important that strengthened safeguards measures be applied in as many countries as possible. Therefore, we recommend that the Secretary of State, working with IAEA and its member states through the agency's Board of Governors, consider eliminating, or at a minimum, reducing the number of agreements that limit IAEA's authority to implement strengthened safeguards activities in countries with small quantities of nuclear material.

To help ensure that IAEA's safeguards and nuclear security programs are effective, the agency needs to systematically evaluate the results of its efforts. Therefore, we also recommend that the Secretary of State, working with IAEA and its member states through the agency's Board of Governors, consider developing clear and meaningful measures to better evaluate the effectiveness of IAEA's strengthened safeguards program and nuclear security activities.

Furthermore, to improve IAEA's personnel practices and its ability to determine resource requirements over the long term, we also recommend that the Secretary of State, working with IAEA and its member states through the agency's Board of Governors, consider:

- rectifying human capital practices that negatively impact IAEA's ability to recruit and retain the critical staff needed to implement strengthened safeguards and make changes as appropriate;
- developing a systematic process that forecasts safeguards budgetary requirements for the long term—beyond the current 2-year cycle;
- increasing efforts to encourage more member states to provide voluntary contributions to support IAEA's safeguards activities; and

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- determining whether the nuclear security program receives adequate regular budget funds, and ensure that voluntary contributions are provided with enough flexibility to plan and accomplish priority program objectives.

Finally, to maximize the benefits for safeguards-related activities, we recommend that the Secretary of State, in consultation with the managers of the U.S. safeguards technical support program, work with IAEA to consider ways to ensure that safeguards resources are allocated and spent in the most efficient manner. In particular, these efforts should focus on, among other things, encouraging IAEA to use the most cost effective means of travel, whenever possible.

Agency Comments and Our Evaluation

We provided the Department of State and IAEA with draft copies of this report for their review and comment. IAEA provided technical comments, which we incorporated as appropriate. The Department of State provided written comments, which are presented as appendix III. State also provided technical comments, which we incorporated in the report. The Department of State generally agreed with our findings, conclusions, and recommendations and noted that our recommendations offered reasonable ways that the administration can continue to work with IAEA to improve its effectiveness. The department also noted that the draft report fairly recognized the significant progress IAEA has made, with support from the United States and other member states, in strengthening the safeguards system and in supporting international efforts to improve the physical protection and security of nuclear materials.

In its written comments, the Department of State noted that countries with small quantities of nuclear material and countries without comprehensive safeguards agreements have very limited nuclear activities and therefore they are unlikely to compromise the effectiveness of the safeguards system. In addition, while agreeing that IAEA has a limited ability to measure the effectiveness of its strengthened safeguards activities, State indicated that the problem cannot be fully solved because of the difficulty in detecting undeclared activities. State also noted that our conclusion that IAEA cannot provide member states assurance that its activities are detecting undeclared nuclear weapons programs or helping secure nuclear and radioactive material is not fully consistent with the report's contents, which depict IAEA's successes in uncovering undeclared nuclear activities and the extent of its work in advising states on nuclear security.

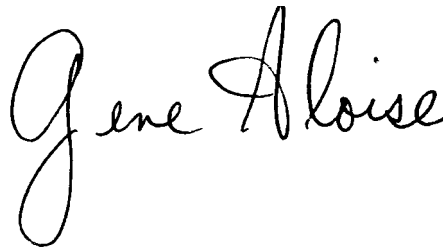
In our view, the report provides an accurate and reasonable view of the challenges facing IAEA's safeguards program, including the challenges posed by countries that have small quantities of nuclear material and are subject to limited safeguards measures as well as countries that are outside of the safeguards system entirely. A goal of the safeguards program is to ensure that all countries comply with and adhere to their safeguards obligations. By not applying the full scope of safeguards measures to over 100 countries IAEA's ability to detect secret nuclear activities is significantly limited. In fact, in response to IAEA's concerns regarding countries with small quantities of nuclear material, the agency's Board of Governors took the first steps to strengthen safeguards measures in countries with small quantities of nuclear material in September 2005. IAEA's Director General noted that these recent actions address some important limitations in the safeguards system.

We concur with the Department of State's belief that IAEA's limited ability to measure the impact of strengthened safeguards cannot be fully solved. In our report, we recognize the difficulty in developing performance measures for IAEA's strengthened safeguards activities, but we believe that it is important that IAEA continue to develop and refine such measures. Assessing the effectiveness of strengthened safeguards in detecting clandestine nuclear weapons programs is an essential element in evaluating the agency's overall performance.

Finally, the Department of State commented that our conclusion—that IAEA cannot provide assurance that it is detecting clandestine nuclear weapons programs or helping to secure nuclear and radioactive materials—is not fully consistent with the body of the report. We noted in the report that IAEA has achieved success in disclosing clandestine nuclear activities in certain countries, particularly in Iran, South Korea, and Egypt. We also noted that IAEA has increased its efforts to help countries secure their nuclear material. However, since IAEA has not developed a systematic approach to measure the impact and effectiveness of its strengthened safeguards and nuclear security programs, the agency cannot track its progress in improving its ability to detect clandestine nuclear programs or ensuring that the nuclear security of member states' nuclear material has improved. A systematic approach to measuring performance would add a greater degree of transparency to IAEA's safeguards and nuclear security programs, and would also provide member states' with a clearer understanding of how the agency reaches conclusions about countries' compliance with their safeguards obligations.

As agreed with your offices, unless you publicly release the contents of this report earlier, we plan no further distribution until 30 days from the report date. We will then send copies of this report to the Secretary of Energy; the Administrator, National Nuclear Security Administration; the Secretary of State; the Secretary of Defense; the Chairman, Nuclear Regulatory Commission; the Director, Office of Management and Budget; and interested congressional committees. We are also providing IAEA's Deputy Directors General for Safeguards and Nuclear Safety and Security with copies of this report. We will also make copies available to others upon request. In addition, this report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions concerning this report, I can be reached at 202-512-3841 or aloisee@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix IV.

A handwritten signature in black ink that reads "Gene Aloise". The signature is written in a cursive style with a large, looped initial "G".

Gene Aloise
Director, Natural Resources
and Environment

Scope and Methodology

To identify the steps IAEA has taken to strengthen its safeguards system and assess the challenges IAEA faces in implementing strengthened safeguards, we obtained and analyzed documentation on IAEA's strengthened safeguards activities, including reports to IAEA's Board of Governors, such as the agency's annual reports on safeguards implementation, strategic planning documents, and internal briefings. In December 2004 and March 2005 we visited IAEA Headquarters in Vienna, Austria, to meet with IAEA officials from the Department of Safeguards, including the Deputy Director General and the directors and staff responsible for managing inspection activities, collecting and analyzing satellite imagery and open source information, and purchasing safeguards equipment, and from the Office of External Relations. We observed a demonstration of remote monitoring and other surveillance equipment at IAEA Headquarters, and we toured IAEA's Seibersdorf Analytical and Clean Laboratories, where environmental samples are analyzed. Further, we obtained the views of officials from the U.S. Mission to the U.N. System Organizations in Vienna on the progress IAEA had made in implementing strengthened safeguards measures since we last reported on safeguards in 1998. While in Vienna, we also conducted structured interviews with a nonprobability sample¹ of representatives from IAEA member states in March 2005 to obtain their views on IAEA's strengthened safeguards system and nuclear security activities.

We developed the structured interview guide for interviewing representatives from IAEA member states by identifying the issues related to the effectiveness and progress of IAEA's safeguards and nuclear security programs and drafting questions to address these issues. Because the practical difficulties of developing and administering a structured interview guide may introduce errors—resulting from how a particular question is interpreted, for example, or from differences in the sources of information available to respondents in answering a question—we included steps in the development and administration of the structured interview guide for the purpose of minimizing such errors. After initial drafting, internal GAO review, and pretesting and modification of the structured interview guide, we further modified the structured interview protocol on the basis of pretesting and comments from two Department of State officials with extensive experience with IAEA's safeguards and nuclear security

¹Results from nonprobability samples cannot be used to make inferences about a population, because in a nonprobability sample some elements of the population being studied have no chance or an unknown chance of being selected as part of the sample.

activities. We finalized the structured interview guide after conducting pretests with a member of the U.S. Mission and an IAEA representative from the Czech Republic.

We identified a nonprobability sample of 25 IAEA member states to respond to our structured interview guide, designed to ensure the inclusion of a range of views across different types of member states. Our sample included states that belong to IAEA's 35-member Board of Governors, which provides overall policy direction and oversight to IAEA; both nuclear and non-nuclear weapons states; states that differ with respect to bringing into force new strengthened safeguards measures; states that do not belong to the Board of Governors, but offer valuable insights into the challenges IAEA faces in detecting undeclared activities and strengthening its safeguards program; and states with special safeguards agreements with IAEA. Of the 25 IAEA member states selected for interviews, we completed interviews with representatives from 9 member states. We completed in-person interviews with Canada, China, Germany, Hungary, Israel, Russia, the United Kingdom, and the United States. We obtained written responses to the structured interview guide from Japan. We were unable to complete interviews with the other 16 member states because representatives from those countries were unwilling to respond to our questions in the absence of official government approval of their responses. However, the nine responses we received reflect a broad range of views of member state representatives from the selection categories listed above, including states that differ with respect to bringing into force new strengthened safeguards measures and states with special safeguards agreement with IAEA.

In addition, to assess IAEA's progress in strengthening safeguards and the challenges it faces, we met with and gathered data from U.S. officials from the Department of State's Office of Multilateral Nuclear Affairs, the Department of Energy's Office of International Safeguards, the Department of Defense's Air Force Technical Applications Center, the Department of Commerce in Washington, D.C.; the Nuclear Regulatory Commission in Rockville, Maryland; Brookhaven National Laboratory in New York; and Sandia and Los Alamos National Laboratories in New Mexico. We also obtained independent assessments and reports on IAEA safeguards from the Departments of State and Energy. Further, we met with experts knowledgeable about safeguards and nonproliferation issues, including from the Monterey Institute of International Studies and the Massachusetts Institute of Technology. We also interviewed former IAEA inspectors, cost-free experts, and the head of IAEA's unattended remote monitoring systems unit to discuss the agency's personnel policies. Lastly, we met with

representatives from Aquila Technologies, which provides IAEA with the majority of its surveillance equipment, and toured its production facility.

To identify the extent of IAEA's reliance on the United States to finance safeguards activities, we met with officials from IAEA's Departments of Management and Safeguards, including the Director of the Division for Budget and Finance and other staff involved in safeguards budgeting, and the Departments of State, Energy, and Defense and the Nuclear Regulatory Commission, and Brookhaven, Los Alamos, and Sandia National Laboratories. We gathered financial data from these sources on U.S. and other member states' assessed, voluntary, and technical support contributions to IAEA's safeguards program from 1998 through 2004. We chose 1998 as the starting year for our analysis to continue the data presented in our 1998 report on U.S. contributions to IAEA's safeguards program. While 2004 was the last year for which complete data on IAEA's safeguards budget and U.S. contributions were available, we present some 2005 estimates where possible. Based on our discussions with U.S. and IAEA officials, we defined voluntary contributions as cash contributions to IAEA, while technical support contributions are defined as funding used to assist IAEA's efforts but not directly provided to IAEA. Further, we analyzed documentation, such as reports from the Office of Internal Oversight Services, an independent group of safeguards experts, and IAEA's Board of Governors, as well as budget and strategic planning documents. We also held discussions with IAEA and U.S. officials to determine the extent to which IAEA evaluates long-term resource requirements.

In our analysis of assessed, voluntary, and technical support contributions to IAEA's safeguards budget we used (1) IAEA data on its assessed safeguards budget; (2) IAEA data on U.S. payments towards its safeguards assessment; (3) IAEA data on voluntary contributions from countries other than the United States; (4) Department of State data on U.S. voluntary contributions to IAEA's safeguards program; and (5) data from the Departments of State, Energy, and Defense and the Nuclear Regulatory Commission to estimate U.S. technical support to IAEA's safeguards program. Since a portion of member states' assessed contributions to IAEA's budget is made in euros (prior to 2002 non-dollar contributions were made in Austrian schillings), we used exchange rates based on the International Monetary Fund's International Financial Statistics to show the dollar value of the non-dollar portion of IAEA's assessed safeguards budget and U.S. contributions. We calculated the non-dollar portion of IAEA's assessed safeguards budget using an average annual exchange rate.

We calculated the non-dollar portion of U.S. payments towards its safeguards assessment using an average monthly exchange rate for the month in which the payments were made to IAEA.² Also, we used the average monthly exchange rates from January through July 2005 to estimate the dollar value of the non-dollar portions of the 2005 IAEA safeguards budget and U.S. safeguards assessment. Additionally, IAEA data on U.S. payments did not indicate the portion applicable to safeguards versus other IAEA programs. To identify the safeguards portion of U.S. non-dollar payments, we used the percentage of the total U.S. non-dollar assessment for each year that IAEA data indicated was for safeguards. Finally, in some cases it was not possible to obtain a complete breakdown of U.S. support that was provided as voluntary contributions versus technical support. In such instances, we characterized U.S. support as voluntary contributions for purposes of consistency.

To describe how IAEA is helping its member states better secure their nuclear material and facilities from nuclear terrorism and identify impediments to implementing the program, we collected and analyzed documentation, including IAEA's yearly reports to its Board of Governors on its nuclear security program. We also met with officials from IAEA's Offices of Nuclear Security and Legal Affairs, and the Departments of State and Energy, the Nuclear Regulatory Commission, and Sandia National Laboratory. Moreover, we also toured IAEA's Nuclear Security Equipment Laboratory at IAEA Headquarters and observed a demonstration of hand held radiation detection equipment. We obtained IAEA, Department of State, and Department of Energy financial data on contributions to the Nuclear Security Fund in order to describe the extent to which IAEA relies on U.S. support for its nuclear security program, and to analyze the timing of contributions to the fund.³ Further, we gathered data from the Department of Energy and the Nuclear Regulatory Commission to estimate U.S. technical support to IAEA's nuclear security program. Similar to our

²U.S. assessed payments to IAEA's budget are not always made in the same year for which they are assessed. Our analysis used exchange rates at the actual time of payment to identify the dollar value of these contributions. However, we present U.S. contributions according to the year for which they were assessed, not the year in which they were actually paid. Additionally, in some cases, previous years' surpluses are credited to member states' assessed contribution balances. We calculated the value of the non-dollar portion of these credits using an average of the September and October exchange rates because an IAEA official indicated that cash surpluses are made available to member states to credit towards their budget assessment during these months.

³We did not include interest paid on Nuclear Security Fund contributions in our analysis.

analysis of contributions to IAEA's safeguards program, we defined technical support as funding used to assist IAEA's efforts but not directly provided to IAEA.

To assess the reliability of all these data we received—the safeguards and nuclear security budget and contribution data—we met with IAEA and U.S. officials to discuss these data in detail, and we compared data from different sources to identify any discrepancies. We also obtained and reviewed responses from key officials with IAEA and each of the U.S. agencies to a series of data reliability questions that addressed such areas as data entry, data access, quality control procedures, and data accuracy and completeness. Follow-up questions were added as necessary. In addition, we obtained written responses from the Department of Safeguards and U.S. officials to clarify discrepancies in the data we received. Based on this work, we determined that the data were sufficiently reliable for the purposes of this report.

We conducted our review from October 2004 through August 2005 in accordance with generally accepted government auditing standards.

Countries' Safeguards Agreements with IAEA That Are In Force, as of July 2005

State	Comprehensive safeguards agreement	Additional protocol	Small quantities protocol	Integrated safeguards
Non-nuclear weapons states				
Afghanistan	X	X	X	
Albania	X			
Algeria	X			
Andorra				
Angola				
Antigua and Barbuda	X		X	
Argentina	X			
Armenia	X	X		
Australia	X	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				
Brazil	X			
Brunei Darussalam	X		X	
Bulgaria	X	X		X
Burkina Faso	X	X	X	
Burundi				
Cambodia	X		X	
Cameroon	X		X	
Canada	X	X		
Cape Verde				
Central African Republic				

**Appendix II
Countries' Safeguards Agreements with
IAEA That Are In Force, as of July 2005**

(Continued From Previous Page)

State	Comprehensive safeguards agreement	Additional protocol	Small quantities protocol	Integrated safeguards
Chad				
Chile	X	X		
Colombia	X			
Comoros				
Congo, Republic of the				
Cost 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	
Fiji	X		X	
Finland	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				

**Appendix II
Countries' Safeguards Agreements with
IAEA That Are In Force, as of July 2005**

(Continued From Previous Page)

State	Comprehensive safeguards agreement	Additional protocol	Small quantities protocol	Integrated safeguards
Guinea-Bissau				
Guyana	X		X	
Haiti				
Holy See	X	X	X	
Honduras	X		X	
Hungary	X	X		X
Iceland	X	X	X	
Indonesia	X	X		X
Iran ^b	X			
Iraq	X			
Ireland	X	X		
Italy	X	X		
Jamaica	X	X		
Japan	X	X		X
Jordan	X	X	X	
Kazakhstan	X			
Kenya				
Kiribati	X		X	
Korea, Republic of	X	X		
Kuwait	X	X	X	
Kyrgyzstan	X		X	
Laos	X		X	
Latvia	X	X		
Lebanon	X		X	
Lesotho	X		X	
Liberia				
Libya ^c	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	

**Appendix II
Countries' Safeguards Agreements with
IAEA That Are In Force, as of July 2005**

(Continued From Previous Page)

State	Comprehensive safeguards agreement	Additional protocol	Small quantities protocol	Integrated safeguards
Marshall Islands	X	X		
Mauritania				
Mauritius	X		X	
Mexico	X			
Micronesia				
Monaco	X	X	X	
Mongolia	X	X	X	
Morocco	X		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				
Nigeria	X			
Norway	X	X		X
Oman				
Palau	X	X		
Panama	X	X	X	
Papua New Guinea	X		X	
Paraguay	X	X	X	
Peru	X	X		X
Philippines	X			
Poland	X	X		
Portugal	X	X		
Qatar				
Republic of Molodova				
Romania	X	X		
Rwanda				
St. Kitts and Nevis	X		X	
St. Lucia	X		X	
St. Vincent and the Grenadines	X		X	
Samoa	X		X	

**Appendix II
Countries' Safeguards Agreements with
IAEA That Are In Force, as of July 2005**

(Continued From Previous Page)

State	Comprehensive safeguards agreement	Additional protocol	Small quantities protocol	Integrated safeguards
San Marino	X		X	
Sao Tome and Principe				
Saudi Arabia				
Senegal	X		X	
Serbia and Montenegro	X			
Seychelles	X	X	X	
Sierra Leone				
Singapore	X		X	
Slovakia	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		
Syria	X			
Tajikistan	X	X	X	
Thailand	X			
The Former Yugoslav Republic of Macedonia	X		X	
Timor-Leste				
Togo				
Tonga	X		X	
Trinidad and Tobago	X		X	
Tunisia	X			
Turkey	X	X		
Turkmenistan				
Tuvalu	X		X	
Uganda				
Ukraine	X			
United Arab Emirates	X		X	

**Appendix II
Countries' Safeguards Agreements with
IAEA That Are In Force, as of July 2005**

(Continued From Previous Page)

State	Comprehensive safeguards agreement	Additional protocol	Small quantities protocol	Integrated safeguards
United Republic of Tanzania	X	X	X	
Uruguay	X	X		
Uzbekistan	X	X		X
Vanuatu				
Venezuela	X			
Vietnam	X			
Yemen	X		X	
Zambia	X		X	
Zimbabwe	X		X	
Nuclear weapons states with voluntary safeguards agreements in force				
China	X	X		
France	X	X		
Russia Federation	X			
United Kingdom	X	X		
United States	X			
States with special safeguards agreements				
India				
Israel				
Pakistan				

Source: GAO analysis of IAEA data.

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

^bAlthough Iran has not ratified the Additional Protocol, it is acting as if the Additional Protocol was in force.

^cAlthough Libya has not ratified the Additional Protocol, it is acting as if the Additional Protocol was in force.

Comments from the Department of State



United States Department of State
Assistant Secretary and Chief Financial Officer
Washington, D.C. 20520

SEP 22 2005

Ms. Jacquelyn Williams-Bridgers
Managing Director
International Affairs and Trade
Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548-0001

Dear Ms. Williams-Bridgers:

We appreciate the opportunity to review your draft report, "NUCLEAR NONPROLIFERATION: IAEA Has Strengthened Its Safeguards and Nuclear Security Programs, but Weaknesses Need to Be Addressed," GAO Job Code 360518.

The enclosed Department of State comments are provided for incorporation with this letter as an appendix to the final report.

If you have any questions concerning this response, please contact Robert Newman, Action Officer, Bureau of International Security and Nonproliferation, at (202) 647-9715.

Sincerely,

A handwritten signature in black ink, appearing to read "Sid Kaplan".

Sid Kaplan (Acting)

cc: GAO – Glen Levis
NP - Rademaker
State/OIG – Mark Duda

**Department of State Comments on GAO Draft Report
Nuclear Nonproliferation: IAEA Has Strengthened Its Safeguards and
Nuclear Security Programs, but Weaknesses Need to Be Addressed
(GAO-06-000, GAO Code 360518)**

Thank you for the opportunity to comment on your draft report entitled “Nuclear Nonproliferation: IAEA Has Strengthened Its Safeguards and Nuclear Security Programs, but Weaknesses Need to Be Addressed.” The Department of State welcomes the report and generally agrees with its findings. Over the past nine months, the Department has worked closely with the GAO team to assist in the latter’s efforts to evaluate the IAEA’s programs. We are grateful for the quality and substance of your efforts.

The President has emphasized the threat that weapons of mass destruction, and particularly proliferation of nuclear weapons, pose to America and the world. The Administration has actively pursued a range of policies to construct and strengthen a multi-layered defense against that threat. The IAEA and its programs are an important component of this nonproliferation framework.

In the broader nuclear area, with U.S. leadership, the Proliferation Security Initiative has enhanced the readiness of participating countries to interdict illicit transfers of nuclear technology and nuclear materials; the UN Security Council adopted resolution 1540, establishing for the first time binding obligations on all UN member states to enact and enforce legal measures against proliferation; the G-8 Global Partnership against WMD has secured and eliminated weapons-related facilities and materials and redirected the scientific communities involved in WMD projects into civilian arenas; the Global Threat Reduction Initiative has identified and secured potentially dangerous nuclear materials; our ongoing nuclear threat reduction programs have helped deter and detect illicit nuclear exports through strengthened export controls, anti-smuggling, detection, and law enforcement tools at border crossings; the dismantlement of the A. Q. Khan nuclear trafficking network has impeded would-be proliferators’ efforts to acquire key technologies; and negotiations have led to the verified dismantlement of Libya’s previously covert nuclear programs and to an agreement in principle by North Korea to verifiably dismantle its nuclear programs.

Additionally, the world must create a safe, orderly system to field civilian nuclear plants without adding to the danger of weapons proliferation. Enrichment and reprocessing are not necessary for nations seeking to harness nuclear energy for peaceful purposes. Both the President and the Director General of the IAEA

have recognized that this is an inherent weakness in the nonproliferation regime that cannot be solved only by means of more effective safeguards. The world's leading nuclear exporters should ensure that states have reliable access at reasonable cost to fuel for civilian reactors, so long as those states renounce enrichment and reprocessing.

The IAEA plays important roles in this broad policy framework. Its safeguards system is an essential part of efforts to deter and detect covert nuclear activities in non-nuclear weapon states parties to the Nuclear Non-Proliferation Treaty (NPT), and thus helps to prevent production of weapons materials and weapons at their source. Its nuclear security programs also contribute to broader national and international efforts to secure nuclear facilities and nuclear materials in many nations, reducing the risk that materials will fall into dangerous hands. The Administration has devoted significant attention and resources to strengthening the IAEA and its key programs and to maximizing their effectiveness in these key areas.

The Administration has continued U.S. leadership to ensure the full and effective implementation of the IAEA's strengthened safeguards system. At the technical level, we continue to work closely with the IAEA to ensure that its methods and technologies effectively help deter and detect the diversion of nuclear material, the presence of undeclared nuclear material and activities, and the use of covert nuclear facilities. As your report reflects, we provide significant funding, technical advice, and technical support for the safeguards system. In addition to working to ensure the system as a whole is as strong as possible, we have worked to ensure its effective use in countries of concern. IAEA inspections have confirmed two decades of Iran's significant noncompliance with its safeguards obligations.

It is also important to emphasize that for the IAEA safeguards system to be effective, it must be enforced and noncompliant activities must be reported. It is the charge of the International Atomic Energy Agency not only to uncover covert nuclear activity around the world but also to report noncompliance to the U.N. Security Council.

The President proposed, in February 2004, the establishment of a special committee of the IAEA Board of Governors to strengthen the capability of the IAEA to ensure that nations comply with their international obligations. Based on this proposal, the Board of Governors established such a committee in June 2005; it is scheduled to meet for the first time this fall. We also will be looking for ways

to encourage acceptance of the principle, as espoused by the President in February 2004, that only states in compliance with their non-proliferation obligations should serve on the Board and the new Committee.

The Administration has worked with the IAEA, with the G-8, and bilaterally to promote universal adherence to comprehensive safeguards agreements and Additional Protocols. In 2004, under U.S. leadership, the G-8 undertook a global program of joint demarches, with a joint letter from the G-8 Foreign Ministers, urging adherence to these instruments. The USG also gained agreement in the Asia Pacific Economic Cooperation (APEC) Forum last year that all APEC economies that had not yet done so would aim to sign Additional Protocols by the end of 2005. We intend to continue such efforts, which are consistent with the recommendations of your report. We also continue to work to bring the U.S. Additional Protocol into force.

The Administration also sought and obtained in 2003 a significant increase in the IAEA's budget. The bulk of this increase (\$19.4 million of \$25.1 million overall, or 77%) is for safeguards. This increase, the first in nearly 20 years, is being phased in over a four-year period (2004-2007). The IAEA had grown excessively dependent on voluntary contributions, largely from the United States, to carry out its safeguards responsibilities. The budget increase substantially closes the funding gap, although as the draft report notes the IAEA will remain heavily dependent on voluntary assistance from member states, particularly for safeguards research and development. The United States will continue to support adequate funding for an effective safeguards system.

The Administration has strongly supported the strengthening and expansion of IAEA nuclear security programs. Working with the Agency and with like-minded member states, we have been successful in achieving a much strengthened Convention on the Physical Protection of Nuclear Material; significantly broadened IAEA guidance for strengthening physical security at nuclear facilities, expanded and strengthened IAEA programs of assistance, including assessments aimed at strengthening the security of nuclear facilities, nuclear material and radioactive sources in Member States; and further strengthened standards for the protection of radioactive sources. The USG has also made significant extra-budgetary contributions to IAEA nuclear security programs, and successfully solicited nuclear security contributions from other states, to support these initiatives.

The Department of State generally agrees with GAO's findings and the thrust of its conclusions and recommendations. In our view these fairly recognize the significant progress the IAEA has made, with the support of the United States and other member states, in strengthening its safeguards system and in supporting international efforts to improve physical protection and security of nuclear materials. The draft report also reasonably portrays key weaknesses and challenges to the IAEA's efforts.

We take a slightly different view of two issues that the report characterizes as challenges facing implementation of the IAEA's strengthened safeguards system. First, regarding the lack of safeguards coverage for states with small quantities of nuclear material or without safeguards agreements in force, we agree with GAO this gap in safeguards coverage should be corrected, as the IAEA, the United States, and other like-minded states are already working to do. However, because the states in question have very limited nuclear activities, and in many cases limited scientific and industrial infrastructure, we would note that for the most part, this gap in the IAEA's ability to verify compliance is unlikely to compromise the effectiveness of the safeguards system.

Second, the USG has long supported efforts to assess the effectiveness of IAEA programs, and we agree with the report that the IAEA has limited ability to measure the effectiveness of its strengthened safeguards measures. However, we do not believe that problem can be fully solved. The effectiveness of traditional safeguards has long been assessed with reasonable thoroughness, but success in detecting undeclared activities is much harder to measure. A full assessment would implicitly require information about the presence or absence of covert activities as a basis for judging success in their detection.

We also believe the report's conclusion on this point, that "the Agency cannot provide member states assurance that its activities are detecting clandestine nuclear weapons programs or helping secure nuclear and radioactive materials," is not fully consistent with the body of the report which discusses the IAEA's success in uncovering undeclared nuclear activities in Iran and Egypt and the extent of its work advising states on nuclear security. We believe the Agency does provide meaningful assurances that its activities in both safeguards and nuclear material security are contributing to U.S. and global security. Nevertheless, we continue to support improved assessment of effectiveness in IAEA programs.

The report's recommendations offer a reasonable list of ways the Administration can continue to work with the IAEA to improve its effectiveness.

As we have discussed above, efforts are under way on a number of these points. We expect to continue to push forward with these and other initiatives to improve the Agency's effectiveness and performance, within the broader framework of our nuclear nonproliferation policy.

GAO Contact and Staff Acknowledgments

GAO Contact

Gene Aloise (202) 512-3841

Staff Acknowledgments

In addition to the contact named above, Virginia Chanley; Leland Cogliani; Nancy Crothers; Glen Levis; Christopher Murray; Judy Pagano; Keith Rhodes (GAO's Chief Technologist); and F. James Shafer, Jr., made key contributions to this report.

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