United States Government Accountability Office

GAO

Report to the Permanent Subcommittee on Investigations, Committee on Homeland Security and Governmental Affairs, U.S. Senate

June 2008

NUCLEAR SECURITY

NRC and DHS Need to Take Additional Steps to Better Track and Detect Radioactive Materials

GAO-08-598

June 2008

NUCLEAR SECURITY

NRC and DHS Need to Take Additional Steps to Better Track and Detect Radioactive Materials

GAO Accountability • Integrity • Reliability

Highlights

Highlights of GAO-08-598, a report to the Permanent Subcommittee on Investigations, Committee on Homeland Security and Governmental Affairs, U.S. Senate

Why GAO Did This Study

Concerns have grown that terrorists could use radioactive materials and sealed sources (materials sealed in a capsule) to build a "dirty bomb"— a device using conventional explosives to disperse radioactive material. In 2003, GAO found weaknesses in the Nuclear Regulatory Commission's (NRC) radioactive materials licensing process and made recommendations for improvement. For this report, GAO assesses (1) the progress NRC has made in implementing the 2003 recommendations, (2) other steps NRC has taken to improve its ability to track radioactive materials, (3) Customs and Border Protection's (CBP) ability to detect radioactive materials at land ports of entry, and (4) CBP's ability to verify that such materials are appropriately licensed prior to entering the United States. To perform this work, GAO assessed documents and interviewed NRC and CBP officials in headquarters and in several field locations.

What GAO Recommends

GAO recommends NRC take steps to ensure that the current target dates for launching new systems are not further postponed. GAO recommends CBP more effectively communicate guidance on when officers must verify the legitimacy of radioactive materials and take steps to ensure that this guidance is being followed. NRC neither agreed nor disagreed with GAO's findings and recommendations but described its efforts to implement GAO's 2003 recommendations and its plans to implement GAO's 2008 recommendations. CBP agreed with GAO's recommendations.

To view the full product, including the scope and methodology, click on GAO-08-598. For more information, contact Gene Aloise at (202) 512-3841 or aloisee@gao.gov.

What GAO Found

NRC has implemented three of the six recommendations in GAO's 2003 report on the security of radioactive sources. It has worked with the 35 states to which it ceded primary authority to regulate radioactive materials and sources and others to (1) identify sealed sources of greatest concern, (2) enhance requirements to secure radioactive sources, and (3) ensure security requirements are implemented. In contrast, NRC has made limited progress toward implementing recommendations to (1) modify its process for issuing licenses to ensure that radioactive materials cannot be purchased by those with no legitimate need for them, (2) determine how to effectively mitigate the potential psychological effects of malicious use of such materials, and (3) examine whether certain radioactive sources should be subject to more stringent regulations. Beyond acting on GAO's recommendations, NRC has also taken four steps to improve its ability to monitor and track radioactive materials. First, NRC created an interim national database to monitor the licensed sealed sources containing materials that pose the greatest risk of being used in a dirty bomb. Second, NRC is developing a National Source Tracking System to replace the interim database and provide more comprehensive, frequently updated information on potentially dangerous sources. However, this system has been delayed by 18 months and is not expected to be fully operational until January 2009. Third, NRC is also developing a Web-based licensing system that will include more comprehensive information on all sources and materials that require NRC or state approval to possess. Finally, NRC is developing a license verification system that will draw information from the other new systems to enable officials and vendors to verify that those seeking to bring these radioactive materials into the country or purchase them are licensed to do so. However, these systems are more than 3 years behind schedule and may not include the licensing information, initially at least, on radioactive materials regulated by agreement states—which represent over 80 percent of all U.S. licenses for such materials. The delays in the deployment and full development of these systems are especially consequential because NRC has identified their deployment as key to improving the control and accountability of radioactive materials.

While CBP has a comprehensive system in place to detect radioactive materials entering the United States at land borders, some equipment that is used to protect CBP officers is in short supply. Specifically, vehicles, cargo, and people entering the United States at most ports of entry along the Canadian and Mexican borders are scanned for radioactive materials with radiation detection equipment capable of detecting very small amounts of radiation. However we found that personal radiation detectors are not available to all officers who need them. Moreover, while CBP has systems in place to verify the legitimacy of radioactive materials licenses, it has not effectively communicated to officers at the borders when they must contact officials to verify the license for a given sealed source. Consequently, some CPB officers are not following current guidance, and some potentially dangerous radioactive materials have entered the country without license verification.

Contents

Figures

Abbreviations

CBP	Customs and Border Patrol
DHS	Department of Homeland Security
EPA	Environmental Protection Agency
IAEA	International Atomic Energy Agency
IND	improvised nuclear devices
NRC	Nuclear Regulatory Commission
NSTS	National Source Tracking System
PAG	Protective Action Guides
RIID	radiation isotope identification device
RDD	radiological dispersal device

GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

June 19, 2008

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

Radioactive sealed sources, which are commonly used throughout the world for a variety of purposes, are radioactive materials sealed in a capsule or permanently bonded in a solid form. These sealed sources are used in medicine and in the oil and gas, electric power, construction, and food industries. For example, devices containing radioactive sealed sources are used to diagnose and treat millions of patients each year, sterilize items such as medical instruments and food, and detect flaws in the metal welds in pipelines. Currently, about 2 million sealed sources are licensed for use in the United States. Since terrorists attacked the United States in 2001, concerns have grown that they could obtain and use sealed sources to build a "dirty bomb"—a type of radiological dispersal device (RDD) that uses conventional explosives to disperse radioactive material.

The consequences of detonating an RDD depend on the amount and type of radioactive material used and the size and characteristics of the area in which the material is dispersed. In many scenarios, an RDD would cause few deaths or injuries, but significant economic effects could result. In particular, the affected area would need to be decontaminated and people who work or live in the affected area might not return to their homes or businesses for an extended period of time because they fear the consequences. Generally, the smaller or more confined the area in which a given amount of radioactive material is dispersed, the more severe the consequences. Accordingly, depending upon the circumstances, even small amounts of material can be potentially dangerous. For example, a relatively small quantity of a particular material dispersed over many city blocks could be disruptive and result in an evacuation while first responders assessed the extent of the contamination and determined the need for a cleanup. In this case, the small quantity of this material might not cause immediate health effects or require significant cleanup, but it could result in economic and psychological consequences if people were

temporarily evacuated from their businesses and homes. However, the same small quantity of the same material dispersed in a more confined setting, such as a restaurant or enclosed subway station, would also result in an evacuation and would prevent people from returning to the affected area until a more extensive cleanup could be completed. Moreover, those exposed to radiation under this scenario could experience radiation sickness, with symptoms that include nausea, vomiting, and diarrhea. If exposure is extended, the result can be permanent injury or death. Finally, larger amounts of this same radioactive material spread over a larger area could produce more significant consequences. (For further discussion of the potential effects of an RDD, see app. I.)

Until 2001, oversight of radioactive sealed sources in the United States largely focused on ensuring that such sources were licensed as required and used and stored safely. In the years after 2001, security concerns surrounding radioactive sealed sources received greater attention nationally and internationally. For example, in May 2003, the Nuclear Regulatory Commission (NRC) and the Department of Energy (DOE), relying in part on a 2002 study by Sandia National Laboratories[1] that, among other things, identified several radionuclides—the particular types of radioactive material used in sealed sources—that are most commonly used in the United States and that pose the greatest risk of being used by terrorists to make an RDD.[2] Also that year, the International Atomic Energy Agency (IAEA) published a system for ranking quantities of individual radionuclides into one of five categories on the basis of their potential to harm human health.[3] Under IAEA's system, a given radionuclide is considered "dangerous" when gathered in close proximity to people in sufficient quantity to cause direct human health effects.[4] A

[1]Sandia National Laboratories, located in Albuquerque, New Mexico, and Livermore, California, are 2 of the more than 20 national laboratories and technology centers overseen by DOE.

[2]A radionuclide is an unstable, radiation-emitting nuclide. A nuclide is a particular atomic form of an element distinguished from other nuclides by its number of neutrons and protons, as well as by the amount of energy it contains. Every known element has multiple (radio)nuclides. For example, cesium has many radionuclides, and each is suited to different purposes—cesium-133 is used in atomic clocks, and cesium-137 is used as an irradiator to sterilize blood and in other medical radiation devices for treating cancer.

[3]The IAEA Safety Guide #RS-G-1.9, "Categorization of Radioactive Sources," details the underlying methodology for the five-category scheme.

[4]Direct, or nonprobabilistic, human health effects are readily observable, may be acute, and are, accordingly, more severe than the elevated risk of a future health effect, such as cancer.

category 1 quantity of a given radionuclide, the most dangerous, is defined as an amount 1,000 times or more than the amount necessary to cause permanent human injury; a category 2 quantity is defined as an amount at least 10 times but less than 1,000 times the amount necessary to cause permanent human injury. A category 3 quantity of a given radionuclide is defined as at least the minimum amount, but less than 10 times the amount, sufficient to cause permanent injury. Category 4 and 5 quantities of radioactive materials are unlikely to cause permanent injury. In September 2003, the United States and other nations endorsed IAEA's Code of Conduct, which sets forth basic principles and guidance to promote the safe and secure use of sealed sources containing sufficient quantities of radioactive material to be categorized as dangerous. The Code of Conduct applies to categories 1, 2, and 3—all of which are potentially dangerous to human health and could, if not properly controlled, cause permanent injuries or death to a person who handled it or who was otherwise in contact with it.

How dangerous any given type of radioactive material is depends on its activity level, or intensity; how long exposure lasts; and the way in which the body is exposed to it—via inhalation, ingestion, or external exposure. The different types of radiation—including alpha, beta, gamma, and neutron—also vary in how easy or difficult they are to block, or shield, and this variation, in turn, affects the threat to health that a particular type of radiation poses. Depending on the intensity and length and manner of exposure, health effects range from death, to severe injury, to the development of cancer, to no discernable damage. For example, alpha radiation poses little threat to human health from external exposure but poses considerable health risks if inhaled or ingested. Gamma radiation is more penetrating and, if not properly shielded, can cause injury or death through external exposure. Although sources of neutron radiation are less common, neutron radiation is emitted from some materials that are used to make nuclear weapons. Thus, tools that can detect neutron radiation are particularly important for national security purposes, such as securing our borders.

An underlying goal of federal and state regulation of radioactive materials is to protect people from health effects caused by exposure to harmful levels of radiation. The Atomic Energy Act gives NRC primary responsibility for regulating most domestic industrial, medical, and research uses of radioactive materials to protect public health and safety. The act authorizes NRC to relinquish primary regulatory authority over radioactive materials to states (called "agreement" states) that agree to meet certain conditions. To date, NRC has relinquished authority to 35

states to grant licenses to possess and use radioactive materials and sealed sources and conduct regular inspections of licensees to enforce compliance. NRC and numerous state governments license, monitor, track, and require security for radioactive materials in order to protect both workers and members of the general public from exposure to hazardous levels of radiation generated by the activities of their licensees. Given this mandate to regulate the radioactive material covered by their licenses, NRC and state regulators focus on the dangers posed by day-to-day occupational exposure to radiation and the direct health effects from industrial accidents. NRC periodically evaluates its own regulatory program and evaluates each agreement state's program for compatibility with NRC regulations.

NRC and agreement states issue two types of licenses to authorize the possession of radioactive materials: specific licenses and general licenses. Specific licenses are issued for devices that contain relatively larger radioactive sealed sources. These devices, such as medical equipment used to treat cancer, cameras used for industrial radiography, and moisture and density gauges used in construction, generally require training to be used safely and may also need to be properly secured to avoid misuse. Organizations or individuals wanting to obtain a specific license must submit an application and gain the approval of either NRC or an agreement state. In contrast, devices approved for use under general license, such as luminous exit signs, normally contain relatively small radioactive sources. Such devices are designed with inherent radiation safety features, are widely commercially available, and do not require NRC or agreement state approval to possess. Of the approximately 22,000 specific materials licenses in the United States, NRC administers about 3,750, and the agreement states administer the rest.

Other federal agencies' responsibilities related to regulation of radioactive materials are focused on protecting the general public from exposure to harmful levels of radiation (the Environmental Protection Agency), establishing emergency response procedures (the Department of Homeland Security), or preventing the illicit import of such materials (Customs and Border Protection, a component of the Department of Homeland Security). For example, the Environmental Protection Agency (EPA) is responsible for developing and implementing standards for protecting the general public from, among other things, radiation from contaminated air, water, and soil—whether this contamination is the by-product of industrial activities or occurred as a result of an accidental or deliberate release of radioactive materials. EPA sets cleanup standards for areas contaminated by radiation that consider the direct health effects and

the risks posed by very long-term exposure to even very low levels of radiation, which has the potential to increase the risk of developing cancer in the future. EPA is also responsible for establishing a comprehensive set of guidelines for use by local, state, and federal emergency services personnel and other first responders in the event of a release of radioactive material—such as that caused by an industrial accident or an RDD. The Department of Homeland Security (DHS) incorporates the radiation exposure thresholds, established primarily by EPA, into their guidance document, Application of Protective Action Guides for Radiological Dispersal Device and Improvised Nuclear Device Incidents. EPA's more general guidelines identify steps that should be taken to respond to and mitigate the effects of various types of radiological incidents—whether they are industrial accidents or terrorist attacks. Finally, DHS's Customs and Border Protection[5] (CBP) is responsible for preventing the smuggling of radioactive materials into the United States.

In August 2003, we reported that (1) the number of radioactive sealed sources in the United States was unknown because NRC and agreement states tracked licenses, which can be issued for more than one source, rather than individual sealed sources; (2) despite concerns about the need for heightened security of radioactive sources, NRC had only recently issued requirements to improve the security of a relatively small number of the very largest sealed sources, used for irradiating food or medical supplies, leaving many others without increased security; and (3) there were potential security weaknesses in NRC and agreement state licensing processes. We made several recommendations to correct these problems, including that NRC (1) collaborate with agreement states to identify the types, amount, and availability of the highest-risk radioactive sources and the associated health and economic consequences of their malicious use; (2) re-examine its licensing procedures and requirements; and (3) work with states to devise and implement additional security measures, including performance measures to make sure any new measures are effective.[6] In addition, we reported in March 2006 that, among other things, CBP did not have access to NRC or agreement state licensing data, making

[5]CBP is the unified border agency within DHS. CBP combines the inspectional workforces and broad border authorities of the former U.S. Customs Service, U.S. Immigration and Naturalization Service, Animal and Plant Health Inspection Service, and the entire U.S. Border Patrol.

[6]GAO, *Nuclear Security: Federal and State Action Needed to Improve Security of Sealed Radioactive Sources*, GAO-03-804 (Washington, D.C.: Aug. 6, 2003).

it difficult for officers at U.S. ports of entry to verify the legitimacy of shipments of radioactive sealed sources or materials.[7] Accordingly, we recommended that CBP and NRC develop a capacity to provide CBP border personnel with information needed to help determine if radioactive sealed source shipments are legitimate, including NRC licensing data. We also conducted two undercover operations to test CBP's and NRC's ability to prevent those with malicious intent from obtaining radioactive sources or from smuggling them into the United States. In March 2006, we reported on an undercover operation in which we used forged NRC documents to transport category 5 radioactive sources across the northern and southern borders of the United States, underscoring CBP's inability to verify the legitimacy of radioactive sources entering the United States.[8] In March 2007, using the name of a fictitious business, we obtained a radioactive materials license from NRC, which we altered and then used to obtain commitments from private companies to purchase dangerous quantities of radioactive sources.[9] We did this only a few months after NRC had issued guidance designed to prevent those with no legitimate need to possess radioactive sources from acquiring a license.

In this context, this report assesses (1) the progress NRC has made in implementing the recommendations in our August 2003 report, (2) other steps NRC has taken to improve its ability to monitor and track radioactive materials, (3) CBP's ability to detect radioactive materials at ports of entry on the northern and southern borders, and (4) CBP's ability to verify that such materials are appropriately licensed before they are allowed to enter the United States.

To assess the progress NRC has made in implementing the recommendations in our August 2003 report, we reviewed NRC's periodic reports to the Congress on the status of these recommendations, reviewed the relevant policy and procedural changes undertaken since the report was issued, and interviewed NRC officials about the status of our

[7]GAO, *Combating Nuclear Smuggling: DHS Has Made Progress Deploying Radiation Detection Equipment at U.S. Ports-of-Entry, but Concerns Remain*, GAO-06-389 (Washington, D.C.: Mar. 22, 2006).

[8]GAO, *Border Security: Investigators Successfully Transported Radioactive Sources across Our Nation's Borders at Selected Locations*, GAO-06-545R (Washington, D.C.: Mar. 28, 2006).

[9]GAO, *Nuclear Security: Actions Taken by NRC to Strengthen Its Licensing Process for Sealed Radioactive Sources Are Not Effective*, GAO-07-1038T (Washington, D.C.: July 12, 2007).

recommendations and actions taken and steps planned to implement them. We also spoke to various state regulators of radioactive sources and materials. We attended two annual meetings of the Organization of Agreement States and interviewed each of the board members to obtain their perspectives on NRC's implementation of the recommendations on issues affecting states. We also obtained documents and interviewed several experts at Sandia and Los Alamos National Laboratories in Albuquerque and Los Alamos, New Mexico, respectively, and Lawrence Livermore National Laboratory in Livermore, California, about the risks posed by RDDs. In addition, we met with officials from the National Nuclear Security Administration's Office of Global Threat Reduction, who are working on a classified, comprehensive analysis of the potential social and economic costs of various RDD scenarios. Finally, we obtained documents and interviewed officials from EPA about their responsibilities for developing and implementing standards for protecting the general public from radiation in contaminated air, water, and soil.

To assess other steps NRC has taken to improve its ability to monitor and track radioactive materials, we obtained documentation about the capabilities, operations, and reliability of the NRC databases currently in operation and those in various stages of development. We also interviewed senior NRC database managers responsible for running or developing these systems.

To assess CBP's ability to detect and verify the legitimacy of radioactive sealed sources and materials before they are allowed to enter the United States, we gathered documentation on the capabilities and operations of DHS's National Targeting Center, toured the facility, and interviewed the center's director. We gathered documents and interviewed CBP officials, including port directors and CBP line officers, during visits to a nonprobability sample[10] of several ports of entry on both the Canadian and Mexican borders. In addition, we gathered documentation about the operations of four other ports of entry and interviewed the principal CBP officials responsible for running these land border crossings. We selected these ports of entry because of their geographic locations and sizes, as well as the estimated volume of entries into the United States of both passengers and cargo (general and radioactive materials) at these

[10]Results from a nonprobability sample 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.

locations. We also gathered information about the technical capabilities of the radiation detection equipment used by CBP officers. Finally, we interviewed officers of the Organization of Agreement States and other state officials to obtain the states' perspectives on their collaboration with NRC and DHS. We conducted this performance audit from August 2006 to May 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Results in Brief

NRC has implemented three of the six recommendations in our 2003 report on the security of radioactive sources by working with agreement states to (1) identify radioactive sealed sources of greatest concern, (2) determine how agreement state and nonagreement state officials could participate in the development and implementation of additional security measures for radionuclides of concern, and (3) include performance criteria for assessing NRC's and agreement states' implementation of these additional security requirements in periodic evaluations of both NRC and agreement state effectiveness. Specifically, NRC, working with DOE, developed a list of 16 radionuclides of concern that, if gathered in sufficient quantities, pose the greatest risk of being used by terrorists to make an RDD. Second, NRC, working with agreement states, has required several additional security measures called "increased controls" be taken to protect such radionuclides from theft, diversion, or other unauthorized access when they are gathered in quantities at or above a particular threshold. Increased controls include such measures as implementing 24-hour surveillance, multiple layers of physical security, and measures to ensure the immediate notification of local law enforcement agencies in the event of any actual or suspected breach in security. Finally, NRC and agreement states also established criteria for assessing the implementation of these increased controls and integrated these criteria into NRC's existing oversight program. To date, inspection teams comprised of inspectors from NRC (headquarters and regional office staff) and agreement states have assessed the implementation of increased controls by several agreement states and one of four NRC regional offices.

In contrast, NRC has made limited progress toward implementing our recommendations to (1) modify its process for issuing licenses to ensure that radioactive materials cannot be purchased by individuals who have no legitimate need for them, (2) determine how to effectively mitigate the

potential psychological effects of malicious use of radioactive materials, and (3) re-examine whether certain radioactive sources should be regulated through specific licenses rather than general licenses. More specifically, although NRC did take steps in December 2006 that it thought would ensure that radioactive materials could not be purchased by those without a legitimate need for them, these changes were not sufficient to prevent us from obtaining an NRC license for a fictitious business and using this license to obtain commitments from manufacturers of industrial devices containing radioactive materials to sell them to us. Taken together, the devices we could have acquired would have contained a potentially dangerous quantity of one of the 16 radionuclides of concern. Moreover, NRC has not yet taken steps to determine how to mitigate the potential psychological effects of a terrorist attack using radioactive materials, although it has participated in an interagency working group that recently produced a draft version of a public education action plan that seeks, among other things, to reduce public fears of radioactivity and diminish the impact of a terrorist attack using such materials. Finally, although NRC has gathered the data it needs to re-examine whether certain radioactive sources should be regulated through specific licenses rather than general licenses, it has only recently begun the process of deciding, in consultation with agreement states, whether and what sort of changes should be made.

Beyond responding to our previous recommendations, NRC has taken four steps to improve its ability to monitor and track radioactive materials since we issued our 2003 report. However, three of these efforts have limitations and are not yet implemented. More specifically, NRC created an interim national database to monitor all the licensed radioactive sealed sources that contain the more dangerous quantities (categories 1 and 2) of the types of radioactive sources that pose the greatest risk of being used in an RDD. This database, which relies on data that are updated annually, is intended to provide limited monitoring and tracking information on sealed sources until NRC can launch the National Source Tracking System. This system is intended to replace the interim database and provide more detailed, comprehensive, and frequently updated information on radioactive sealed sources. The National Source Tracking System will initially include information only about the potentially more dangerous category 1 and 2 radioactive sealed sources containing RDD-suitable radioactive materials, but will eventually include information on category 3 and the largest category 4 sources which NRC also considers to be potentially dangerous. Also, this system has already been delayed by 18 months and is not currently expected to be launched until January 2009. In April 2008, NRC announced plans to expand the National Source Tracking System to include category 3 and the largest category 4 sources by July 31,

2009—a date which NRC told us the following month would slip to at least March 2010. NRC is also developing a Web-based system that will include information on all NRC specific licenses. This system is already more than 3 years behind schedule, however, and may not include information, initially at least, on radioactive materials licenses that are issued by agreement states—which represent over 80 percent of all U.S. licenses for these materials. NRC officials told us that they are currently working with agreement states to determine the most efficient means of including agreement state data in the Web-based licensing system. Furthermore, NRC is in the early stages of developing a new, third system—a license verification system—which NRC officials hope to have operational by the time the Web-based licensing system is deployed in the summer of 2010, and will draw on information in both the National Source Tracking System and the Web-based licensing system to provide regulators and vendors with the ability to verify that those seeking to purchase additional radioactive sealed sources are licensed to do so. Taken together, these systems will include detailed information about what licensees are allowed to possess and, importantly, whether a prospective licensee seeking to purchase additional sealed sources is licensed to possess the additional types and quantities. The delays in the deployment and full development of both the National Source Tracking System and Web-based licensing system, and the new license verification system, are especially consequential because NRC has identified the deployment of these systems as key to improving the security of radioactive materials in the United States.

While CBP has a comprehensive system in place to detect radioactive materials entering the United States at land borders, some equipment that is used to protect CBP officers is in short supply. More specifically, vehicles, cargo, and people entering the United States at most ports of entry along the Canadian and Mexican borders are scanned for radioactive materials with radiation detection equipment capable of detecting even very small amounts of radiation—whether these materials are in the form of industrial sources, raw materials, trace amounts of radiation found in such common products as ceramics or bananas, or radionuclides left in the human body in the aftermath of medical procedures. If radiation is detected, CBP officers must investigate until they are convinced that any vehicles, cargo, and people pose no threat. When CBP officers cannot resolve the radiation alarm with the information available to them at the border, they are required to contact technical experts at CBP's National Targeting Center for assistance. If radioactive materials are found, CBP officers must take steps to ensure that those seeking entry to the United States appear to have a legitimate reason to possess and transport such

materials, and are licensed as appropriate, before being allowed to enter the country. However, while CBP has comprehensive systems in place for detecting radiation, we found that personal radiation detectors—an important component of the suite of radiation detection equipment in place at the borders—are in short supply. Unlike other radiation detection equipment that is designed to be used as screening tools for radioactive materials, personal radiation detectors are designed to alert the individual wearer when he or she is being exposed to unusually high levels of radiation. While most CBP officers dealing with the public in front-line positions are equipped with personal radiation detectors, some are not. According to CBP officials, the agency lacks sufficient resources to purchase the approximately 1,500 personal radiation detectors it needs to provide one for each officer at the border who currently needs one.

While CBP has systems in place to verify that all licenses for radioactive materials are legitimate, it has not effectively communicated its guidance to CBP officers on when they must contact the National Targeting Center to verify that radioactive materials are legitimately licensed. Consequently, some CPB officers are not following the most recent guidance, and some dangerous radioactive materials have entered the country without license verification. Specifically, according to a directive issued in 2003, there are circumstances when even large shipments of radioactive materials could be admitted without a CBP officer contacting the center to verify legitimacy. In 2006, to tighten security, CBP issued a supplemental memorandum revising the circumstances under which CBP officers are required to contact the National Targeting Center. That is, as of 2006, CBP officers must now contact the center to verify that radioactive materials are legitimately licensed whenever they detect more than incidental, trace amounts of radiation—for example, amounts higher than the low levels found in such common products as ceramics and bananas. However, headquarters has not effectively communicated this updated guidance to CBP officers at the border. When we asked CBP officers at several ports of entry about the current guidance for regulating the flow of radioactive materials across the border, almost all officers either provided us with the 2003 directive or confirmed that the 2003 directive was current and operative; only one gave us guidance reflecting the 2006 memorandum. Finally, at one port of entry, CBP officers were confused about when to verify licenses and were routinely permitting large shipments of neutron-emitting material to enter the country. This situation was particularly troubling because (1) some neutron-emitting materials can be used to make nuclear weapons and (2) it has been CBP policy since 2003 to verify the legitimacy of all neutron-emitting materials.

We are recommending that the Chairman of the NRC take steps, consistent with sound systems development practices, to (1) ensure that priority attention is given to meeting the current January 2009 and summer 2010 target dates for launching the National Source Tracking System, Web-based licensing system, and the new license verification system, respectively; and (2) complete the needed steps to include all potentially dangerous radioactive sources in the National Source Tracking System as quickly as is reasonably possible. In addition, to improve the likelihood of preventing radioactive sources and materials from being smuggled into the United States, we recommend that the Secretary of Homeland Security direct the Commissioner of CBP to (1) effectively communicate current CBP guidance to officers at ports of entry regarding when they are required to contact the National Targeting Center to verify the legitimacy of radioactive materials, and (2) take measures to ensure that this guidance is being followed.

We provided a draft of this report to the Chairman of the NRC, the Secretary of Homeland Security, the Secretary of Energy, the Administrator of the EPA, and the Chair of the Organization of Agreement States for comment. NRC neither agreed nor disagreed with the report's findings and recommendations. Instead, NRC described its current efforts to implement the recommendations from our 2003 report and stated its intention to place the highest priority on the completion and deployment of the National Source Tracking System and the Web-based licensing system and a new, third system. Although we are encouraged by NRC's efforts to finish implementing the recommendations from our 2003 report, we remain concerned that nearly 5 years after we issued our report these recommendations have yet to be fully implemented. The other federal agencies that were offered the opportunity to comment on our report either agreed with our recommendations and outlined the steps to be taken to implement them, or chose not to comment on the final draft. Specifically, according to DHS's written comments, CBP concurred with our recommendations and specified the steps it will take to implement them. DOE and EPA reviewed and provided comments on earlier versions of our draft report and, after reviewing our final draft, had no further comments. The Organization of Agreement States neither agreed nor disagreed with our findings and recommendations, but offered comments on the quality of agreement state regulatory programs and NRC collaboration with agreement states, which we incorporated into the report.

NRC Has Implemented Three of the Six Recommendations from GAO's 2003 Report

Since 2003, NRC has worked with agreement states and others to identify the radioactive materials that pose the greatest risk of being used to make an RDD, established additional security measures for these materials, and taken steps to ensure the increased security measures are effectively implemented. However, NRC has not successfully corrected the weaknesses in its radioactive materials licensing processes. Further, NRC has taken limited steps to determine how to effectively mitigate the potential psychological effects of an RDD. Finally, NRC has not yet decided whether certain radioactive sources need stronger licensing requirements.

NRC Has Worked with the States and Others to Identify Radioactive Sources That Pose the Greatest Risk of Being Used to Make an RDD

An NRC and DOE working group had established a tentative list of radioactive materials under NRC license and DOE control and the quantities at which they pose the greatest risk. However, according to agreement states representatives, the agreement states were not directly involved in creating this list prior to the release of our August 2003 report. Our report recommended that the Chairman of NRC collaborate with the agreement states on this list, which NRC did before the list was finalized in August 2005. Specifically, in July 2002, the chairman of the NRC and the Secretary of Energy established a working group to identify radioactive materials according to the relative risk they posed of being used by terrorists to make an RDD. The working group assessed the relative hazards of various radioactive isotopes, taking into consideration both the nature of the materials (their potential threat to human health) and their attractiveness for use in an RDD (their half-lives, the quantities in which such materials are typically found, the level of protection typically surrounding them, and the ease with which they might be dispersed). The working group completed its initial study in November 2002 and issued a final report in May 2003. During this period, NRC, DOE, and other U.S. government entities were also negotiating with other countries under the auspices of the International Atomic Energy Agency (IAEA) to create a single international threshold quantity at which nations adopting IAEA's Code of Conduct would agree to take measures to more closely track and consider increased security measures to protect radionuclides of concern. NRC also consulted with agreement states on this issue. In the end, it was agreed in September 2003 that the threshold for increased concern—that is, the quantities at which various radionuclides become subject to more stringent security—should be category 2 quantities.

After our August 2003 recommendation that NRC consult with the agreement states on this list, NRC officials formally provided it to agreement state officials for their review. The agreement states agreed

with the list and the thresholds developed by the IAEA and participating countries (see table 1).

Table 1: 16 Radionuclides of Concern

Radionuclide	Common abbreviation	Principal emission(s)	Threshold for concern in curies (IAEA category 2)
Americium-241	Am-241	alpha	16
Americium-241/Beryllium	Am-241/Be	alpha/neutron	16
Californium-252	Cf-252	alpha	5.4
Cesium-137	Cs-137	beta/gamma	27
Cobalt-60	Co-60	beta/gamma	8.1
Curium-244	Cm-244	alpha	14
Gadolinium-153	Gd-153	gamma	270
Iridium-192	Ir-192	beta/gamma	22
Plutonium-238	Pu-238	alpha	16
Plutonium-239/ Beryllium	Pu-239/Be	alpha/neutron	16
Promethium-147	Pm-147	beta	11,000
Radium-226	Ra-226	alpha	11
Selenium-75	Se-75	gamma	54
Strontium-90 (Yttrium-90)	Sr-90 (Y-90)	beta	270
Thulium-170	Tm-170	gamma	5,400
Ytterbium-169	Yb-169	gamma	81

Source: NRC.

Note: NRC published the list of 16 radionuclides of concern in the *Federal Register* in 2007 as part of Orders Imposing Additional Security Measures.

NRC and Agreement States Have Established Additional Security Requirements and Taken Steps to Ensure Their Implementation

NRC also implemented our recommendations to (1) determine how agreement state and nonagreement state officials could participate in the development and implementation of additional security measures for radionuclides of concern and (2) include performance criteria for assessing NRC's and agreement states' implementation of these additional security requirements in periodic evaluations of both NRC and agreement state effectiveness. First, NRC worked with agreement states to devise and implement several additional security measures—called "increased controls" —to protect category 2 or greater quantities of radionuclides of concern from theft, diversion, and other unauthorized access. In late 2003, NRC and state officials, some of whom were also officers of the Organization of Agreement States or Conference of Radiation Control Program Directors (an organization that includes both agreement and

nonagreement states), established several working groups to facilitate the participation of state officials and their organizations in developing and implementing additional security measures for certain radioactive sources and materials. Several state officials, including a former chair of the Organization of Agreement States (OAS), told us that these working groups functioned in a highly collaborative and deliberative manner. Another OAS official told us that the fact that so many agreement state officials have been willing to volunteer to serve in working groups, and that NRC has been willing to provide some financial support for state officials' involvement, is a testament to the importance that both NRC and agreement states placed on federal-state collaboration. NRC and agreement states officially issued requirements for the increased controls in December 2005. The purposes of the increased controls, according to NRC, are to reduce the risk of unauthorized use of radioactive materials and to aid the prompt detection and assessment of and response to any such attempt. Increased controls include such measures as 24-hour surveillance, multiple layers of physical security, and measures to ensure the immediate notification of local law enforcement agencies in the event of any actual or suspected breach in security. For example, increased controls on medical sources require some sources to be kept in heavily secured rooms with limited access (see fig. 1).

Figure 1: Cesium-137 Sources at a Hospital Used for Cancer Treatment Are Kept in a Secure Room with Limited Access

Source: GAO.

According to NRC, all increased controls were to be fully implemented by June 2006. Some licensees with the highest-risk sources were inspected by June 2007, while all increased controls must be fully inspected by June

2009. NRC regional offices and agreement state regulators are also currently in the process of reaching out to licensees to help ensure they will be able to meet the June 2009 deadline and have already performed preliminary increased controls inspections on approximately 1,100 of the 1,700 licensees subject to the new controls (see table 2).

Table 2: Increased Controls on Category 2 or Greater Quantities of the 16 Radionuclides of Concern

Control	General purpose
Access controls	Control access to high-risk materials at all times.
Background checks for unescorted access	Limit unescorted access only to those determined to be trustworthy and reliable after background checks.
Monitor, detect, and respond to unauthorized access	Ensure the establishment of the means to monitor and immediately detect and respond to any unauthorized access.
Advance coordination with local law enforcement	Response plans must include advanced cooperation with local law enforcement agencies, and any actual response must include this local law enforcement agency.
Transportation controls	Additional security measures are required for shipments of category 1 and 2 sources.
Protection of sensitive physical plant information	Protecting security related information against unauthorized disclosure by limiting access to trustworthy and reliable individuals with a need to know.

Source: NRC.

Agreement state officials told us that they have already prevented at least one attempted theft of an industrial radiography source typically used to inspect metal parts and welds for defects. The would-be thieves broke in to an area protected by an alarm system that had been recently installed by the licensee to comply with the new requirement mandating the capacity to monitor, detect, and respond quickly with local law enforcement in the event of any unauthorized access. This new alarm system immediately notified local law enforcement authorities, who responded in time to prevent the criminals from obtaining an iridium-192 radiography source—a potent gamma emitter that could cause extensive radiation burns if handled improperly.

NRC and agreement states have also collaborated in establishing criteria for assessing the implementation of increased controls and integrated these criteria into NRC's existing oversight program, the Integrated

Materials Performance Evaluation Program (IMPEP).[11] In March 2006, NRC established performance criteria devised in working groups with agreement state officials for evaluating the implementation of increased controls. Under each of the existing performance categories—staffing and training, the technical quality of inspections, licensing actions, incident and allegation activities, and the overall status of the materials inspection program—NRC added additional performance criteria. For example, NRC regional and agreement state programs are now evaluated on whether they have established a system to readily identify new licensees that should be subject to increased controls and to determine whether sensitive licensee information is being securely maintained. Although not all NRC regional and agreement states' radioactive materials programs have been evaluated on their implementation of the increased controls, 22 of the 35 agreement states and one of the three NRC regional offices with responsibilities for regulating such materials have to date had aspects of their implementation of increased controls at least partially assessed in this manner. Moreover, agreement state officials familiar with this revised performance evaluation process told us that the new criteria were effective and valid measures of the implementation of the increased controls.

Weaknesses Persist in NRC's Materials Licensing Process

To increase the security of radioactive materials and sealed sources and better ensure that they are used as intended, we recommended in 2003 that NRC modify its process for issuing specific licenses to ensure that such sources cannot be purchased before NRC has verified, through inspection or other means, that the materials and sources will be used as intended. In December 2006, NRC issued new prelicensing guidance to help NRC and agreement state licensing officials to make a risk-based determination of whether an applicant for a license to possess an amount of radioactive material or source sufficient to require a specific (rather than a general) license should have to undergo some sort of verification before being granted a license. This guidance asked two screening questions: (1) whether "the applicant is an entity or a licensee transferring control to an entity that has never had a license or is unknown" and (2)

[11]NRC implemented IMPEP in 1995 to evaluate NRC's regional materials program and the agreement state radiation control programs using evaluation criteria, known as performance indicators, to ensure consistency in the nation's materials safety program. Reviews are conducted jointly by the Office of Federal and State Materials and Environmental Management Program staff, with agreement state and regional representatives usually on the team. Approximately 10 to 12 reviews are scheduled each year. NRC regions are normally reviewed every 2 years, and agreement states every 2 to 4 years—the timeline may be adjusted depending on past performance.

whether the applicant is seeking category 2 or greater quantities of one or more of the 16 radionuclides of concern and has not already been licensed to possess materials subject to a security order or additional requirements for increased controls. If the applicant answers yes to either question, according to the guidance, the license examiner should consider whether it is necessary to take any of the steps on a 12-item checklist. For example, one checklist item suggests doing an Internet search on the name of the applicant; another suggests conducting a site visit to the stated place of business. In spring 2007, however, our investigators, posed as first-time radioactive materials license applicants for devices containing sources large enough to require specific licenses, and therefore subject to the extra scrutiny from the 12-item checklist, they were able to obtain a materials license from NRC, even though an Internet search or a prelicensing site visit would have revealed the application to be based on false claims.[12] After being notified of the results of our undercover investigation in June, NRC stopped issuing specific licenses for radioactive materials and sources until it could develop and issue "supplemental interim prelicensing guidance." This supplemental guidance, issued 12 days after NRC stopped issuing specific licenses, requires a first-time licensee to pass a site visit inspection at the applicant's place of business or appear at an NRC regional office for a face-to-face meeting with a license application reviewer and satisfy this official that the radioactive materials will be used as intended. Applicants would not be subject to these requirements if they already have an established regulatory relationship with NRC or an agreement state and meet other specific criteria.

In September 2007, NRC announced in a public briefing that it had developed a comprehensive plan for resolving all the vulnerabilities in its radioactive materials licensing processes. NRC announced plans to do several things to help make its program more secure, including the following.

- Establish a panel of independent external reviewers to study NRC's materials licensing program vulnerabilities, with particular scrutiny of its "good faith assumptions" about applicants. This panel presented a number of observations and recommendations to NRC in March 2008.

[12]GAO investigators made a similar application for a radioactive materials license to an agreement state but withdrew the application when the agreement state official informed GAO investigators that it would require a site visit to the applicant's place of business—a step that would have revealed the application not to be authentic.

- Reconstitute the NRC and agreement state prelicensing working group to develop solutions to vulnerabilities associated with verification, counterfeiting, and general licenses.

- Establish a new materials program working group that would review the results of an independent external review and comprehensively assess the entire materials licensing program, including NRC's evaluation of state programs.

- Leverage the capabilities of new databases currently under development—the National Source Tracking System and Web-based licensing.

To assure themselves that other radioactive materials licenses had not been issued to fraudulent individuals, NRC also undertook a retrospective review of a sampling of licenses to verify their legitimacy. NRC officials stated that these reviews uncovered no other incidences of fraud. We think all of these actions are useful steps toward closing the long-standing vulnerabilities in NRC materials licensing processes, but it is too early to evaluate whether these steps will be successful.

NRC Has Taken No Significant Actions to Mitigate the Potential Psychological Effects of an RDD

In addition to recommending that NRC work with agreement states and others to identify and better secure the radioactive sources that pose the greatest risk of being used to make an RDD, we also recommended that NRC determine how to effectively mitigate the potential psychological effects of malicious use of radioactive materials. Since we issued our 2003 report, DHS issued the National Response Plan in December of 2004 to establish a comprehensive all-hazards approach to domestic incident management. The National Response Plan, revised and reissued as the National Response Framework in January 2008, details how federal agencies and others should coordinate to ensure an efficient and effective nationwide response to a broad spectrum of domestic incidents, including those involving the malicious use of radioactive materials. Under the National Response Framework, where a radiological incident involves facilities or materials licensed by the NRC or agreement states, NRC either coordinates federal response activities or assists DHS in doing so, depending on the scope of the incident.[13] In our view, such coordination should include taking actions to determine how to effectively mitigate all the effects of such an RDD—including psychological effects.

[13]See National Response Framework, "Emergency Support Function #10-Oil and Hazardous Material Response," p. 14, and Nuclear/Radiological Incident Annex, p. NUC-3 and table 1.

However, NRC has not implemented this recommendation because, according to NRC officials, NRC has only a very limited role to play in mitigating the psychological effects that may occur in the aftermath of an RDD event unless the amount of radioactive materials released is sufficient to cause "prompt fatalities"—that is, fatalities directly caused by exposure to radioactive materials. Accordingly, NRC has identified and taken limited steps that it sees as consistent with its prescribed role. Specifically, NRC points to its participation in the interagency Radiation Source Protection and Security Task Force Public Education Working Group with DHS, DOE, agreement and nonagreement states, and others to design a coordinated public education campaign to, among other things, reduce public fears of radioactivity and diminish the impact of a terrorist attack using radioactive materials. This working group issued a draft public education action plan in December 2007 and provided an update on its efforts on May 15, 2008. NRC is also a member of and has provided input to a Health Physics Society[14] working group that is putting together a program to educate the public about radiation and help counteract unfounded or irrational fears.

Despite these activities, in our view, NRC's response to our recommendation is inadequate. Over 4 years after we made our recommendation, NRC has not yet determined how to effectively mitigate the potential psychological effects of the malicious use of radioactive materials. Moreover, according to existing EPA protective action guidelines, the amount of radioactive material needed to cause "prompt fatalities"—the threshold at which NRC accepts having a significant role—is significantly greater than would be necessary to cause contaminated areas to be evacuated, a threshold at which psychological effects could reasonably be expected to occur. According to NRC officials, unless the prompt fatalities threshold is met, NRC believes its job is to provide the public with prompt, complete information about the effects of any release of radiation involving material the agency regulates and, to the extent it is relevant, to inform the public about the NRC regulations or guidance that may be relevant as a result. Beyond participating in an interagency task force working group, providing any additional information that may be

[14]The Health Physics Society is a scientific and professional organization whose members specialize in occupational and environmental radiation safety. The society supports its members in the practice of their profession and also, among other things, promotes public information preparation and dissemination, education and training opportunities, and scientific information exchange through conferences and meetings, http://hps.org/aboutthesociety/ (accessed April 17, 2008).

needed is, according to NRC, the responsibility of others (federal, state, or local officials, etc.). This approach is consistent with NRC's view that its primary responsibility is to regulate "inside the fence, inside licensee-controlled areas." "Outside the fence," NRC views its role as assisting those federal agencies that have primary responsibility, namely DHS, DOE, and others and making sure that its licensees comply with these agencies' legitimate concerns.

NRC Has Not Yet Decided Whether Certain Radioactive Sources Need Stronger Licensing Requirements

In light of growing concerns about the potential malicious use of radioactive sealed sources, and to better secure generally licensed devices containing such sources, we recommended that NRC, in consultation with agreement states, re-examine whether certain radioactive sources should be regulated through specific licenses rather than general licenses. According to NRC, by November 2007 it had gathered the necessary information about generally licensed devices containing relatively larger radioactive sources (the largest category 4 sources or higher) to decide whether changes should be made.[15] NRC and agreement state officials are currently analyzing the data and conferring in working groups and, according to NRC officials, initiated a rulemaking process in September 2007. Given the complexity and range of the issue and the solutions to be considered, NRC officials estimate the formal rulemaking process will take approximately 2 years, depending on what form a new rule takes. Rules that require states to make statutory changes typically take longer to implement. NRC officials stressed that it is impossible to predict what form a final rule would take. The various options—for example, a lower activity cap for general licenses; specific licensing requirements for particular radionuclides regardless of activity; or the development of a new, more streamlined specific license—will continue to be a subject of discussion among federal and state radioactive materials regulators until a decision has been reached. If a revised rule is finalized by September 2009, agreement states could have up to an additional 3 years to fully implement any changes—meaning that any rule change may not be fully implemented until the fall of 2012.

[15]NRC has gathered information from licensees of category 1 through 3 and the most dangerous category 4 sources. Under the IAEA categorization scheme, any source containing category 3 or greater quantities of radioactive materials could be dangerous to human health if not handled properly.

NRC Has Improved Its Ability to Monitor and Track Radioactive Sealed Sources, but New Systems Have Been Delayed

NRC has developed an interim database that can monitor and track the more dangerous, category 1 and 2 radioactive sealed sources. However, two additional systems—one to track radioactive sealed sources and one to track licenses—have been repeatedly delayed. A third system under development will draw on information in both of these systems to provide regulators and vendors with the ability to verify that those seeking to purchase radioactive sources are licensed to do so.

NRC Created an Interim National Database to Better Monitor the More Dangerous Radioactive Sealed Sources

NRC established the interim database in October 2003 to provide NRC and agreement states a stop-gap means of more closely monitoring the potentially more dangerous sources until the new National Source Tracking System (NSTS) could be completed. This database is called "interim" because it is intended to be a temporary measure for implementing a quick, practical response to the recommendation in the May 2003 DOE–NRC report on RDDs that the U.S. government develop a database of sources at greatest risk of being used to make an RDD. The interim database currently records information about category 1 and 2 radioactive sealed sources licensed by both NRC and agreement states.[16] For a given source, the interim database records the radionuclide; the quantity (activity); the licensee address; and the make, model, and serial number (where available) of the registered source. Although participation is voluntary, NRC successfully persuaded agreement states to provide data on their licensees for inclusion in the interim database, and as a result, the database includes information from 99 percent of all licensees. Originally, the database was intended to be a one-time snapshot of what radioactive materials existed in the United States during fiscal year 2004. However, NRC began to update the database annually as it became apparent that the development and launch of the NSTS would take longer than expected. The result is an annual snapshot of information about radioactive sources as they were at one point during a given year, not a system that tracks the

[16]During the first year of the interim database, information on some category 3 sources that were aggregated in quantities large enough to be considered a category 2 quantity were also recorded. However, the difficulty in defining what constituted collocated/aggregated or separate sources made recording aggregated category 2 quantities extremely difficult and such information was no longer collected after the first year of implementation. For example, keeping a larger number of category 3 sources divided among locked barriers of a certain security level may allow some such material at the same facility not to be reported as collocated and not subject to the aggregation rules that would require it to be reported as a category 2 quantity.

current location of sources. The information for any given source in the database is, at any given time, 0 to 12 months old.

It is important to note that the licensee address listed in the interim database may simply be the address for the licensee's administrative offices—that is, the place where the company officials responsible for dealing with NRC or state regulators have offices—and not necessarily the address of the physical location of the material. A licensee may be allowed to store radioactive materials in several locations throughout one or more states but still provide only a single administrative address for reporting purposes in the interim database. NRC and agreement states check the completeness and accuracy of this inventory of source locations during routine inspections of licensees.

New Systems to Track Radioactive Sealed Sources and Licenses Have Limitations and Have Been Repeatedly Delayed

The completion and implementation of the major new systems NRC is developing to help it better track, and ultimately help secure, radioactive sealed sources have been delayed repeatedly. The impetus for the creation of the NSTS was a recommendation in the May 2003 DOE-NRC report on RDDs that radionuclides identified as being at greatest risk of use by terrorists to make an RDD be nationally tracked. The Energy Policy Act of 2005 required the establishment of a mandatory tracking system.[17] The NSTS is also consistent with the United States' endorsement of the IAEA Code of Conduct, which recommends that nations establish a national source registry to include, at a minimum, category 1 and 2 sources of radionuclides of concern.

The NSTS will initially track category 1 and 2 sources of the 20 radionuclides that NRC has determined are sufficiently attractive for use in an RDD or for other malicious purposes that warrant national tracking. The 20 radionuclides include the 16 radionuclides of concern plus four additional radionuclides: actinium-227, polonium-210, and thorium-228 and

[17]An NRC rule creating the NSTS and certain provisions for the system are required by the Energy Policy Act of 2005. The final rule (issued under NRC's authority to regulate radioactive materials for public health and safety, an authority shared with the agreement states) requiring that licensees report to the NSTS and requiring the issuance of unique source serial numbers was published in the *Federal Register* on November 8, 2006. NRC has since modified the rule and now requires reporting to the NSTS by January 31, 2009.

-229.[18] In April 2008, NRC proposed a rule to expand the NSTS to include all category 3 sources and the largest category 4 sources (at or about one-tenth of the activity threshold for category 3). Although the NSTS was originally supposed to be operational in mid-2007, difficulties in developing the system have led NRC to postpone the launch of the NSTS multiple times. NRC's current estimate for the launch of the NSTS (tracking category 1 and 2 sources) is January 31, 2009. NRC estimates the expansion of the NSTS will be implemented by March 2010.

According to NRC, the NSTS will initially be populated by the data from the interim database. However, unlike the interim database, the NSTS will not be an annual snapshot of source inventories. The NSTS will be a transaction-based system that will track each major step that each tracked radioactive source takes within the United States, from "cradle to grave." That is, licensees will be responsible for recording the manufacture, shipment, arrival, and disposal of all licensed and tracked category 1 and 2 radioactive sources. More specifically, the NSTS will include the radionuclide, quantity (activity),[19] manufacturer, manufacture date, model number, serial number, and site address. The licensee will have until the close of the next business day after a transaction takes place to enter it into the system. As a result, the location of all such sources will be accounted for and more closely tracked than in the interim database. While some sources may be moved temporarily to different sites, any time that the source changes its "home base," the transaction must be registered through the NSTS. In this way, the data in the system should be kept up-to-date.

For security reasons, access to the information in the NSTS will be on a need-to-know basis. Licensees will have access to information about their sources, agreement state officials will have access to information about licensees and sources in their state, and only selected NRC officials will have access to the entire system.

[18]NRC opted to include these four additional radionuclides that NRC deems of concern for RDD purposes in the NSTS at DOE request. Although NRC and agreement state licensees do not possess large numbers of sources containing these radionuclides, and none with category 2 or higher quantities, DOE might.

[19]The activity data for a given source may be reported as of the manufacture date or assay date. Because all radioactive materials decay over time, an up-to-date estimation of the activity level will be calculated, if needed, by the system.

While the NSTS is designed to track larger and potentially more dangerous radioactive sealed sources, NRC's Web-based licensing system is being developed to provide quick access to up-to-date information on all NRC specific licenses for radioactive materials and sources in all five IAEA categories. In its technical comments on a draft of this report, NRC told us that it is developing a third system—a license verification system—which, once operational, will draw on the information in NSTS and the Web-based licensing system which will provide regulators and vendors of radioactive sources with an easily accessible ability to verify that those seeking to purchase nationally tracked sources are licensed to do so. Taken together, these systems will include detailed information about what licensees are allowed to possess and, importantly, whether a prospective licensee seeking to purchase additional sealed sources is authorized to possess the additional types and quantities. For example, an individual from a construction company wanting to purchase a piece of equipment containing a radioactive sealed source must demonstrate to the vendor that the company is licensed to possess such a source. Once all three systems are operational, the vendor could easily verify that the company is legitimately licensed to purchase a given piece of equipment containing the particular sealed source. Although the Web-based licensing system was originally supposed to be deployed in 2005, it is now estimated be completed no earlier than the late summer of 2010. Moreover, the Web-based licensing system may not initially include any information on radioactive materials licenses issued by agreement states—which represent over 80 percent of all U.S. licenses for these materials. NRC officials told us that they are currently working with agreement states to determine the most efficient means of including agreement state data in the Web-based licensing system. Finally, NRC has only recently begun developing its new license verification system and has not yet established firm completion dates. However, NRC officials told us that they expect it to be complete by the time that the Web-based licensing is launched.

The delays in the development of both the NSTS and the Web-based licensing system are especially consequential because NRC officials, both commissioners and staff, have identified the deployment of these systems as key to improving the control and accountability of radioactive materials in the United States. More specifically, in NRC's September 2007 public hearing addressing the weaknesses that we uncovered in NRC's materials licensing program, the commissioners said that an expanded NSTS including category 3 and perhaps the largest category 4 sources, a Web-based licensing system including agreement state data, and some means for making relevant information in both of these systems available to vendors and officials at ports of entry, would be a secure and effective

means of verifying that those seeking to obtain radioactive materials, or enter the United States with licensable quantities of radioactive materials or sources, were doing so for legitimate purposes.

CBP Has a Comprehensive System for Detecting Radiation at Ports of Entry on the Northern and Southern Borders

CBP has a comprehensive, layered system for detecting and identifying radioactive materials as they enter the United States at land ports of entry—whether they are in the form of industrial sources, raw materials, trace amounts of radiation found in such common products as ceramics or bananas, or radionuclides left in the human body in the aftermath of medical procedures. However, some equipment that is used to protect CBP officers is in short supply.

CBP's Radiation Portal Monitors Scan Most Vehicle, Cargo, and Passenger Traffic Entering the United States

According to CBP, over 90 percent of the personally owned vehicles entering the United States at land ports of entry pass through radiation portal monitors.[20] Portal monitors are very sensitive and can detect even the very small amounts of radiation. All vehicles must pass through the monitors at every port of entry that deploys them. Any vehicle triggering a portal monitor alarm is referred to a secondary screening area, where it is sent through a second portal monitor to confirm (or disconfirm) the original alarm. Whether the second portal monitor confirms the alarm or not, the vehicle, the driver, any passengers, and any cargo are scanned by a CBP officer with a hand-held radiation isotope identification device (RIID). The RIID can detect very small amounts of radiation and also identify many of the most commonly used radionuclides by name and activity level. CBP keeps detailed records on the cause of each alarm and its resolution and sends them to a central location for archiving. All portal monitor alarms must be resolved—that is, CBP officers must investigate each alarm until they are convinced that the vehicle, occupants, and any cargo pose no threat and, if radioactive materials are found, that the vehicle occupants appear to have a legitimate reason to possess and transport them—before the vehicle, driver, and any passengers can be allowed to enter the United States.

[20]According to CBP officials, 91 percent of all personal vehicles arriving in the United States are scanned by radiation portal monitors. In addition, 100 percent of truck cargo arriving from Mexico and 91 percent arriving from Canada are scanned by portal monitors.

The vast majority of portal monitor alarms are resolved by CBP officers at the border using the information available to them directly from portal monitor and RIID scans, documents provided by shippers and passengers, and the explanations of the travelers (commercial and passenger vehicle drivers and passengers) for why they are carrying radioactive materials, whatever the amount or form. When CBP officers cannot resolve the radiation alarm with information available to them at the border, they are required to contact technical experts at CBP's National Targeting Center for assistance. These experts offer scientific expertise to help CBP officers interpret and use the portal monitor and RIID data and will also verify whether any radioactive sources have been properly licensed by checking NRC and agreement state licensing data.[21] Figures 2 and 3 show vehicles lining up and passing through portal monitors at ports of entry. Figure 4 shows an inspection area and a truck-sized portal monitor on the southern border.

[21]NRC provides the National Targeting Center with up-to-date information concerning the licensing, import, and export of all regulated radioactive materials and sources in the United States. This cooperation gives CBP indirect access to NRC and agreement state licensing databases; NRC's list of licensees authorized to import or export radioactive materials and sources; and advanced notification of large, category 1 radioactive materials shipments.

Figure 2: Passenger Vehicles at a Port of Entry on the Southern Border

Source: GAO.

Figure 3: Trucks Passing through Portal Monitors on the Northern Border

Source: GAO.

Figure 4: Truck-Sized Portal Monitor in the Inspection Area at a Port of Entry on the Southern Border

Source: GAO.

Most of the CBP officers we spoke with at the ports of entry we visited told us they had never or rarely felt it necessary to contact the National Targeting Center for assistance, but they all stated that they would not hesitate to do so if they encountered anything out of the ordinary or if they thought something might pose any threat to national security. Those CBP officers who told us they had contacted the center for assistance were very pleased with the timely and practical help they received.

Some Radiation Detection Equipment Is in Short Supply

Finally, we found that personal radiation detectors—an important component of the suite of radiation detection equipment at the borders—are in short supply. Unlike portal monitors and RIIDs, personal radiation detectors are not designed to be used as screening tools for radioactive materials. Instead, they are designed to alert the individual wearer when he or she is being exposed to unusually high levels of radiation, permitting CBP officers to take protective measures if needed. While most CBP officers dealing with the public in frontline positions are equipped with personal radiation detectors, some are not. According to CBP officials, the agency lacks sufficient resources to purchase the approximately 1,500 personal radiation detectors it needs to provide one for each officer at the border who currently needs one. In fact, during our visit to one port of entry, we found that some officers in frontline positions at the border did not have a personal radiation detector. Moreover, CBP has no money currently in the budget to acquire the approximately 2,000 additional personal radiation detectors it would require to equip the new officers it plans to hire—leaving a shortfall of about 3,500 personal radiation detectors. CBP headquarters officials are aware of the shortage of personal radiation detectors and they hope to procure enough of them for each officer who needs one. However, they acknowledged that, in doing so, they have to consider competing priorities at the border, and also whether emerging technologies may provide a more effective solution.

CBP Guidance on When to Verify Licenses for Radioactive Materials Entering the United States Was Not Communicated to the Field

In December 2003, CBP issued a radiation detection program directive that contained, among other things, the requirement that CBP officers at the border contact the National Targeting Center for assistance under certain circumstances when radiation is detected. Under the directive, even large shipments of radioactive materials can be admitted without a CBP officer contacting the National Targeting Center to verify whether the materials are legitimately licensed. The radiation detection program directive was scheduled for review in December 2006, but CBP officials told us that this review was delayed pending the resolution of unrelated matters regarding the CBP's right to search property for radioactive materials between ports of entry.

In response to our March 2006 reports[22] assessing the progress DHS has made deploying radiation detection equipment at U.S. ports of entry and detailing how our investigators used fake documents to bring licensable

[22] GAO-06-389 and GAO-06-545R.

quantities of industrial radioactive sources into the United States respectively, CBP revised its policy. Specifically, in May 2006, CBP issued a memorandum that officials told us tightened security by requiring CBP officers to contact the center to verify the legitimacy of a license or obtain technical assistance whenever they detect more than incidental, trace amounts of radiation, such as that found in ceramics and bananas or in people who have recently undergone a medical treatment using radionuclides. This memorandum, according to headquarters officials, was intended to communicate to officers at the border that they should verify the legitimacy of radioactive materials because CBP officers at a port of entry cannot determine whether a licensee or shipper is authentic without the assistance of the National Targeting Center.

This updated guidance, however, was not effectively communicated to officers at the border. Specifically, we asked border officials at the several ports of entry we visited and the four others we interviewed on the telephone about the current guidance they use for regulating the flow of radioactive materials across borders. All either provided us copies of the 2003 radiation detection program directive or confirmed it was current and operative, and some gave us versions of the directive that were port-specific, and therefore, more detailed. Only one port of entry provided us with guidance reflecting the May 2006 memorandum and its requirement that CBP officers contact the National Targeting Center to verify the legitimacy of all licensable quantities of radioactive materials crossing the border. Moreover, officials at all these ports of entry told us that they contact the National Targeting Center for technical assistance when they need it; officials at only one port of entry told us they would call solely to verify whether radioactive materials are appropriately licensed. Officials representing a few other ports of entry told us they had never called the National Targeting Center to verify the legitimacy of a license and that all of their inquiries had been made solely to seek technical assistance.

In addition, the officers we spoke to had minimal knowledge of the general regulatory structure established by NRC and agreement states. While we found officers generally were aware that radioactive materials and sources must be licensed, they typically did not take steps to verify licenses, as required by the May 2006 guidance. At the ports of entry we visited, we observed CBP officers working to ensure that when radioactive materials triggered an alarm, the people carrying (or contaminated with) these materials had a good explanation and that the readings from the portal monitors and RIIDs were in accord with what travelers said and what their documents attested to. In short, the officers were focused on resolving the alarm according to the rules established in the 2003 radiation detection

program directive and on attending to the many other tasks they have in monitoring what flows through U.S. land ports of entry.

In fact, the approach to resolving radiation alarms according to the procedures prescribed in the 2003 radiation detection directive has been so ingrained in day-to-day practice at one port of entry that CBP field office managers had discovered only in the week before our visit that officers had been allowing large neutron radiation-emitting shipments to enter the United States without contacting the National Targeting Center for technical support and to verify their legitimacy. While this situation has since been corrected, this is of particular concern because (1) some neutron radiation-emitting materials can be used to produce nuclear weapons and (2) it is in direct conflict with CBP's 2003 directive and 2006 supplemental guidance.

A senior CBP headquarters official told us that the 2003 radiation detection program directive, as supplemented by the additional criteria established by the May 2006 memorandum on when CBP officers must call to verify the legitimacy of radioactive materials, reflected current policy. He told us that the May 2006 memorandum was always envisioned as only an interim solution, pending a revision of the directive. According to this official, CBP was still working on a revision to the directive that would fully incorporate the heightened security of the memorandum—but he could not give a firm date when an updated directive would be issued. In our view, until CBP effectively communicates the guidance in the 2006 memorandum to its border locations, CBP officers at the border will not know when they should contact the National Targeting Center to verify that radioactive materials being brought into the United States are legitimately licensed.

Conclusions

NRC has taken a number of important actions to implement several of our recommendations from our 2003 report that will enhance the accountability and control of radioactive sources and materials and its ability to help protect the nation from nuclear smuggling. Still, its actions in three key areas remain incomplete. In our view, the reasons behind our recommendations 4 years ago are still valid today. Accordingly, to further enhance public protection from the threats posed by potentially dangerous quantities of radioactive sealed sources and materials, we continue to believe that NRC should implement the recommendations from our 2003 report. Specifically, NRC should

- correct the vulnerabilities uncovered in NRC's materials licensing process and implement the steps needed to ensure that radioactive materials can only be purchased by those with a legitimate reason to possess them, and

- determine whether certain radioactive sources should be regulated through specific licenses rather than general licenses and move quickly to implement whatever changes are deemed necessary.

In addition, we continue to believe that a plan of how to effectively mitigate the potential psychological effects of an RDD event needs to be developed. For potential incidents involving radiological facilities or materials licensed by NRC or agreement states, for which NRC has coordinating responsibilities, NRC should work with DHS, other federal agencies, and agreement states, respecting the roles described in the National Response Framework, to take action to determine how to effectively mitigate the potential psychological effects of such an event.

Also, the causes of the delays in the development and implementation of NRC's more comprehensive systems for securing, monitoring, and tracking radioactive materials need to be confronted and addressed. Specifically, NRC's National Source Tracking System and Web-based licensing system have missed numerous milestones and are not expected to be complete as currently envisioned until at least 2010. Past delays in implementing these systems give reason to wonder whether these dates will again be extended and whether NRC is firmly committed to delivering these systems. The recent decision to develop a third new system has added to these concerns. In our view, given the potential consequences of the use of these materials in an RDD and the potential for these systems to greatly improve the security of both NRC's and agreement states' materials licensing processes, it is time for NRC to make meaningful progress in successfully completing these important initiatives.

While CBP has a comprehensive system in place to detect radiation at ports of entry on the northern and southern borders, CBP's task of preventing the smuggling of radioactive materials is made more difficult by the fact that guidance on when officers should verify whether radioactive materials being brought into the United States are legitimately licensed has not been effectively communicated. The result of this communication gap is that resources that are available to CBP officers at the border to ensure that those possessing radioactive materials are doing so legitimately are underutilized.

Recommendations for Executive Action

Given the repeated delays in implementing improvements to the Nuclear Regulatory Commission's ability to monitor and track radioactive sealed sources, we recommend that the Chairman of the Nuclear Regulatory Commission take steps, consistent with sound systems development practices, to ensure that priority attention is given to meeting the current January 2009 and summer 2010 target dates for launching the National Source Tracking System, Web-based licensing system, and the new license verification system, respectively.

In addition, because some quantities of radioactive materials are potentially dangerous to human health if not properly handled, we recommend that the Nuclear Regulatory Commission complete the steps needed to include all potentially dangerous radioactive sources (category 3 and the larger category 4 sources, as well as categories 1 and 2) in the National Source Tracking System as quickly as is reasonably possible.

Finally, to improve the likelihood of preventing radioactive sources and materials from being smuggled into the United States, we recommend that the Secretary of Homeland Security direct the Commissioner of Customs and Border Protection to

- effectively communicate current Customs and Border Protection guidance to officers at ports of entry regarding when they are required to contact the National Targeting Center to verify that radioactive materials are legitimately licensed, and
- take measures to ensure that this guidance is being followed.

Agency Comments and Our Evaluation

We provided the Chairman of the Nuclear Regulatory Commission, the Secretary of Homeland Security, the Secretary of Energy, the Administrator of the Environmental Protection Agency, and the Chair of the Organization of Agreement States with draft copies of our report for their review and comment.

In commenting on the draft of this report, NRC neither agreed nor disagreed with our findings and recommendations. Instead, NRC described its current efforts to implement the recommendations from our 2003 report. On this point, NRC outlined the steps it is taking to modify and strengthen its processes and procedures for licensing radioactive materials. NRC also provided an update on the status of the efforts of the Radiation Source Protection and Security Task Force's subgroup on public education—a subgroup led by DHS of which NRC is a member—to proactively educate the general public about radiation with the goal of

reducing public anxiety and mitigating the adverse psychological effects in the event of an RDD attack. Finally, NRC described its proposed rule, expected to be issued in the fall of 2009, to limit the quantity of radioactive material allowed in a generally licensed device. Although we are encouraged by NRC's efforts to finish implementing the recommendations from our 2003 report, we remain concerned that nearly 5 years after we issued our report these recommendations have yet to be fully implemented. Furthermore, NRC stated that it is taking the steps necessary to launch the National Source Tracking System (NSTS) and Web-based licensing and to complete the needed steps to include all potentially dangerous radioactive sources in the NSTS as quickly as is reasonably possible. In addition, NRC assures that it intends to place the highest priority on the completion and deployment of the NSTS and Web-based licensing system. However, we are concerned that NRC has once again postponed its estimated completion dates for these systems—by at least 9 months in the case of expanding NSTS to include the smaller but still potentially dangerous radioactive sources and estimates a similar delay in the deployment of the Web-based licensing system. Finally, in its technical comments, NRC informed us that it is developing a new, third system which will draw information from both the NSTS and the Web-based licensing system to provide an improved capability for vendors and regulators to verify licensing information. While we hope this new, third system provides the intended additional capabilities, we are concerned that after so many delays with NSTS and the Web-based licensing system, adding a third system may further delay the ultimate security benefits that these systems are expected to provide. NRC also provided additional technical comments, which we incorporated into the report as appropriate.

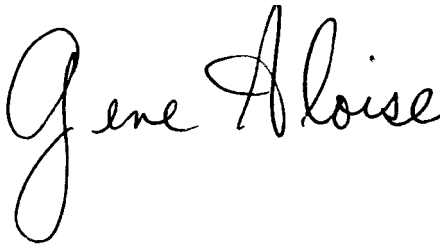
The other federal agencies that were offered the opportunity to comment on our report either agreed with our recommendations and outlined the steps to be taken to implement them, or chose not comment on the final draft. Specifically, according to DHS's written comments, CBP concurred with our recommendations and specified the steps it will take to effectively communicate current Customs and Border Protection guidance to officers at ports of entry regarding when they are required to contact the National Targeting Center to verify that radioactive materials are legitimately licensed, and the measures it will take to ensure this guidance is being followed. In fact, CBP has already updated its current guidance to CBP officers at the border by issuing a memorandum to the field directors restating and clarifying when officers must contact the National Targeting Center to verify that radioactive materials are legitimately licensed and requiring them to incorporate this guidance into ports of entry standard

operating procedures. Finally, DOE and EPA reviewed and provided comments on earlier versions of our draft report and, after reviewing our final draft, had no further comments.

The Organization of Agreement States neither agreed nor disagreed with our findings and recommendations, but offered two comments which we incorporated into the report. Specifically, state officials thought it was important to recognize the quality of agreement state regulatory programs by highlighting the fact that while GAO investigators succeeded in obtaining an NRC radioactive materials license using fictitious documents, GAO withdrew its application to obtain a materials license from the agreement state when that state informed GAO investigators that it would take steps that would have revealed the application not to be authentic. State officials also wanted to stress what they view as the high level of collaboration they enjoy with NRC, as evidenced by the number of state officials involved in security-related working groups with NRC officials and the financial support that NRC provides to states to enable this level of state participation.

As agreed with your offices, unless you publicly announce the contents of this report, we plan no further distribution until 24 days from the report date. At that time, we will send copies of this report to the Chairman of the Nuclear Regulatory Commission, the Secretary of Homeland Security, the Secretary of Energy, the Administrator of the Environmental Protection Agency, the Chair of the Organization of Agreement States, and interested congressional committees. 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 staffs have any questions about this report, please contact me 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 that made major contributions to this report are listed in appendix V.



Gene Aloise
Director, Natural Resources
and Environment

Appendix I: Potential Effects of a Radiological Dispersal Device with Category 1, 2, and 3 Quantities of Radioactive Material

A radiological dispersal device (RDD) is any type of device that is intended to disperse radioactive materials, through conventional explosives or other means. Among the federal agencies, the Environmental Protection Agency (EPA) has lead responsibility for providing radiological emergency planning guidance, known as Protective Action Guides (PAG), to protect the public from exposure to radiation. In addition, the Department of Homeland Security (DHS) issued PAGs for responses to RDD and improvised nuclear devices (IND) for interim use and comment. Both EPA's and DHS's PAGs can be used by other federal agencies or state governments to develop their own guidance or regulations to protect public health. According to EPA officials, the general public's fear of radiation, coupled with most law enforcement officers' relative inexperience dealing with radioactive material, would likely cause any emergency incident that triggers first responders' radiation detectors to be treated as an RDD. Until the type and specific quantity of radioactive material could be determined, the situation would initiate a federal response, whether or not specific, federal thresholds for safety have been reached. Even very small amounts of radioactive material are sufficient to set off the radiation detectors of first responders.

For purposes of illustration (see table 3), we calculated how large an area might be sufficiently contaminated using International Atomic Energy Agency (IAEA) category 1, 2, and 3 quantities of cesium-137—assuming the material could be evenly distributed—to (1) trigger the EPA PAG recommending relocation of the public until the site is cleaned up and (2) reach the threshold at which potential direct health effects, such as radiation sickness, might occur. We used category 2 and 3 amounts of cesium-137 (one of the 16 radionuclides of concern) because, according to the International Atomic Energy Agency categorization scheme, the threshold category 3 quantity is the amount at which a radionuclide becomes potentially dangerous to human health if not handled appropriately. A category 2 quantity of a radioactive material is at least 10 times more dangerous than the category 3 threshold quantity and is also the level at which NRC requires licensees to take additional security measures to protect the material from unauthorized access or use. We calculated how large an area might be contaminated with a category 1 quantity of cesium-137 because such quantities can be found in medical devices and irradiators throughout the United States.

Table 3: Potential Contamination from an RDD

	Amount of radioactive material (cesium-137)		
Thresholds for concern (based on 1 year of exposure)	Category 3 threshold (2.7 curies)	Category 2 threshold (27 curies)	Category 1 threshold (2,700 curies)
EPA recommends relocation (2 rem)[a]	15.1 acres	150.7 acres	15,012 acres
Potential observable health effects (100 rem)	0.3 acre	3 acres	300 acres

Source: GAO.

Notes: Calculations based on the Department of Energy's Federal Regulatory Monitoring and Assessment Center dose assessment methodology. The potential area contamination figures assume uniform ground deposition of radioactive material, which is difficult to accomplish and may not be realistic.

[a]A rem is a term scientists use to describe how much radiation the body absorbs, multiplied by a quality factor for the various types of radiation (e.g., alpha, beta, gamma, or neutron). For example, scientists estimate that the average person receives 360 millirem (0.36 rem) every year from natural (such as radon gas) and manufactured radiation sources (such as exposure to radioactive isotopes used in some medical procedures).

Specifically, when the potential additional exposure to radiation for a person remaining in a given area for 1 year reaches 2 rem, EPA considers the area sufficiently dangerous to recommend that people be relocated until the site can be decontaminated. When the potential exposure to radiation over the course of 1 year reaches 100 rem, the International Commission on Radiological Protection—an organization of radiation scientists from around the world who provide recommendations regarding radiation exposure—concludes that readily observable health effects, such as radiation sickness, are possible with extended exposure. Only a category 1 quantity would be likely to produce health effects due to acute radiation doses. This level, however, is still substantially below the level at which prompt fatalities could occur. (Prompt fatalities from untreated radiation exposure may only result from acute radiation doses—that is, doses delivered in their entirety in a matter of hours or days—of at least hundreds of rem from a predominately beta-gamma emitting radionuclide like cesium-137.)

EPA guidance is based on protecting human health and calculating the odds that radiation exposure will lead to cancer, the most common of radiation's long term side effects. In the event of an RDD, federal RDD PAGs, such as those issued by DHS in 2006, would be used to manage the response to the incident. PAGs are operative during the emergency, and their chief goal is to protect the public by providing standards to guide the response in the early and intermediate phases of an incident. However,

any PAG guidance is only a series of recommendations and is not legally enforceable or binding.

Furthermore, a PAG does not establish cleanup levels. In fact, guidance for specific cleanup levels after an RDD has been deliberately left ad hoc, and is to be established after an evaluation occurs using an "optimization" process for long-term site cleanup and restoration. The level to which a contaminated site would be cleaned up for the long term would be agreed upon after the emergency has passed and would depend on the uses of the site. A cleanup standard would factor in the lifetime exposure that the contamination creates for the people using the site—generally, the long-term increased risk of developing cancer. For example, a site that is used for business purposes, where the typical person would spend only working hours, would not have to be cleaned up to the same level as a site where people live, where some people could reasonably be exposed to the post-cleanup radiation levels 24 hours a day. Public involvement in the decision would play a significant role in determining what risk levels are acceptable. While EPA provides guidelines, state and local authorities make the ultimate decisions under most scenarios.

Appendix II: Comments from the Nuclear Regulatory Commission

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 28, 2008

Mr. Gene Aloise, Director
Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, D.C. 20548

Dear Mr. Aloise:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to your e-mail dated April 21, 2008, requesting NRC review and comment on your draft report, "Nuclear Security: NRC and DHS Need to Take Additional Steps to Better Track and Detect Radioactive Materials" (GAO-08-598). I appreciate you providing the NRC the opportunity to review this draft report and the time and effort that you and your staff have invested in reviewing this important topic.

NRC's leadership role in applying a risk-based approach has enhanced security of radioactive materials and has reduced the potential threat from a radiological dispersal device (RDD) or radiological exposure device. As a result, these materials are significantly more secure than before the events of September 11, 2001. NRC is working closely with its domestic and international partners to continuously assess, integrate, and improve its security programs to make risk-significant radiation sources more secure and less vulnerable to terrorists.

Specifically, the U.S. Government Accountability Office (GAO) noted that the NRC has made limited progress toward implementing 3 of the 6 recommendations in the 2003 report on security of radioactive sources. The GAO recommended that the NRC: (1) modify its process for issuing licenses to ensure that radioactive materials cannot be purchased by individuals with no legitimate need for them; (2) determine how to effectively mitigate the potential psychological effects of malicious use of such materials; and (3) examine whether certain radioactive sources should be subject to more stringent regulations. With regard to these recommendations, the NRC and its Federal and Agreement State partners have made and are making significant progress towards achieving these goals.

Beginning in January 2008, the NRC has modified its licensing process and now conducts pre-licensing site visits for all unknown applicants before issuing new licenses. The new procedure was tested in a pilot project with the Agreement States. The procedure will be revised based on comments received from licensing reviewers in the NRC Regions and the Agreement States as a result of the pilot project. These actions are aiding in the prevention of illegitimate purchases of radioactive materials.

The NRC is working with its Federal and Agreement State partners to address the issue of mitigation of potential psychological effects of an RDD through the Radiation Source Protection and Security Task Force's (Task Force) subgroup on public education, which is chaired by the Department of Homeland Security. As noted in their December 2007 Draft Public Education Action Plan, proactively educating the public about radiation in general and the

specific radiation risks associated with RDDs may reduce the public's anxiety and ameliorate adverse psychological impacts in the event of an RDD attack. This plan was presented to the Task Force on May 15, 2008.

Additionally, the Task Force has reactivated the radiation sources subgroup to reevaluate the list of radioactive sources that warrant enhanced security and protection. The subgroup's proposed evaluation will take economic, physical, psychological, and social disruption consequences into consideration. The results will be presented to the Task Force by November 2008. The combined work planned by these two subgroups will address mitigation of psychological impacts of a RDD and address whether enhanced security measures may be warranted for certain radioactive materials.

With regard to whether generally licensed radioactive sources should be subject to more stringent regulations, the NRC formed a rulemaking working group which included State representatives in September 2007, to consider which sources should be specifically licensed. The working group has drafted a proposed rule to limit the quantity of radioactive material allowed in a generally licensed device. The draft proposed rule is currently being reviewed by the NRC and the Agreement States and is expected to be issued for public comment this fall. The final rule is projected to be issued in fall 2009.

In addition to providing a status update on the NRC's progress in implementing the recommendations from the 2003 report, the GAO also recommended that the Chairman of the NRC take steps, consistent with sound systems development practices, to: (1) ensure that priority attention is given to meeting the current January and October 2009 target dates for launching the National Source Tracking System (NSTS) and Web-based Licensing (WBL) System, respectively, and (2) complete the needed steps to include all potentially dangerous radioactive sources in the NSTS as quickly as is reasonably possible.

With regard to the GAO's recommendation that the NRC take steps to ensure that priority attention is given to meeting the current January and October 2009 target dates for launching the NSTS and WBL systems, I want to assure you that the Commission has placed a high priority in the deployment of these systems. In accordance with Office of Management and Budget guidance, the NRC has employed sound system development practices. The NRC has: (1) assigned professionally certified project managers to both NSTS and WBL; (2) set reasonable performance baselines and integrated project schedules for both NSTS and WBL; and (3) employed earned value management on the NSTS project and will employ it on the WBL project once a contract is in place. The NSTS is on schedule for deployment in January 2009. Additionally, a proposed rule has been issued for public comment, which would expand NSTS beyond Category 2 sources to include Category 3 and $1/10^{th}$ of the Category 3 threshold values. The final rule is projected to be issued in early 2009. The October 2009 target date for WBL deployment was based upon having a contract awarded and a preliminary estimate of remaining work. The NRC has encountered delays in awarding the contract, which are based on changing scope and requirements to meet current programmatic needs. NRC's goal is to have the contract awarded by late summer 2008 and to have the system deployed 24 months later.

-3-

Enclosed are additional comments related to enhancing the clarity and accuracy of statements in the body of the report. Should you have any questions about these comments, please contact Mr. Jesse Arildsen of my staff at (301) 415-1785.

Sincerely,

R.W. Borchardt
Executive Director
for Operations

Enclosure:
NRC Comments on the GAO's Draft Report,
"Nuclear Security: NRC and DHS Need to
Take Additional Steps to Better Track and
Detect Radioactive Materials" (GAO-08-598)

Appendix III: Comments from the Department of Homeland Security

U.S. Department of Homeland Security
Washington, DC 20528

Homeland Security

June 2, 2008

Mr. Gene Aloise
Director, Natural Resources and Environment
U.S. Government Accountability Office
Washington, D. C. 20548

Dear Mr. Aloise:

Thank you for providing us with a copy of the draft report entitled "NUCLEAR SECURITY: NRC and DHS Need to Take Additional Steps to Better Track and Detect Radioactive Materials" (GAO-08-598) where GAO was requested to assess: 1) the progress NRC has made in implementing 2003 recommendations; 2) other steps NRC has taken to improve its ability to track radioactive materials; 3) Customs and Border Protection's (CBP's) ability to detect radioactive materials at land ports of entry; and 4) CBP's ability to verify that such materials are appropriately licensed before they are allowed to enter the United States.

CBP concurs with GAO's recommendation that CBP effectively communicate current CBP guidance to officers at ports of entry regarding when they are required to call the National Targeting Center to verify the legitimacy of radioactive materials; and take measures to ensure that this guidance is being followed.

CBP will:

1) Issue guidance to officers at ports of entry regarding when they are required to call the National Targeting Center to verify the legitimacy of radioactive materials.

2) Have all field offices ensure that the port's Standard Operating Procedures include the guidance.

Due Date: March 31, 2009.

We thank you again for the opportunity to review the draft report and provide comments.

Sincerely,

Penelope G. McCormack
Acting Director
Departmental GAO/OIG Liaison Office

www.dhs.gov

Appendix IV: Comments from the Organization of Agreement States

Organization of Agreement States

May 27, 2008

Gene Aloise
Director, Natural Resources and Environment U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Aloise:

Please accept the comments below on behalf of the Board of the Organization of Agreement States on the draft report on Nuclear Security, which you provided to us during the week of April 21, 2008 and for the statement of facts provided to us in March. We've noted the changes from the earlier document to this one.

In the section of the report beginning on page 18, which discusses GAO's ability to obtain a license from NRC for a false company, no mention is made of GAO's attempt to obtain a license from an Agreement State. GAO subsequently abandoned that attempt when the licensing process of the Agreement State was made known. The Agreement States believe this is very significant, not only because an Agreement State's actions caused such an attempt to be abandoned, but because this points out the very real fact that the licensing process may indeed differ. Agreement State programs may go to different lengths in verifications made during the licensing process. So, the fact that GAO obtained a license from one regulatory agency is not indicative that the same would happen with any other regulatory agency.

Although collaboration between NRC and the Agreement States is mentioned several times throughout the report, we do not believe this point is emphasized enough. Currently, there are an unprecedented number of security-related working groups involving NRC and Agreement State staff members. The fact that the states are able to obtain volunteers to work on all of these working groups and that NRC is funding the travel involved with such efforts, is a testament to our belief in the importance of ensuring security of radioactive material in this country.

We appreciate the opportunity to review the report and provide comments. Thank you for your patience.

Sincerely,

Cindy Cardwell, Chair
Organization of Agreement States

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

Gene Aloise, (202) 512-3841 or aloisee@gao.gov

Staff Acknowledgments

In addition to the contact named above, Ned Woodward, Nabajyoti Barkakati, Kevin Bray, Ryan Coles, Nancy Crothers, Walker Fullerton, Cindy Gilbert, Richard Hung, Carol Kolarik, Keith Rhodes, and Kevin Tarmann made significant contributions to this report.

GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's Web site (www.gao.gov). Each weekday, GAO posts newly released reports, testimony, and correspondence on its Web site. To have GAO e-mail you a list of newly posted products every afternoon, go to www.gao.gov and select "E-mail Updates."

Order by Mail or Phone

The first copy of each printed report is free. Additional copies are $2 each. A check or money order should be made out to the Superintendent of Documents. GAO also accepts VISA and Mastercard. Orders for 100 or more copies mailed to a single address are discounted 25 percent. Orders should be sent to:

U.S. Government Accountability Office
441 G Street NW, Room LM
Washington, DC 20548

To order by Phone: Voice: (202) 512-6000
TDD: (202) 512-2537
Fax: (202) 512-6061

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: www.gao.gov/fraudnet/fraudnet.htm
E-mail: fraudnet@gao.gov
Automated answering system: (800) 424-5454 or (202) 512-7470

Congressional Relations

Ralph Dawn, Managing Director, dawnr@gao.gov, (202) 512-4400
U.S. Government Accountability Office, 441 G Street NW, Room 7125
Washington, DC 20548

Public Affairs

Chuck Young, Managing Director, youngc1@gao.gov, (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, DC 20548