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DOE Needs to Take
Action to Safely
Consolidate
Plutonium



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Highlights

Highlights of [GAO-05-665](#), a report to congressional committees

Why GAO Did This Study

Plutonium is very hazardous to human health and the environment and requires extensive security because of its potential use in a nuclear weapon. The Department of Energy (DOE) stores about 50 metric tons of plutonium that is no longer needed by the United States for nuclear weapons. Some of this plutonium is contaminated metal, oxides, solutions, and residues remaining from the nuclear weapons production process. To improve security and reduce plutonium storage costs, DOE plans to establish enough storage capacity at its Savannah River Site (SRS) in the event it decides to consolidate its plutonium at SRS until it can be permanently disposed of in a geologic repository at Yucca Mountain, Nevada. GAO was asked to examine (1) the extent to which DOE can consolidate this plutonium at SRS and (2) SRS's capacity to monitor plutonium storage containers.

What GAO Recommends

GAO recommends that DOE (1) develop a comprehensive strategy to consolidate, store, and eventually dispose of its plutonium and (2) ensure that its facilities' cleanup plans are consistent with its plutonium consolidation plans. In commenting on the report, DOE generally agreed with our recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-05-665.

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

SECURING U.S. NUCLEAR MATERIALS

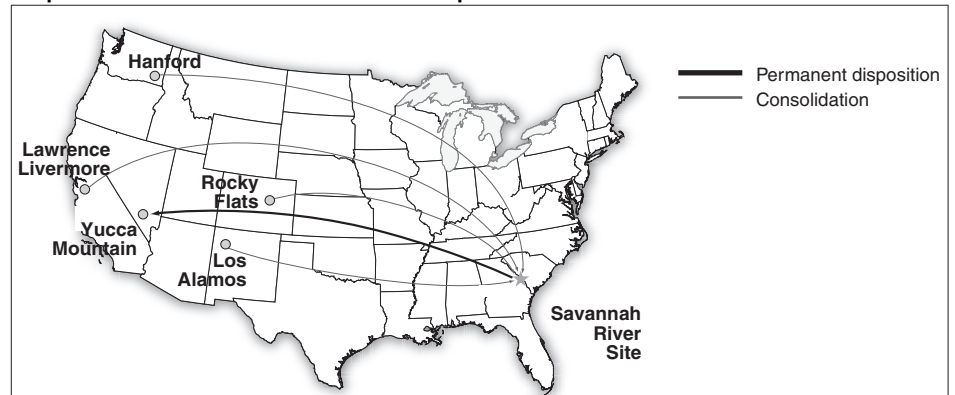
DOE Needs to Take Action to Safely Consolidate Plutonium

What GAO Found

DOE cannot yet consolidate its excess plutonium at SRS for several reasons. First, DOE has not completed a plan to process the plutonium into a form for permanent disposition, as required by the National Defense Authorization Act for Fiscal Year 2002. Without such a plan, DOE cannot ship additional plutonium to SRS. Second, SRS cannot receive all of the plutonium from DOE's Hanford Site because it is not in a form SRS planned to store. Specifically, about one-fifth of Hanford's plutonium is in the form of 12-foot-long nuclear fuel rods, which Hanford had planned to ship intact to SRS as part of its efforts to accelerate the cleanup and demolition of its closed nuclear facilities. However, SRS's storage plan called for storing DOE's standard storage containers and not intact fuel rods. Recent changes in DOE's security requirements have complicated SRS's storage plans by eliminating one facility that DOE planned to use to store plutonium. Until DOE develops a permanent disposition plan, additional plutonium cannot be shipped to SRS and DOE will not achieve the cost savings and security improvements that consolidation could offer. Continued storage at Hanford will cost an additional approximately \$85 million annually and will threaten that site's achievement of the milestones in its accelerated cleanup plan.

In addition, DOE lacks the capability to fully monitor the condition of the plutonium necessary to ensure continued safe storage. The facility at SRS that DOE plans to use to store plutonium lacks adequate safety systems to conduct monitoring of storage containers. Without a monitoring capability, DOE faces increased risks of an accidental plutonium release that could harm workers, the public, and/or the environment. DOE had planned to construct a monitoring capability in another building at SRS that already had the safety systems needed to work with plutonium. However, this building would not have had sufficient security to conduct all of the required monitoring activities. In addition, this building also has other serious safety problems. Faced with these challenges, DOE announced in April 2005 that it would have SRS's storage facility upgraded to conduct plutonium monitoring.

Proposed Consolidation and Permanent Disposition of DOE's Unneeded Plutonium



Sources: GAO (data); MapArt (images).

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Abbreviations

DBT	design basis threat
DE	destructive examination
DOE	Department of Energy
HEPA	High-Efficiency Particulate Air
NDE	nondestructive examination
NNSA	National Nuclear Security Administration
Safety Board	Defense Nuclear Facilities Safety Board
SRS	Savannah River Site

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

July 20, 2005

The Honorable Joe Barton
Chairman, Committee on Energy and Commerce
House of Representatives

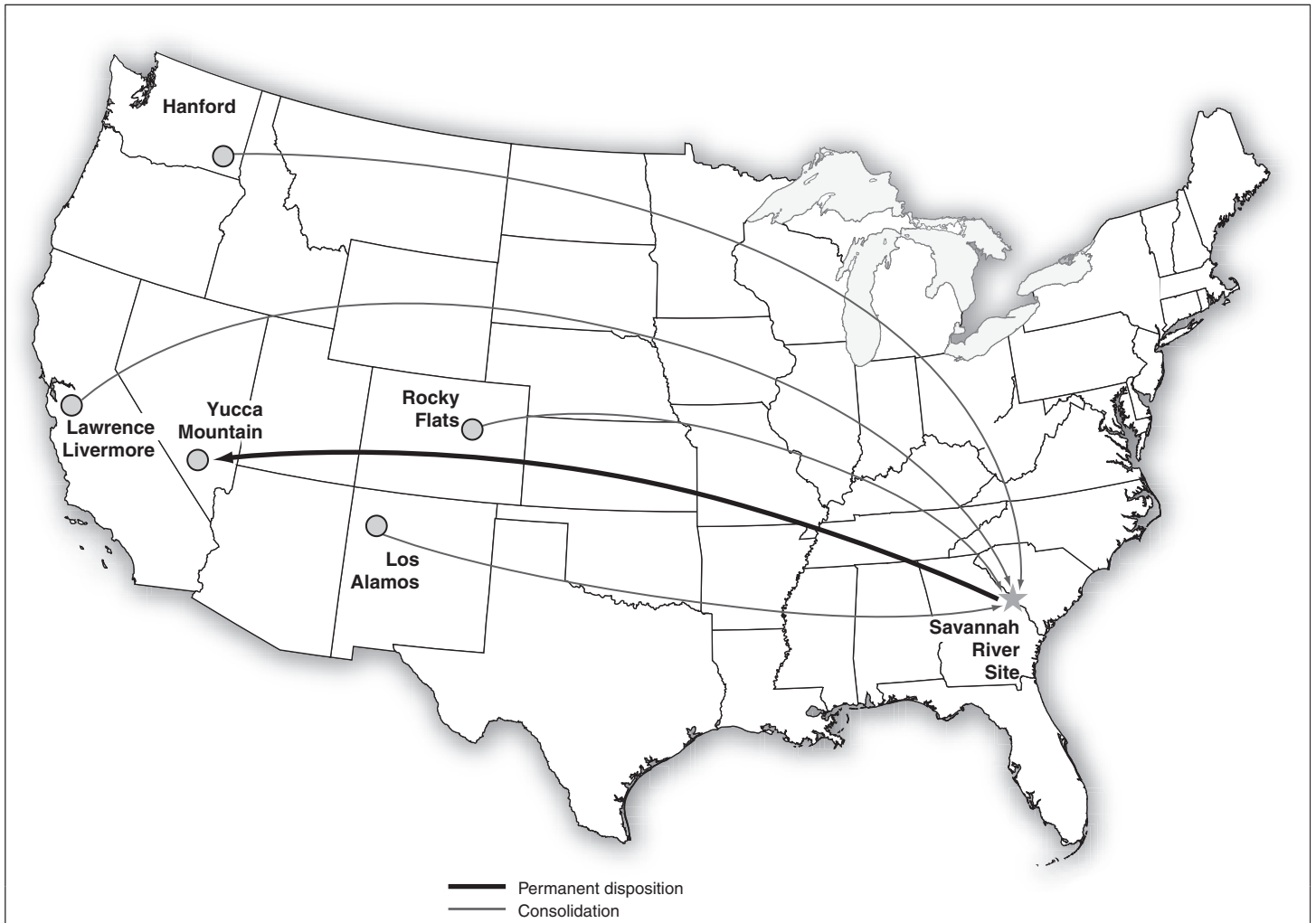
The Honorable Ed Whitfield
Chairman, Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
House of Representatives

Plutonium—a man-made element produced by irradiating uranium in nuclear reactors and used in nuclear weapons—is very hazardous to human health and the environment and presents an attractive target for theft by a terrorist. When the United States stopped producing nuclear weapons in 1989, it had plutonium inventories located in numerous Department of Energy (DOE) facilities throughout the United States. These facilities included the Hanford Site in Washington, the Rocky Flats Environmental Technology Site in Colorado, the Los Alamos National Laboratory in New Mexico, the Lawrence Livermore National Laboratory in California, and the Savannah River Site (SRS) in South Carolina.

DOE stores about 50 metric tons of plutonium that is no longer needed by the United States for nuclear weapons. The majority is in the form of pits (the spherical core of a nuclear weapon), clean metal, and oxides while the remainder is in nonpit forms such as contaminated metal, oxides, solutions, and residues remaining from the nuclear weapons production process.¹ To improve security and reduce costs, DOE plans to establish enough storage capacity at SRS in the event it decides to consolidate its nonpit plutonium for interim storage until it can be permanently disposed of in a geologic repository at Yucca Mountain, Nevada. (See fig. 1.)

¹The exact amounts of plutonium that are in pit and nonpit forms is considered classified information.

Figure 1: Proposed Consolidation and Permanent Disposition of DOE's Unneeded Plutonium



Sources: GAO (data); MapArt (images).

Nonpit plutonium has particularly dangerous characteristics that demand special storage conditions. Unlike pits, nonpit plutonium is in forms that can be easily dispersed. If not safely contained, plutonium can be dangerous to human health, even in extremely small quantities. Because it can be highly radioactive, inhaling a few micrograms of plutonium creates a long-term risk of lung, liver, and bone cancer. Inhaling larger doses can cause immediate lung injuries and death. In certain forms, plutonium can spontaneously combust in the presence of oxygen at temperatures above

room temperature. Because of these hazards, nonpit plutonium must be stabilized and packaged appropriately to minimize the risk of accidental release. In addition, facilities storing plutonium must be properly equipped with safety systems that prevent it from escaping into the surrounding air, land, or water in the event a container is breached. This report addresses the storage and monitoring of nonpit plutonium (hereafter referred to as plutonium) at SRS.

In 2003, DOE issued a technical standard for plutonium stabilization and storage that it believes will allow it to safely store plutonium for a minimum of 50 years. DOE is nearing completion of a multiyear effort to stabilize and package plutonium at its sites across the United States into 5-inch-wide, 10-inch-long storage containers. Under DOE's standard, once the plutonium is safely packaged, DOE must periodically monitor the storage containers for changes in the plutonium's condition, particularly any pressurization or corrosion of the containers. Such monitoring includes annually x-raying a sample of storage containers to evaluate potential pressurization. Storage containers may also be cut open to evaluate the plutonium inside and the container itself for potential corrosion. An effective monitoring program is intended to detect damaged storage containers or inadequately stabilized plutonium and will help DOE ensure the continued safe storage of the material.

DOE must also provide security against potential terrorists interested in the plutonium's value for constructing a nuclear weapon, an improvised nuclear device, or even a "dirty bomb."² For many years, a key component of DOE security has been the development of the design basis threat (DBT), a classified document that identifies the potential size and capabilities of terrorist forces. Since September 11, 2001, the size of the potential threat has increased significantly.³

DOE has cancelled two proposed construction projects at SRS that would have provided plutonium storage and monitoring and would have

²A dirty bomb, also known as a radiological dispersion device, uses conventional explosives to disperse radioactive material. While a dirty bomb would have few short-term health effects on exposed individuals, it could potentially increase the long-term risks of cancer for those contaminated. In addition, the evacuation and cleanup of contaminated areas after such an explosion could lead to panic and serious economic costs.

³See GAO, *Nuclear Security: DOE Needs to Resolve Significant Issues Before It Fully Meets the New Design Basis Threat*, [GAO-04-623](#) (Washington, D.C.: Apr. 27, 2004).

processed the plutonium for permanent disposition. In 2001, DOE cancelled a project initiated in 1995 to build a new facility at SRS, called the Actinide Packaging and Storage Facility, that would have provided long-term storage and monitoring of standard plutonium containers in a secure environment. DOE cancelled the project because it expected to store the plutonium for only a few years until a facility to process the plutonium for permanent disposition was available. Instead, DOE decided to use existing buildings at SRS to package and store the plutonium until construction of the processing facility was completed. In addition, in 2002, citing budgetary constraints, DOE cancelled its plans to construct the facility that would have processed its most heavily contaminated plutonium into a form for permanent disposition by a method known as immobilization. Immobilization involves mixing the plutonium with ceramics, placing the mixture in large canisters, and then filling the canisters with high-level radioactive waste that has been turned into molten glass that then hardens. These canisters would have then been shipped to a geologic repository for high-level radioactive waste that DOE plans to construct at Yucca Mountain, Nevada. As a result of the cancellation of the immobilization facility, DOE has no means for processing its most heavily contaminated plutonium into a form suitable for permanent disposition.

In December 2003, the Defense Nuclear Facilities Safety Board (Safety Board), an independent federal agency established by the Congress in 1988 to oversee the safety of DOE's nuclear weapons complex, reported that although the facilities DOE plans to use for plutonium storage can do so safely for a limited time, the facilities do not meet modern safety standards for long-term plutonium storage. The Safety Board concluded that DOE's lack of planning for plutonium storage forced SRS to focus on what can be done with existing facilities, foreclosing options that may have been both cost-effective and safe. The Safety Board proposed that DOE conduct a new study of the options for storing plutonium at SRS. In addition, it advocated the development of a complete, well-considered plan for permanently disposing of all of DOE's excess plutonium.

In this context and as agreed with your offices, we examined (1) the extent to which DOE can consolidate its plutonium at SRS and (2) SRS's capacity to monitor plutonium storage containers. A forthcoming classified report will discuss SRS's plans for upgrading security to meet the 2004 DBT.

To evaluate DOE's plans for consolidating plutonium, monitoring stored plutonium, and providing security, we reviewed plutonium storage,

monitoring, and security plans and reports prepared by DOE's Office of Environmental Management, DOE's Office of Security and Safety Performance Assurance, DOE's National Nuclear Security Administration (NNSA), DOE's operating contractor for SRS (Westinghouse Savannah River Company), and DOE's security contractor for SRS (Wackenhut Services, Inc.). In addition, we reviewed studies on plutonium storage at SRS produced by the Safety Board. Over the course of our work, we toured plutonium storage facilities at SRS. During these visits, we interviewed and received briefings from DOE Savannah River Operations, Westinghouse, and Wackenhut officials. We also visited plutonium storage facilities at DOE's Hanford Site, specifically Hanford's Plutonium Finishing Plant. Hanford currently stores the majority of the plutonium that could eventually be shipped to SRS. During this visit, we interviewed and received briefings from DOE Richland Operations officials. We also spoke with officials from DOE's operating contractor for Hanford (Fluor Hanford) and Fluor's security subcontractor for the Hanford Site (Protection Technology Hanford). In addition, we interviewed officials from the Safety Board, DOE's Office of Environmental Management, and DOE's Office of Independent Oversight and Performance Assurance. Additional information on our objectives, scope, and methodology can be found in appendix I. We conducted our work from June 2004 through June 2005 in accordance with generally accepted government auditing standards.

Results in Brief

DOE cannot consolidate all of its plutonium at the Savannah River Site for several reasons. First, DOE has not completed a plan to process the plutonium into a form for permanent disposition, as required by the National Defense Authorization Act for Fiscal Year 2002. Without such a plan, DOE cannot ship additional plutonium to SRS. Second, even if this plan was in place, SRS cannot currently receive all of Hanford's plutonium because it is in a form that SRS had not planned on storing. Specifically, Hanford was preparing to ship plutonium to SRS as part of its efforts to accelerate the cleanup and demolition of its closed nuclear facilities. About one-fifth of Hanford's plutonium is in the form of 12-foot-long nuclear fuel rods. Because disassembling the fuel rods would delay cleanup activities, Hanford's accelerated cleanup plan calls for shipping these rods intact to SRS inside special shipping containers. However, SRS's storage plans called for storing Hanford's plutonium in DOE's standard 5-inch-wide, 10-inch-long storage containers. SRS's storage plan assumed Hanford would disassemble the fuel rods and package the plutonium in storage containers. Despite these inconsistencies, DOE approved both Hanford's accelerated cleanup plan and SRS's plutonium storage plans. Instead of

developing an integrated plan for plutonium consolidation, DOE relied upon its individual sites to independently develop plans to achieve their own goals. Although SRS's storage facility has sufficient space to store the fuel rods, several steps are necessary before DOE would be able to ship the fuel rods to SRS. These include obtaining Department of Transportation-certified shipping containers for the fuel rods and completing the appropriate safety analyses and documentation for SRS's storage facility. Changes to DOE's security requirements have complicated SRS's storage plans by eliminating one facility that DOE planned to use to store plutonium. Originally, DOE had planned to use two SRS facilities to store its excess plutonium. However, both facilities would need extensive and expensive upgrades to comply with the new 2004 DBT requirements. In order to save money, DOE has, therefore, decided to use only one facility to store plutonium. Until DOE develops a plan to process the plutonium for permanent disposition, additional plutonium cannot be shipped to SRS and DOE will not achieve the cost savings and security improvements that plutonium consolidation could offer. In particular, continued plutonium storage at Hanford will cost approximately an additional \$85 million annually and will threaten that site's achievement of the milestones in its accelerated cleanup plan.

In addition, DOE lacks the capability at SRS to fully monitor the condition of the plutonium that is in storage containers as required by DOE's storage standard. According to the Safety Board, the facility at SRS that DOE plans to use to store the plutonium is not equipped to conduct the needed monitoring of storage containers. In fact, because this storage facility lacks adequate fire protection, ventilation, and filtration, DOE's standard storage containers cannot be removed from their outer packaging—35-gallon steel drums used to ship the containers to SRS. The only facility at SRS that can be used to safely remove the storage containers from their outer packaging, monitor them, and, if necessary, restabilize and repackage the plutonium, has closed in preparation for decommissioning. Without a monitoring capability that would detect whether the stored plutonium is becoming unstable and damaging the storage containers, DOE faces increased risks of an accidental plutonium release at SRS that could harm workers, the public, and/or the environment. Because SRS's storage facility lacks the capability to monitor stored plutonium, DOE had planned to construct a monitoring capability in another building at SRS that already had the ventilation and filtration systems needed to work with plutonium. However, this building would not have had sufficient security to conduct all of the monitoring activities required by DOE's storage standard. In addition, the Safety Board has reported that, like the storage facility, this

building lacks adequate fire protection as well as having other serious safety concerns. Given these challenges, DOE announced in April 2005 that it would have SRS's storage facility upgraded to allow storage and monitoring activities to be centralized in one facility.

We are making recommendations to ensure that DOE develops a comprehensive strategy for plutonium consolidation, storage, and disposition and that its facilities' cleanup plans are consistent with this strategy.

We presented a draft of this report to DOE for comment. In its comments, DOE generally agreed with our recommendations and stated that its recently created Nuclear Materials Disposition and Consolidation Coordination Committee will develop a strategic plan for the consolidation and disposition of special nuclear material. Upon completion of this plan, DOE stated that it will ensure that its sites' cleanup plans are revised accordingly. DOE also provided technical comments that we incorporated into the report as appropriate.

Background

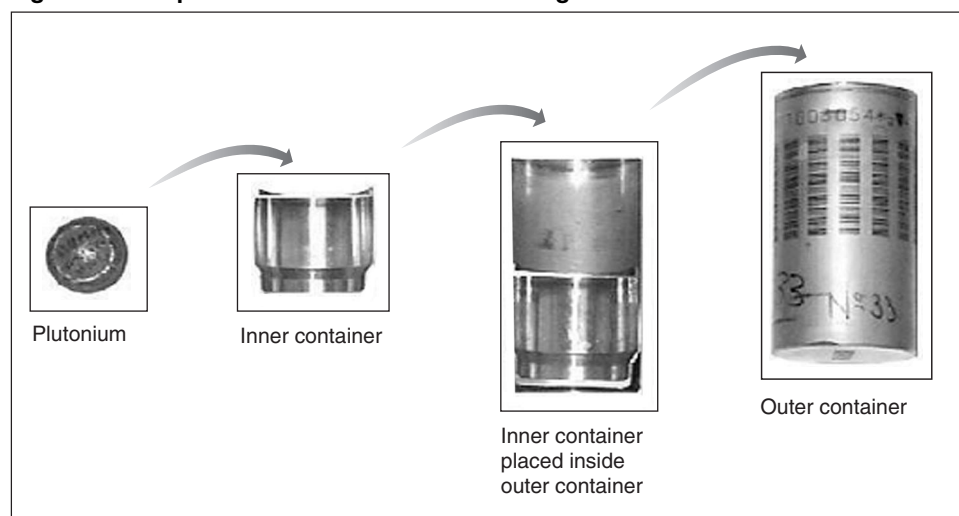
SRS was constructed in the early 1950s by the DuPont Company under contract to the Atomic Energy Commission (a predecessor agency to DOE) to produce tritium and plutonium-239 for use in nuclear weapons. Covering 310 square miles along the Savannah River and encompassing land across several counties in South Carolina, the site historically has supported five nuclear reactors, two chemical separation plants, a heavy water extraction plant, a nuclear fuel and target fabrication facility, a tritium extraction facility, and waste management facilities. During the cold war, SRS was the only source of tritium in the United States and supplemented the production of weapons-grade plutonium at DOE's Hanford Site. Although SRS no longer produces plutonium, some of its missions continue, such as the extraction of tritium for nuclear warheads. SRS is currently managed under contract to DOE by Westinghouse Savannah River Company.

To address the problems associated with unstable forms of plutonium and inadequate packaging for long-term storage, DOE established a standard for the safe storage of plutonium for a minimum of 50 years.⁴ This standard establishes the stabilization and packaging requirements for plutonium.

⁴U.S. Department of Energy, *Stabilization, Packaging, and Storage of Plutonium-Bearing Materials*, DOE-STD-3013-2003 (Washington, D.C.: December 2003).

Stabilization occurs by heating the material to remove moisture that could lead to a buildup of pressure. This buildup of pressure increases the risk of rupturing a container. Plutonium containers designed to meet this standard consist of an inner and outer container, each welded shut. (See fig. 2.)

Figure 2: Components of a DOE Standard Storage Container



Source: SRS.

The inner container is designed so that it can be monitored for a buildup of pressure using analytical techniques, such as radiography, that do not damage the container. Containers must also be resistant to fire, leakage, and corrosion. Each storage container can hold a total of 5 kilograms of material, but a maximum of 4.4 kilograms of the 5 kilograms can be pure plutonium. The remaining material is chemical impurities such as chlorides and fluorides that are mixed with the plutonium.

Plutonium stabilization and packaging is completed at Rocky Flats, Hanford, and SRS, and SRS has already received nearly 1,900 containers from Rocky Flats. Stabilization and packaging is still ongoing at Lawrence Livermore and Los Alamos National Laboratories. Once completed, DOE estimates that it will have nearly 5,700 plutonium storage containers being stored at locations across the United States that could eventually be shipped to SRS. (See table 1.)

Table 1: DOE's Estimate of the Number of Storage Containers by Site after Plutonium Stabilization and Packaging Have Been Completed

Site	Number of storage containers
SRS	2,935
Hanford	2,275
Los Alamos National Laboratory	342
Lawrence Livermore National Laboratory	135
Total	5,687

Source: SRS.

Notes: 1,895 of the storage containers now stored at SRS were originally packaged and shipped from the Rocky Flats Environmental Technology Site in Colorado.

In addition to 2,275 storage containers, Hanford has additional plutonium in the form of fuel rods that were to be used in the now-closed Fast Flux Test Facility nuclear reactor. These fuel rods contain enough plutonium that, if they were cut apart and the material packaged, would require approximately 1,000 additional storage containers. See pages 11 and 12 for additional discussion of Hanford's fuel rods.

Until April 2005, SRS's plutonium storage plans called for using two buildings at the site for plutonium storage and monitoring operations: Building 105-K and Building 235-F. Building 105-K was originally a nuclear reactor built in the early 1950s and produced plutonium and tritium until 1988. The reactor was then placed in a cold standby condition until its complete shutdown in 1996. The major reactor components were removed and the facility is now primarily used to store plutonium and highly enriched uranium.

Building 235-F was also constructed in the 1950s and was used until the mid-1980s to produce plutonium heat sources that were used to power space probes for the National Aeronautics and Space Administration and the Department of Defense. The building is currently used to store plutonium.

DOE must provide extensive security for plutonium storage facilities at SRS because they contain Category I quantities of plutonium. Category I material includes specified quantities of plutonium or highly enriched uranium in the following forms: (1) assembled nuclear weapons and test devices; (2) pure products containing higher concentrations of plutonium or highly enriched uranium, such as major nuclear components and recastable metal; and (3) high-grade materials, such as carbides, oxides, solutions, and nitrates. The risks associated with Category I special nuclear materials vary but include the nuclear detonation of a weapon or test

device at or near design yield, the creation of improvised nuclear devices capable of producing a nuclear yield, theft for use in a nuclear weapon, and the potential for sabotage in the form of radioactive dispersal.

To manage potential security risks, DOE has developed the DBT, a classified document that identifies the potential size and capabilities of terrorist forces. DOE requires the contractors operating its sites to develop security measures designed to defend against the threat contained in the DBT. While specific measures vary from site to site, SRS's security measures include

- a variety of integrated alarms and sensors capable of detecting intruders;
- physical barriers, such as fences and antivehicle obstacles;
- numerous access control points, such as turnstiles, badge readers, vehicle inspection stations, special nuclear material detectors, and metal detectors;
- operational security procedures, such as a "two person" rule that prevents only one person from having access to special nuclear material;
- hardened facilities and vaults; and
- a heavily armed paramilitary protective force equipped with such items as automatic weapons, night vision equipment, body armor, and chemical protective gear.

DOE Cannot Consolidate Its Plutonium from Other DOE Sites at the Savannah River Site

DOE cannot consolidate its excess plutonium at SRS for several reasons. First, DOE has not completed a plan to process the plutonium into a form for permanent disposition, as required by the FY 2002 defense authorization act. Without such a plan, DOE cannot ship additional plutonium to SRS. Second, SRS cannot currently receive all of Hanford's plutonium because it is in a form that SRS had not planned on storing. Changes to the DBT have complicated SRS's storage plans by eliminating one facility that DOE had planned to use for plutonium storage. DOE is facing these storage challenges because of its failure to adequately plan for plutonium consolidation and disposition. Until DOE develops a permanent disposition plan, additional plutonium cannot be shipped to SRS and DOE

will not achieve the cost savings and security improvements that plutonium consolidation could offer. For example, continued plutonium storage at Hanford will cost approximately an additional \$85 million annually and will threaten that site's achievement of the milestones in its accelerated cleanup plan.

SRS Cannot Receive Additional Plutonium Until a Plan to Process the Plutonium for Permanent Disposition Is Developed

Section 3155 of the National Defense Authorization Act for Fiscal Year 2002⁵ provides that if DOE decides not to construct either of two proposed plutonium disposition facilities at SRS,⁶ DOE is prohibited from shipping plutonium to SRS until a plan to process the material for permanent disposition is developed and submitted to the Congress. In 2002, DOE cancelled the plutonium immobilization plant and, to date, DOE has not developed a plan for the plutonium that would have been processed in that plant for permanent disposition. In its fiscal year 2006 budget, DOE has requested \$10 million to initiate conceptual design of a facility that would process this plutonium. However, it is uncertain when this design work would be completed and a plan prepared.

SRS Cannot Currently Receive Some of Hanford's Plutonium Because Hanford's Accelerated Cleanup Plans and SRS's Storage Plans Are Inconsistent with One Another

Even if a plan to process this plutonium for permanent disposition had been developed and DOE were able to ship the plutonium, SRS cannot currently accommodate some of Hanford's plutonium because Hanford's accelerated cleanup plans and SRS's storage plans are inconsistent with one another. DOE approved both plans even though Hanford's accelerated cleanup plan called for shipping some of its plutonium to SRS in a form that SRS had not planned on storing.

Hanford stores nearly one-fifth of its plutonium in the form of 12-foot-long nuclear fuel rods, with the remainder in about 2,300 DOE standard 5-inch-wide, 10-inch-long storage containers. The fuel rods were to be used in Hanford's Fast Flux Test Facility reactor. The reactor has been closed, and the fuel rods were never used. Hanford's plutonium is currently being stored at the site's Plutonium Finishing Plant—the storage containers in vaults and the nuclear fuel rods in large casks inside a fenced area. Hanford was preparing to ship plutonium to SRS as part of its efforts to accelerate

⁵Pub. L. No. 107-107, § 3155, 115 Stat. 1378 (2001).

⁶The two proposed plutonium disposition facilities are the plutonium immobilization plant and a mixed oxide fuel fabrication facility for surplus plutonium pits and nonpit plutonium.

the cleanup and demolition of its closed nuclear facilities. Although Hanford's original cleanup plan called for demolishing the Plutonium Finishing Plant by 2038, the plan was modified in 2002 to accelerate the site's cleanup. Hanford's accelerated cleanup plan that was approved by DOE's Office of Environmental Management now calls for shipping the storage containers and nuclear fuel rods to SRS by the end of fiscal year 2006 so that Hanford can demolish the Plutonium Finishing Plant by the end of fiscal year 2008. To meet the new deadline, Hanford planned to ship the fuel rods intact to SRS.

Nevertheless, SRS's July 2004 plutonium storage plan stated that Hanford would cut the fuel rods and package the plutonium in approximately 1,000 DOE standard storage containers before shipping the material to SRS. At the time the plan was issued, SRS planned to use Building 105-K and Building 235-F to store plutonium in standard storage containers and not intact fuel rods. Although Building 105-K is capable of storing the fuel rods intact, several steps are necessary before DOE would be able to ship the fuel rods from Hanford to SRS. First, there is currently no Department of Transportation-certified shipping container that could be used to package and ship the fuel rods. In addition, SRS would be required, among other things, to prepare the appropriate analyses and documentation under the National Environmental Policy Act and update Building 105-K's safety documentation to include storage of the fuel rods. Wherever the fuel rods are stored, they would have to be disassembled prior to processing the plutonium for permanent disposition. Hanford and SRS currently lack the capability to disassemble the fuel rods, but DOE plans to study establishing that capability at SRS as part of its conceptual design of a facility to process the plutonium for disposition.

Changes in Security Requirements Have Eliminated One Facility at SRS That DOE Planned to Use for Plutonium Storage

SRS originally planned to use both Building 105-K and Building 235-F to store plutonium storage containers. After the DBT was changed in October 2004, SRS was forced to reevaluate its storage plans. Because the DBT substantially increases the potential threat that SRS must defend against, significant additional security will be required for SRS facilities storing plutonium. SRS projected the total cost of this additional security at over \$300 million. SRS estimated that it could save more than \$120 million by consolidating plutonium in Building 105-K and not using Building 235-F for storage. Building 235-F was originally planned to store approximately 1,900 storage containers. Although SRS officials believe that Building 105-K has sufficient space to store all of DOE's plutonium storage containers from other DOE sites in the event that DOE decides to ship additional plutonium

to SRS, DOE's estimates of the total number of containers have varied over time and may continue to change as Lawrence Livermore and Los Alamos conduct plutonium stabilization and packaging operations.

DOE's Failure to Adequately Plan for Plutonium Consolidation Will Lead to Additional Storage Costs and Threatens Hanford's Cleanup Plans

The challenges DOE faces storing its plutonium stem from the department's failure to adequately plan for plutonium consolidation. DOE has not developed a complexwide, comprehensive strategy for plutonium consolidation and disposition that accounts for each of its facilities' requirements and capabilities. Until DOE is able to develop a permanent disposition plan, additional plutonium cannot be shipped to SRS, and DOE will not achieve the cost savings and security improvements that plutonium consolidation could offer. According to DOE officials, the impact of continued storage at Los Alamos and Lawrence Livermore will be relatively minor because both laboratories had already planned to maintain plutonium storage facilities for other laboratory missions. However, according to Hanford officials, continued storage at the site could cost approximately an additional \$85 million annually and will threaten the achievement of the goals in the site's accelerated cleanup plan. Specifically, maintaining storage vaults at Hanford's Plutonium Finishing Plant will prevent the site from demolishing the plant as scheduled by September 2008.

DOE Lacks the Capability to Fully Monitor the Condition of Stored Plutonium at SRS

DOE lacks the capability at SRS to fully monitor the condition of the plutonium that is in storage containers as required by DOE's storage standard. According to the Safety Board, Building 105-K does not have adequate safety measures to monitor the containers. Therefore, DOE had planned to construct a monitoring capability in Building 235-F at SRS, which already had the safety systems needed to work with plutonium. However, Building 235-F would not have had sufficient security to conduct all of the required monitoring. In addition, the Safety Board identified serious safety concerns with Building 235-F. Because of these concerns, DOE changed its plans again in April 2005 and announced that it would install monitoring equipment and the necessary safety systems in Building 105-K.

SRS's Designated Storage Facility Lacks Sufficient Safety Measures to Conduct Plutonium Monitoring

Under DOE's plutonium storage standard, storage containers must be periodically monitored to ensure continued safe storage. Without a monitoring capability that would detect whether storage containers are at risk of rupturing, there is an increased risk of an accidental plutonium release that could harm workers, the public, and/or the environment. The following two types of monitoring activities are to be performed:

- *Nondestructive examination (NDE)*: Between 13 and 41 storage containers are to be tested annually for leaks or contamination and x-rayed to detect any increase in internal pressure that could rupture a container.
- *Destructive examination (DE)*: Between 13 and 15 storage containers are to be punctured and cut open annually. Samples of the gases inside the container are to be taken and analyzed and the containers themselves examined for indications of corrosion. In addition, the material inside is to be analyzed to detect any changes in the plutonium's condition.

DOE has categorized the plutonium storage containers into three groups based on their risk of rupturing because of pressurization or corrosion. (See table 2.)

Table 2: Storage Container Monitoring Categories

Category	Type of monitoring	Characteristics	Number of storage containers
Pressure and corrosion	NDE and DE	Containers with impure plutonium oxides contaminated with chlorides. The chlorides make the containers at risk for rupture due to both pressure and corrosion. Plutonium in these containers may also contain other impurities such as calcium, iron, magnesium, silicon, sodium, and potassium, among others.	1,597
Pressure	NDE and DE	Containers with impure plutonium oxides without chlorides, but still at risk of rupture due to pressurization.	1,386
Innocuous	NDE	Containers with relatively pure plutonium metal and oxides with little risk for rupture due to pressure or corrosion.	2,704
Total			5,687

Source: SRS.

A storage container's placement in one of the three groups—pressure and corrosion, pressure, or innocuous—determines the type of monitoring a container will be subjected to and how many containers will be monitored annually. Table 3 shows the number of examinations DOE plans to conduct beginning in fiscal year 2005.

Table 3: Annual Number of NDE and DE by Monitoring Category, Fiscal Years 2005-2016

Category	Fiscal year											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Pressure and corrosion			13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	14 NDE 14 DE
Pressure	25 NDE	25 NDE	25 NDE 2 DE	26 NDE 2 DE	26 NDE 2 DE							
Innocuous	2 NDE	2 NDE	2 NDE	2 NDE	2 NDE							
Total	27 NDE	27 NDE	40 NDE 15 DE	41 NDE 15 DE	41 NDE 15 DE	13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	13 NDE 13 DE	14 NDE 14 DE

Source: SRS.

Note: According to SRS's plutonium surveillance and monitoring plan, gas pressurization and corrosion have been identified as the only mechanisms that could cause the failure of a storage container. Gas pressurization would likely be discovered early because gas generation decreases over time. Therefore, monitoring of the pressure category will stop after 5 years. Since corrosion is a slower phenomenon and is considered to have a longer term potential to cause failure, monitoring on the pressure and corrosion category will continue for 10 years. The innocuous category has little potential for pressurization or corrosion, therefore monitoring will stop after 5 years.

Since an accidental release of plutonium would present an extreme hazard to workers, the public, and the environment, monitoring activities must occur in a facility that, among other things, is equipped to confine accidentally released plutonium through effective ventilation and appropriate filters. In addition, the facility must have a fire protection system to protect storage containers and prevent their contents from being released in a major fire. According to the Safety Board, Building 105-K is not currently equipped with adequate ventilation or fire protection. Specifically, SRS removed the High-Efficiency Particulate Air (HEPA) filters that were used when the building was a nuclear reactor. Such filters could prevent plutonium from escaping the building in the event of a release from the storage containers. In addition, Building 105-K lacks automatic fire detection or suppression systems. As a result, plutonium storage containers cannot be removed from inside the outer packaging used to ship the containers to SRS. The outer package—a 35-gallon steel drum—is used to ship a single storage container and is designed to resist

damage during transportation and handling. The outer package confines the plutonium in the event the storage container inside is breached. In addition, the outer package provides an additional layer of protection from fire for the storage container inside. (See fig. 3.)

Figure 3: Outer Packaging Used to Ship Storage Containers



Source: SRS.

Because monitoring requires x-raying individual storage containers and, in some cases, puncturing and cutting storage containers to analyze the condition of the container and the plutonium within, the storage containers must be removed from their outer packaging. In addition, SRS plans to establish a capability to restabilize the plutonium by heating it in a specialized furnace in the event monitoring determines that the stored plutonium is becoming unstable (i.e., increasing the risk of rupturing a storage container). The restabilized plutonium would then be packaged into new storage containers. The only facility at SRS currently capable of

restabilizing and repackaging the plutonium has closed in preparation for decommissioning.⁷

Plutonium Monitoring in Another SRS Building Also Presented Safety and Security Concerns

Because Building 105-K does not have the capability to monitor storage containers, DOE had planned to install monitoring equipment in Building 235-F at SRS. Building 235-F was chosen primarily because it was already equipped with filtered ventilation systems appropriate to handling plutonium—multiple and redundant air supply and exhaust fan systems that use HEPA filters. Exhaust from the ventilation system is further filtered through a sand filter before entering the outside atmosphere.⁸ Currently, Building 235-F is limited to removing storage containers from their outer packaging and performing nondestructive examinations. If nondestructive examination indicates pressurization in a storage container, DOE has installed equipment in Building 235-F that could puncture the storage container to relieve pressure.

Although Building 235-F has the appropriate ventilation and filtration, it faced several challenges that would have affected its ability to monitor plutonium. Building 235-F is not currently equipped to conduct destructive examinations or to restabilize and package the plutonium in new storage containers if necessary. In addition, because of changes in the DBT, Building 235-F would not have had sufficient security to store Category I quantities of plutonium. According to SRS officials, 972 storage containers contain Category I quantities of plutonium. These storage containers are in the innocuous monitoring category and are at low enough risk for rupture that only two randomly sampled containers are subject annually to nondestructive examination. However, SRS would have been unable to remove those containers from Building 105-K to monitor their condition, leaving these 972 storage containers unmonitored. According to SRS

⁷This facility—FB Line—was constructed in the early 1960s at SRS to convert plutonium solutions into solid forms to be used in nuclear weapons components. In recent years, its primary mission has been the stabilization of scrap plutonium from cleanup operations at SRS and packaging the stabilized plutonium into storage containers. It ceased operations and transferred its remaining plutonium to Building 105-K in March 2005.

⁸Sand filters are large, deep beds installed in underground concrete enclosures and filled with up to 10 feet of rock, gravel, and sand. As air flows upward through the bed, the rock, gravel, and sand filter out plutonium and other chemicals. The decontaminated air can then flow into the outside atmosphere. Sand filters have been used in U.S. nuclear facilities since 1948. Although initially expensive, sand filters can remove a large amount of radioactive material, are relatively low maintenance, and are fire resistant.

officials, security measures could have been established in Building 235-F should a safety issue have arisen that required opening a Category I container.

Furthermore, the Safety Board identified a number of serious safety concerns with Building 235-F. Specifically, the Safety Board reported the following:

- The building lacks fire suppression systems, and many areas of the building lack fire detection and alarm systems.
- The building's nuclear criticality accident alarm system has been removed. A nuclear criticality accident occurs when enough fissile material, such as plutonium, is brought together to cause a sustained nuclear chain reaction. The immediate result of a nuclear criticality accident is the production of an uncontrolled and unpredictable radiation source that can be lethal to people who are nearby.
- A number of the building's safety systems depend upon electrical cables that are approximately 50 years old and have exceeded their estimated life. When electrical cables age, they become brittle and may crack, increasing the potential for failure.
- SRS has discovered two areas in the soil near the building that could present a hazard in the event of an earthquake.
- The building's ventilation system still contains plutonium from its previous mission of producing plutonium heat sources to power space probes. This highly radioactive plutonium could be released, for example, during a fire or earthquake and could pose a hazard to workers in the building.

Because of its concerns about Building 235-F's safety, the Safety Board reported in December 2003 that DOE should not plan extended storage of plutonium in this building and that it may be preferable from safety and cost perspectives to pursue plutonium storage elsewhere at SRS. The Safety Board suggested that DOE consider several options for plutonium storage, including constructing a new facility or installing safety systems such as fire protection and filtered ventilation in Building 105-K.

Similar to the problems that DOE faces with plutonium storage, the department's monitoring challenges are illustrative of its failure to

adequately plan for plutonium consolidation. Instead of a comprehensive strategy that assessed the monitoring capabilities needed to meet its storage standard, DOE's plans went from constructing a state-of-the-art storage and monitoring facility to using a building that the Safety Board had significant concerns with. Moreover, DOE's plans have subsequently changed again. In April 2005, after spending over \$15 million to begin modifications to Building 235-F, DOE announced that it would only use the building to monitor plutonium temporarily. Now, DOE plans to install the necessary safety systems and monitoring equipment in Building 105-K.

Conclusions

DOE has not yet developed a comprehensive plan that is necessary to consolidate and eventually dispose of its excess plutonium. Instead, it has changed its consolidation, storage, and disposition plans numerous times. Furthermore, DOE has relied on its individual offices, sites, and facilities to independently develop plans to achieve their own goals rather than developing an integrated plan for the consolidation and permanent disposition of all of its excess plutonium. Specifically, DOE headquarters approved both Hanford's accelerated cleanup plan and SRS's plutonium storage plans without resolving conflicts between them. Moreover, we agree with the Safety Board that DOE's lack of careful planning has forced SRS to focus on what can be done with existing facilities, eliminating options that may have been both more cost-effective and safer than current plans. DOE has instead pushed forward with plans to use a 50-year-old building at SRS to perform functions it was not designed for. As a result, DOE is currently not able to consolidate all of its plutonium at SRS. Because it is unable to consolidate its plutonium, DOE faces additional costs in excess of \$85 million annually to securely store plutonium at its current locations, and its cleanup goals for Hanford are in jeopardy.

Recommendations for Executive Action

To ensure the continued safe and secure storage of DOE's excess plutonium inventories, we recommend that the Secretary of Energy take the following two actions:

- Develop a comprehensive strategy for the consolidation, storage, and disposition of DOE's excess plutonium. In particular, this strategy should assess the storage, monitoring, and security capabilities of all of DOE's sites currently storing plutonium. Furthermore, the strategy should analyze the environmental impact, national security implications, costs, and schedules to safely consolidate, store, and

eventually dispose of DOE's plutonium at existing facilities and/or at a new storage facility constructed at one of its sites.

- When this comprehensive strategy is completed, we further recommend that the Secretary of Energy ensure that each of DOE's facilities' cleanup plans are reviewed to ensure that each site's cleanup goals and time frames are consistent with the department's comprehensive strategy for plutonium consolidation, storage, and disposition.

Agency Comments and Our Evaluation

We provided DOE with a draft of this report for its review and comment. DOE's letter is presented as appendix II. DOE generally agreed with our recommendations and stated that a Nuclear Materials Disposition and Consolidation Coordination Committee was formed earlier this year to provide a forum to perform nuclear materials disposition and consolidation planning. The objectives of this committee are to develop a plan that would provide the necessary security for DOE's nuclear material, identify paths for disposition, and reduce security and program costs. DOE stated that this committee would produce a strategic plan that would encompass the comprehensive strategy called for in our first recommendation. DOE also stated that the cleanup plans for its sites would be revised accordingly following completion of the committee's strategic plan.

DOE also provided detailed technical comments that we incorporated into the report as appropriate. These technical comments focused primarily on DOE's plans for consolidating plutonium at SRS, the availability of sufficient storage space at SRS, and DOE's ability to monitor stored plutonium. Specifically, DOE emphasized in its technical comments that it has no plans at this time to further consolidate any plutonium at SRS. We recognize that a final decision to consolidate plutonium has not been made. However, it is important to note, as was stated in our draft report, that both Hanford's accelerated cleanup plan and SRS's storage plan assumed that DOE's surplus plutonium would be consolidated at SRS and that both plans were approved by DOE headquarters without resolving conflicts between them. We believe DOE's comments that it has no plans to further consolidate any plutonium at SRS reinforce our recommendation for a comprehensive strategy for the consolidation, storage, and disposition of DOE's excess plutonium.

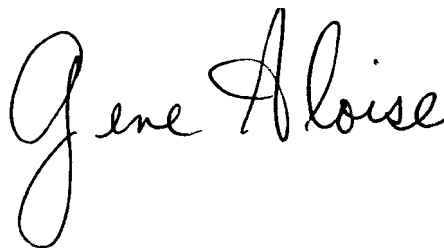
Regarding the availability of sufficient storage space at SRS, DOE stated in its technical comments that, even without Building 235-F, Building 105-K has adequate storage capacity for all of its excess plutonium, including the

Hanford fuel rods. However, it is important to note that DOE was proceeding with its plans to store plutonium in Building 235-F until changes to the DBT forced DOE to reevaluate its plans. Our draft report recognized that SRS officials believe Building 105-K has sufficient space to store all of DOE's plutonium storage containers from its sites across the United States. Nevertheless, DOE's estimates of the total number of containers have varied over time and may continue to change because plutonium stabilization and packaging is still ongoing at Lawrence Livermore and Los Alamos National Laboratories. Furthermore, as our draft report noted, additional safety analyses and documentation are necessary before Building 105-K would be able to store the Hanford fuel rods.

Regarding DOE's ability to monitor stored plutonium, DOE stated in its technical comments that it has the capability in Building 235-F to monitor the condition of stored plutonium and that the building will not be shut down until a monitoring capability is established in Building 105-K. However, as our draft report noted, monitoring at Building 235-F is currently limited to removing storage containers from their outer packaging and performing nondestructive examinations of the containers. Building 235-F also has equipment that can puncture storage containers to relieve pressure if needed. However, Building 235-F does not have the capability to perform destructive examinations of the storage containers, which, according to SRS's plutonium surveillance and monitoring plan, must be conducted beginning in fiscal year 2007. In addition, SRS lacks the capability to restabilize and repackage plutonium if necessary. Until nondestructive examination, destructive examination, stabilization, and repackaging equipment is installed in Building 105-K, we believe that DOE's capability to monitor the condition of stored plutonium at SRS is incomplete. We modified our draft report to further clarify DOE's current monitoring capabilities.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the Secretary of Energy; the Administrator, NNSA; the Chairman of the Safety Board; the Director, Office of Management and Budget; appropriate congressional committees; and other interested parties. We also will make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions 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 who made major contributions to this report are listed in appendix III.

A handwritten signature in black ink that reads "Gene Aloise". The signature is written in a cursive, flowing style.

Gene Aloise
Director, Natural Resources
and Environment

Objectives, Scope, and Methodology

At the request of the Chairman, Committee on Energy and Commerce, House of Representatives, and the Chairman, Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives, we examined (1) the extent to which the Department of Energy (DOE) can consolidate its nonpit plutonium at the Savannah River Site (SRS) and (2) SRS's capacity to monitor plutonium storage containers. A forthcoming classified report discusses SRS's plans for upgrading security to meet the 2004 design basis threat (DBT).

To accomplish our objectives, we reviewed independent studies of storage conditions at SRS performed by the Defense Nuclear Facilities Safety Board (Safety Board), an independent federal agency established by the Congress in 1988 to oversee the safety of DOE's nuclear weapons complex. Specifically, we reviewed the Safety Board's December 2003 report entitled *Plutonium Storage at the Department of Energy's Savannah River Site: Report to Congress* and its June 2004 report entitled *Plutonium Storage at the Department of Energy's Savannah River Site: First Annual Report to Congress*. In addition, we interviewed subject matter experts with the Safety Board. We also obtained and reviewed several SRS studies of plutonium storage options: 1999 *Savannah River Plutonium Storage Study*, 2000 *Evaluation of Savannah River Plutonium Storage and Stabilization Options*, and 2004 *Savannah River Site Storage of Surplus Plutonium Study: 2004 Update*. A GAO analyst with subject matter expertise and a GAO senior methodologist with training and experience in evaluation research and methodology reviewed all of these studies to evaluate their methodological soundness and determine the reliability of their conclusions. These reviews entailed an evaluation of each study's research methodology, including its data quality, research design, and key assumptions, as well as a summary of its major findings and conclusions. We also assessed the extent to which each study's data and methods support its findings and conclusions. We determined that these studies were methodologically sound enough for the purposes of this report.

In cooperation with a GAO economist, we attempted to determine the cost of plutonium storage at SRS by developing a model that evaluated costs under various storage scenarios, such as constructing a new consolidated storage facility or upgrading an existing facility to store plutonium. This model also attempted to determine the cost of continued storage of plutonium at Hanford for comparative purposes. However, we were unable to complete our model because we were unable to obtain complete cost data from DOE. Security costs are a major component of the total cost of storing plutonium, but security cost data were not available at the time of

our review because neither SRS nor Hanford had yet determined how they will enhance security to meet the 2004 DBT.

To determine the extent to which DOE can consolidate its plutonium at SRS, we reviewed DOE's Records of Decision published in the *Federal Register* for plutonium storage and disposition activities at SRS, such as plans to construct an Actinide Packaging and Storage Facility and subsequent postponement and then cancellation of those plans, and relevant DOE orders, policies, and standards, such as DOE-STD-3013-2003, *Stabilization, Packaging, and Storage of Plutonium-Bearing Materials*. We visited SRS and inspected plutonium storage areas in Building 105-K and facilities in Building 235-F originally intended for plutonium storage and monitoring. We interviewed and received briefings from DOE's operating contractor for SRS (Westinghouse Savannah River Company); DOE's security contractor for SRS (Wackenhut Services, Inc.); SRS's Office of Safeguards, Security, and Emergency Services; and SRS's Nuclear Materials Programs Division. We also spoke with officials responsible for the management of Building 105-K and Building 235-F.

We also visited the Hanford Site and toured the Plutonium Finishing Plant, where we observed plutonium storage containers that are currently stored inside the plant and nuclear fuel rods that are stored inside and outside the facility. We spoke with officials from DOE's Richland Operations Office, DOE's operating contractor for Hanford (Fluor Hanford), and Fluor's security subcontractor for the Hanford Site (Protection Technology Hanford). From these officials, we received briefings on Hanford's plans for plutonium storage and shipment. We also discussed the deactivation of the Plutonium Finishing Plant.

In Washington, D.C., we met with DOE's acting Assistant Secretary for Environmental Management to discuss DOE's planned consolidation of plutonium at SRS and how SRS will store the material. We also discussed issues related to storage, monitoring, and security with officials from DOE's Office of Environmental Management, DOE's Office of Independent Oversight and Performance Assurance, and DOE's National Nuclear Security Administration.

To evaluate DOE's ability to monitor plutonium storage containers, we first examined the reliability of SRS's database for tracking inventory and for SRS's plutonium surveillance and monitoring project. We obtained responses to a series of data reliability questions covering issues such as data entry access, internal control procedures, and the accuracy and

completeness of the data. We asked follow-up questions whenever necessary. We also obtained and reviewed related documents, including *Users Manual for the DOE Complex Integrated Surveillance Program Working Database* and other manuals and data dictionaries. We determined that these data were sufficiently reliable for the purposes of this report.

To evaluate the safety of conducting monitoring activities in Building 105-K and Building 235-F, we reviewed the Safety Board's 2003 and 2004 reports described earlier, and discussed the safety conditions of the facilities with subject matter experts on the Safety Board. We observed the facilities where SRS plans to conduct monitoring activities and reviewed documents pertaining to SRS's monitoring plans. We received briefings from Westinghouse Savannah River Company personnel responsible for plutonium monitoring and discussed the planned monitoring activities with officials responsible for managing Building 105-K and Building 235-F. We also discussed monitoring with officials from the Safety Board; Westinghouse Savannah River Company; Wackenhut Services, Inc.; SRS's Office of Safeguards, Security, and Emergency Services; and SRS's Nuclear Materials Programs Division. At the Hanford Site, we observed facilities and equipment for surveillance and monitoring of its plutonium and received a briefing on Hanford's use of that facility.

We conducted our work from June 2004 through June 2005 in accordance with generally accepted government auditing standards.

Comments from the Department of Energy



Department of Energy

Washington, DC 20585

JUL 1 2005

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

Dear Mr. Aloise:

Thank you for your June 14, 2005, letter to the Secretary of Energy providing the draft report, *Securing U.S. Nuclear Materials: DOE Needs to Take Action to Safely Consolidate Plutonium*, and requesting written comments from the Department of Energy (DOE). Your draft report contains two recommendations for executive action: (1) the Secretary develop a comprehensive strategy for the consolidation, storage, and disposition of DOE's excess plutonium, and (2) DOE's cleanup plans be reviewed to ensure they are consistent with the comprehensive strategy.

With respect to your first recommendation, earlier this year former Secretary Abraham established the Nuclear Materials Disposition and Consolidation Coordination Committee (NMDCCC). Secretary Bodman subsequently approved the charter for this Committee. The principal mission of the NMDCCC is to provide a forum to perform cross-cutting nuclear materials disposition and consolidation planning with the objectives of providing the necessary security for DOE's nuclear material, identifying paths for disposition, as appropriate, and reducing out-year security and program costs. One of the responsibilities of this Committee, of which I am a member, is to develop and ensure implementation of a Strategic Plan for disposition and consolidation of special nuclear material. This Strategic Plan will encompass the comprehensive strategy called for in your first recommendation.

Regarding your second recommendation, following completion of the NMDCCC's Strategic Plan, I will ensure that site cleanup plans are revised accordingly. My staff will review those revised plans to make certain they are consistent with the Strategic Plan and its associated implementation schedule.

At a recent meeting with you and your staff, we provided comments to you on the bulk of the draft report. Although some revisions were made to the report as a result of those comments, we believe that the draft report still contains inaccuracies and statements that can be misinterpreted. Enclosed are detailed comments that we respectfully request be considered as you finalize your report.



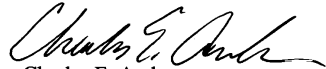
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Appendix II
Comments from the Department of Energy

2

If you have any further questions, please contact me at (202) 586-7709 or Mr. Mark A. Gilbertson, Deputy Assistant Secretary for Environmental Cleanup and Acceleration, at (202) 586-0755.

Sincerely,



Charles E. Anderson
Principal Deputy Assistant Secretary for
Environmental Management

Enclosure

GAO Contact and Staff Acknowledgments

GAO Contact

Gene Aloise (202) 512-3841

Staff Acknowledgments

In addition to the individual named above, Ryan T. Coles, Robin Eddington, Doreen S. Feldman, Jonathan M. Gill, Sherry L. McDonald, Mehrzad Nadji, James D. Noel, Judy K. Pagano, Keith A. Rhodes, Paul Rhodes, and Carol Herrnstadt Shulman made key contributions to this report.

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