
**PLUTONIUM STORAGE
AT THE
DEPARTMENT OF ENERGY'S
SAVANNAH RIVER SITE**

**SECOND ANNUAL REPORT
TO CONGRESS**

**DEFENSE NUCLEAR FACILITIES
SAFETY BOARD**



JUNE 2005

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To the Congress of the United States:

Congress required the Defense Nuclear Facilities Safety Board (Board) and the Secretary of Energy to submit to Congress annual reports on the actions taken by the Secretary in response to the proposals made in the Board's study *Plutonium Storage at the Department of Energy's Savannah River Site*, dated December 1, 2003. Herewith is the Board's second annual report, as required by Section 3183(d) of the Defense Authorization Act for Fiscal Year 2003, on the Department of Energy's (DOE) actions to address the Board's proposals from this study.

For excess plutonium currently at the Savannah River Site, DOE has recently directed that actions be undertaken to consolidate that plutonium into the K-Area Materials Storage facility (KAMS). This direction obviates the need for the safety upgrades to Building 235-F proposed in the Board's initial study. DOE has not yet completed the safety upgrades proposed by the Board for the KAMS facility.

For excess plutonium currently located at other sites, DOE has not made progress in consolidating this plutonium at the Savannah River Site. As such, each site will continue to maintain its excess plutonium inventory, perhaps for several decades. This may result in less desirable storage at some sites.

In the Board's opinion, DOE should consider broader alternatives with regard to safe and secure storage for the country's excess plutonium inventory. Consolidation of excess plutonium into a single, robust facility suitable for extended retrievable storage is logical from safety, security, and economic perspectives. As stated in the previous reports, the Board believes that DOE should aggressively pursue consolidation of its excess plutonium to limit the use of multiple aging facilities never intended for such storage.

Also, given DOE's decision to ultimately dispose of its excess plutonium, the Board believes DOE should consider additional alternatives for its disposition strategy. DOE's current disposition strategy for excess plutonium relies primarily on processing into mixed-oxide fuel and vitrifying into lanthanide borosilicate glass. The vitrification strategy appears to be technically doable, but consideration should be given to greater utilization of the Savannah River Site's H-Area facilities and processing of additional plutonium into mixed-oxide fuel.

Respectfully submitted,

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Acting Chairman

John E. Mansfield
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PREFACE

DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2003 PUBLIC LAW 107-314

SEC. 3183. STUDY OF FACILITIES FOR STORAGE OF PLUTONIUM AND PLUTONIUM MATERIALS AT SAVANNAH RIVER SITE.

(a) **STUDY.**—The Defense Nuclear Facilities Safety Board shall conduct a study of the adequacy of the K-Area Materials Storage facility (KAMS), and related support facilities such as Building 235-F, at the Savannah River Site, Aiken, South Carolina, for the storage of defense plutonium and defense plutonium materials in connection with the disposition program provided in section 3182 and in connection with the amended Record of Decision of the Department of Energy for fissile materials disposition.

(b) **REPORT.**—Not later than one year after the date of the enactment of this Act, the Defense Nuclear Facilities Safety Board shall submit to Congress and the Secretary of Energy a report on the study conducted under subsection (a).

(c) **REPORT ELEMENTS.**—The report under subsection (b) shall—

(1) address—

(A) the suitability of KAMS and related support facilities for monitoring and observing any defense plutonium or defense plutonium materials stored in KAMS;

(B) the adequacy of the provisions made by the Department for remote monitoring of such defense plutonium and defense plutonium materials by way of sensors and for handling of retrieval of such defense plutonium and defense plutonium materials; and

(C) the adequacy of KAMS should such defense plutonium and defense plutonium materials continue to be stored at KAMS after 2019; and

(2) include such proposals as the Defense Nuclear Facilities Safety Board considers appropriate to enhance the safety, reliability, and functionality of KAMS.

(d) **REPORTS ON ACTIONS ON PROPOSALS.**—Not later than 6 months after the date on which the report under subsection (b) is submitted to Congress, and every year thereafter, the Secretary and the Board shall each submit to Congress a report on the actions taken by the Secretary in response to the proposals, if any, included in the report.

EXECUTIVE SUMMARY

In its study *Plutonium Storage at the Department of Energy's Savannah River Site*, dated December 1, 2003, the Defense Nuclear Facilities Safety Board (Board) made proposals concerning the Department of Energy (DOE) plutonium disposition program, the suitability of facilities planned for storing plutonium at the Savannah River Site (SRS), and the remote monitoring and retrieval of plutonium.

PROPOSALS CONCERNING THE PLUTONIUM DISPOSITION PROGRAM

The Board proposed that DOE expedite the development of a complete, well-considered plan for the final disposition of all excess plutonium to preclude unnecessary extended storage of plutonium at SRS. Even with a sound disposition plan, excess plutonium is expected to be stored for several decades at SRS; therefore, the Board proposed that DOE conduct a new study of available options for the storage of plutonium at that site.

Status of DOE Actions. DOE has not established a consistent, well-considered plan for storage and disposition of excess plutonium as envisioned by the Board. Rather, DOE's storage plans continue to change. DOE has to date been unsuccessful in consolidating excess plutonium at SRS. DOE has now directed that the Hanford Site assume for planning purposes that some of its excess plutonium will be retained on site through 2035. DOE's laboratories must also continue to store excess plutonium. Specific actions to accommodate this new direction for extended storage of excess plutonium at various sites have not been identified by DOE and have not been evaluated by the Board. However, this strategy raises potential questions about safety as well as security and operating costs. To reduce the number of security targets, DOE recently directed that plutonium not be stored in Building 235-F (235-F) as previously planned. DOE has been able to reconfigure the K-Area Materials Storage (KAMS) facility such that SRS could now consolidate all of DOE's excess plutonium into this facility. Considering these actions, the Board's proposal to study storage options at SRS reduces to a simple question: Could the annual savings from operating a modern facility specifically designed to provide safe and secure storage of excess plutonium offset the cost of the facility? Such a facility could also be designed to accommodate additional plutonium declared excess in the future.

The Board believes that DOE should consider broader alternatives for safe and secure storage of its excess plutonium. If unable to consolidate plutonium at SRS, DOE should consider other locations for consolidation of plutonium. Options include consolidation in a new facility, specifically designed for such storage, or consolidation in an existing facility that has been determined suitable for extended storage.

Also, given DOE's decision to ultimately dispose of its excess plutonium, the Board believes DOE should consider additional alternatives for its disposition strategy. DOE's current disposition strategy for excess plutonium consists primarily of processing into mixed-oxide (MOX) fuel and vitrifying into lanthanide borosilicate glass for disposal. A small quantity of excess plutonium is being disposed of as waste either at the Waste Isolation Pilot Plant (WIPP) or through the SRS high-level waste system. As envisioned, the vitrification process would be established in

areas of the K-Reactor facility at SRS. While the early planning for this vitrification process has matured, the conceptual design has not yet been approved by DOE. The vitrification process appears to be a technically doable alternative, but the concept is preliminary and still years away from being realized.

The Board notes that the majority of the excess plutonium planned for vitrification could be incorporated into MOX fuel by appropriate blending, some minor processing, and in some cases by addressing higher radiation levels. The remaining plutonium, containing constituents that make it unsuitable for MOX fuel, could be disposed of through the high-level waste system at SRS. Fabrication of excess plutonium into MOX fuel for reactor disposition would appear to be a logical option to provide a disposal path. The Board recognizes that this use of the MOX fuel fabrication facility may need to be negotiated with Russia. A MOX fuel fabrication facility has been recently authorized for construction by the Nuclear Regulatory Commission, but start of construction is being held in abeyance by DOE pending final agreement with Russia.

DOE recently formed a new broadly chartered group—the Nuclear Materials Disposition and Consolidation Coordination Committee—comprising senior DOE management personnel, which may provide the strategic planning needed. This group is to provide a forum to perform cross-cutting nuclear material disposition and consolidation planning for DOE. This is a positive development but the committee does not have a clearly identified set of goals, objectives or schedule.

PROPOSALS CONCERNING THE SUITABILITY OF FACILITIES

DOE originally planned for extended storage of plutonium at SRS in two facilities—the KAMS facility and 235-F. Both are 50-year-old facilities that currently do not meet modern safety standards. The Board proposed safety upgrades to ensure the safety, reliability, and functionality of these facilities for plutonium storage.

Status of DOE Actions. As noted, DOE recently decided to consolidate the excess plutonium currently at SRS into the KAMS facility and not to utilize 235-F for extended storage. The Board agrees with this decision, which obviates the need for safety upgrades to 235-F related to extended storage. The Board's proposals to enhance the safety and reliability of 235-F for extended storage are no longer applicable.

The Board considers the KAMS facility to be a robust structure that can be made suitable for extended storage by establishing an appropriate fire protection system and eliminating unnecessary combustibles. DOE has agreed to remove unnecessary combustibles from the KAMS facility, but has not yet agreed to upgrade the facility's fire protection system.

PROPOSAL CONCERNING REMOTE MONITORING AND RETRIEVAL

As reported in the Board's first annual report on this subject, DOE has completed all necessary actions concerning this proposal.

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1. INTRODUCTION

1.1 CONGRESSIONAL MANDATE TO THE DEFENSE NUCLEAR FACILITIES SAFETY BOARD

In Section 3183 of the National Defense Authorization Act for Fiscal Year 2003 (Public Law 107-314),¹ Congress directed the Defense Nuclear Facilities Safety Board (Board) to conduct a study of the adequacy of the K-Area Materials Storage facility (KAMS) and related support facilities at the Savannah River Site (SRS) in South Carolina, in which the Department of Energy (DOE) proposes to store defense plutonium and defense plutonium materials. The Board was also required to address the suitability of KAMS and related support facilities for monitoring and observing plutonium materials stored in KAMS, the adequacy of provisions for remote monitoring and for retrieval of material, and the adequacy of KAMS for plutonium storage beyond 2019. Congress required that the Board include in its report proposals the Board considered appropriate to enhance the safety, reliability, and functionality of KAMS.

1.2 BACKGROUND

A lack of consistent planning has forced managers at SRS to focus on what can be done with existing facilities, foreclosing consideration of other options that might have been more cost-effective and safety-conscious. Past DOE decisions concerning plutonium storage at SRS were based on a study (Sena, 2000) that is no longer consistent with present circumstances. The DOE storage plans were based on the assumption that planned immobilization and mixed-oxide (MOX) fuel fabrication facilities would provide a near-term disposition path for all excess plutonium metal and oxide. In 2001, due primarily to short range budget constraints, site plans changed from having one new, state-of-the-art facility for stabilization, packaging, and storage of materials to using multiple 50-year-old facilities (KAMS facility and Building 235-F [235-F]).

DOE's current plutonium disposition plan relies on successful licensing, construction, and operation of the MOX fuel fabrication facility for disposal of the bulk of excess plutonium. However, the planned immobilization facility has been canceled. Therefore, DOE needs to establish disposition plans for up to 15 metric tons of excess plutonium that would have been processed in the cancelled immobilization plant.

Although KAMS is a 50-year-old facility, the Board considers it to be a robust structure that can be made suitable for extended storage of plutonium. Fires are the most significant accidents of concern in the facility, yet it lacks fire protection systems. Building 235-F, also a 50-year-old facility, does not meet current safety standards and would have required substantial upgrades before being suitable for extended storage of plutonium.

¹ See the appendix for the statutory text of Sections 3181, 3182, and 3183.

1.3 THE BOARD'S PROPOSALS

The Board's report on its study of plutonium storage at SRS was provided to Congress and to the Secretary of Energy on December 1, 2003 (Conway, 2003).² In that report, the Board concluded that plutonium can be stored safely in the KAMS facility for a limited period of time (4–5 years). For storage beyond this time, the Board made proposals to enhance the safety, reliability, and functionality of the plutonium storage facilities at SRS. The Board further concluded that DOE should expedite decisions on disposal of excess plutonium and reevaluate its plutonium storage plan to determine whether there are better options for extended storage of plutonium at SRS. The Board's study included the following proposals:

Plutonium Disposition Program

Expedite the development of a complete, well-considered plan for the disposition of all excess plutonium to preclude unnecessary extended storage at SRS.

Conduct a new study of available options for the storage of plutonium at SRS.

Suitability of Facilities

K-Area Materials Storage Facility

Install fire protection systems and eliminate unnecessary combustibles in KAMS.

Building 235-F

Establish an acceptable safety basis for stabilization and packaging of plutonium, and for extended storage of plutonium in the facility.

Conduct a systematic evaluation of the facility's safety systems to determine needed upgrades.

Perform a structural analysis assessing the seismic adequacy as measured by current acceptance criteria.

Decontaminate unused process cells.

Remote Monitoring and Retrieval of Material

Develop and implement validated procedures for the handling and intrasite shipment of plutonium containers, including damaged containers.

² The Board's study is available on the Board's website at: www.dnfsb.gov/pub_docs/dnfsb/rc_20031201.pdf

2. DEPARTMENT OF ENERGY'S ACTIONS ON THE BOARD'S PROPOSALS

This section presents the status of and the Board's observations on actions being taken by DOE to address the Board's proposals for enhancing the safety, reliability, and functionality of plutonium storage facilities at SRS. Information on the status of DOE's actions is based on discussions between the Board's staff and representatives of DOE-Headquarters and DOE's Savannah River Operations Office (DOE-SR) and the site contractor.

2.1 PLUTONIUM DISPOSITION PROGRAM

Proposal 1. Expedite the development of a complete, well-considered plan for the disposition of all excess plutonium to preclude unnecessary extended storage at SRS.

It is important for DOE to establish a consistent, technically feasible disposition path for excess plutonium not planned for use in MOX fuel. Without a clearly defined disposition path, plutonium storage at SRS could be unnecessarily prolonged and in facilities not designed for such storage.

Status. DOE's plan has been to consolidate its complex-wide excess plutonium at SRS. Doing so requires that DOE develop a disposition plan for this excess plutonium. DOE's preliminary disposition plan entails vitrifying plutonium in lanthanide borosilicate glass. As envisioned, DOE would locate this vitrification activity in the K-Reactor facility at SRS by 2012 and operate it for about 7 years. The vitrified plutonium canisters would subsequently be encased in high-level waste containers in the Defense Waste Processing Facility and stored on site for eventual shipment to Yucca Mountain. Mission need critical decision for the modified facility was provided to DOE for approval in September 2004. DOE has not yet approved the mission need and proceeding with the conceptual design of these modifications.

DOE (Hayward, 2005) recently approved the charter for a new group—the Nuclear Materials Disposition and Consolidation Coordination Committee—comprising senior DOE management personnel. This group is to provide a forum to perform cross-cutting nuclear material disposition and consolidation planning for DOE. This is a promising development that may provide the strategic planning for storage and disposition of plutonium material that the Board believes is needed. However, the committee does not have a clearly identified set of goals, objectives or schedule.

Board's Observations. DOE has not established a consistent, well-considered plan for storage and disposition of its excess plutonium as envisioned by the Board. Rather, DOE's storage plans continue to change. DOE has to date been unsuccessful in consolidating excess plutonium material at SRS. Even though SRS has reconfigured the KAMS facility so that it can accommodate all of DOE's excess plutonium, DOE has told the Hanford Site to assume for planning purposes that some of its plutonium will remain on site through 2035 (Golan, 2005), and DOE's laboratories must also continue to store excess plutonium. The Hanford Site is now considering storage of its excess plutonium in areas never intended for such storage, such as old underground tank vaults.

The Board believes that DOE should consider broader alternatives for safe and secure storage of its excess plutonium. If it is unable to consolidate the material at SRS, DOE should consider other locations for consolidation of plutonium. Options might include a new facility specifically designed for such storage at another site, or another existing facility that has been evaluated as suitable for extended storage. Consolidation of excess plutonium into a single, robust facility suitable for extended retrievable storage is logical from safety, security, and economic perspectives.

Also, given DOE's decision to ultimately dispose of its excess plutonium, the Board believes DOE should consider additional alternatives for its disposition strategy. During the past year, DOE has continued planning for vitrifying excess plutonium. While the early design for the vitrification process has matured, the conceptual design for modifications to the K-Reactor has not yet been approved by DOE. The vitrification process appears to be a technically doable alternative, but the concept is preliminary, is still years away from being realized, and in the initial stages of design is expected to require significant new funding for SRS.

The Board believes that the majority of the excess plutonium could be sent directly to the MOX fuel fabrication facility and that the remaining plutonium (about 5 metric tons) could probably be processed into MOX fuel by appropriate blending, some minor processing, and in some cases by addressing higher radiation levels. Any remaining plutonium, containing constituents that make it unsuitable for use as MOX fuel, could be disposed of through the SRS high-level waste system. Use of the MOX fuel fabrication facility to disposition excess plutonium, which may need to be negotiated with Russia, would appear to be a logical option and, the Board believes, would be less expensive than developing the vitrification process. The Board recognizes that the MOX fuel fabrication facility is also preliminary but it has recently been authorized for construction by the Nuclear Regulatory Commission. Start of construction is being held in abeyance by DOE pending final agreement with Russia.

Proposal 2. Conduct a new study of available options for the storage of plutonium at SRS.

DOE's plans for storage of plutonium at SRS are based on assumptions that are no longer consistent with the current situation. In the Board's view, DOE would benefit from conducting an integrated study of options for storage of plutonium at SRS.

Status. DOE headquarters (Golan, 2004) directed that DOE-SR update the SRS plutonium storage study. DOE-SR has developed the assumptions to be used for this study, but has not begun the update process.

Board's Observations. DOE recently changed the storage configuration in KAMS, such that SRS can now consolidate all DOE excess plutonium into this facility. To reduce the number of security targets, DOE (Allison, 2005) directed that plutonium not be stored in 235-F as previously planned; material will be stored only in a single facility at SRS that is considered robust and does not require significant upgrades. Considering this recent direction, the Board believes its proposal to study storage options at SRS reduces to a simple question: Could the annual savings from operating a modern facility specifically designed to provide safe and secure storage of excess plutonium offset the cost of the facility? Such a facility could also be designed to accommodate

additional plutonium declared excess in the future. The study as originally proposed is no longer necessary, but the Board believes that DOE should consider whether a new facility is economically viable.

2.2 SUITABILITY OF FACILITIES

K-Area Materials Storage Facility

Proposal 1. Install fire protection systems.

Accident scenarios involving fires are of great concern in KAMS, yet the facility does not have a fire protection system. The Board believes DOE should establish an appropriate fire protection system—a fire alarm and suppression or, alternatively, fire detection and alarm system with an enhanced firefighting capability.

Status. DOE has not agreed to provide a fire protection system for the KAMS facility. The contractor prepared an updated fire hazards analysis and documented safety analysis to evaluate the plan to store plutonium in the facility for an extended period. Initially, DOE-SR believed that these analyses supported the conclusion that a fire protection system was not needed, but this conclusion is now being reconsidered.

Board's Observations. The fire hazards analysis and documented safety analysis rely on extensive analytical modeling of the various fire scenarios to conclude that the storage containers could withstand fire conditions without releasing material. The analytical modeling of the Department of Transportation 9975 shipping container is complex, considering the chemical composition of the insulating material, its response to high temperatures resulting from the fire, and the multiple layers of the container.

The Board notes that DOE-SR obtained an independent review of the fire protection program in KAMS. This review was conducted by a senior fire protection engineer from DOE's Office of Environmental Management. In his report (Boyce, undated), DOE's independent reviewer states:

... modeling of fire is very complex and at best an approximation. If a fire were to occur, it would be prudent for the fire department to extinguish it long before the theoretical limiting cases described in the documentation were reached. Since there is no automatic suppression system to alert the fire department and begin suppression, a fire detection and alarm system should be provided to assure early notification....The firefighters also need quick access to water. There is a standpipe system in the reactor building but it needs to be extended to the material storage area.

In light of the complexity of the analytical modeling of the shipping container and recommendations of DOE's independent reviewer, the Board maintains that an appropriate fire

protection system should be provided in KAMS. DOE-SR (Smith, 2005) has recently taken action to reevaluate its conclusions concerning fire protection needs for the KAMS facility.

Proposal 2. Eliminate unnecessary combustibles in KAMS.

Abandoned cables in the actuator tower present a large combustible load and pose a risk of fire. The Board believes it would be better to remove the abandoned cables, rather than accommodate this fire as approved by DOE for the short-term storage mission.

Status. In discussions with the Board's staff, DOE-SR agreed to remove the abandoned cables, thereby eliminating this fire hazard.

Board's Observations. The Board considers DOE's acceptance of this proposal appropriate. The Board notes that no schedule for removal of the cables has been established. A schedule needs to be developed to ensure that this fire hazard is eliminated in a timely manner.

Building 235-F

DOE-SR (Allison, 2005) recently directed that its site contractor for SRS proceed with planning to transition 235-F to a facility that would handle less-than-Category I quantities of special nuclear materials by September 2006. This action effectively directs that 235-F not be utilized for extended storage. The Board agrees with not utilizing 235-F for that purpose. In light of this decision, the Board's proposals for enhancing the safety and reliability of this facility are no longer applicable to the extended storage mission.

Activities previously planned to be located at 235-F will still be needed at SRS to support extended storage of plutonium. For example, the plutonium must still undergo surveillance to ensure that it is behaving as expected. The ability to stabilize and package material into containers meeting DOE-STD-3013 requirements must also be maintained. DOE-SR now plans to locate these support functions in areas of the K-Reactor adjacent to the KAMS facility. These modifications will need to be appropriately designed and constructed to ensure adequate protection of the public and workers. New safety systems will need to be added to ensure that materials are adequately confined. DOE-SR has stated that these safety systems, described in a new documented safety analysis, will be added and will meet all DOE design requirements. The Board plans to continue to follow these activities.

The Board notes that DOE-SR intends to continue making some structural and equipment upgrades to 235-F. DOE-SR considers these upgrades necessary to provide confinement of plutonium-238 holdup in old processing cells should there be a significant earthquake. The presence of extensive plutonium-238 holdup is one of the most significant hazards in 235-F. The Board believes the first priority for DOE-SR should be to decontaminate the process cells to eliminate this hazard. Any structural or equipment improvements would be warranted only if the effort to decontaminate the plutonium-238 holdup were protracted. The Board will continue to follow this issue in the course of its normal safety oversight for the site.

2.3 REMOTE MONITORING AND RETRIEVAL OF MATERIAL

Proposal 1. Develop and implement validated procedures for the handling and intrasite shipment of plutonium containers, including damaged containers.

As reported in the Board's first annual report (Conway, 2004)³ on this subject, DOE has completed all necessary actions concerning this proposal.

³ The Board's first annual report update is available on the Board's website at: www.dnfsb.gov/pub_docs/dnfsb/rc_200406.pdf

APPENDIX

PUBLIC LAW 107-314, SUBTITLE E—DISPOSITION OF WEAPONS-USABLE PLUTONIUM AT SAVANNAH RIVER, SOUTH CAROLINA, SECTIONS 3181, 3182, AND 3183

SEC. 3181. FINDINGS.

Congress makes the following findings:

(1) In September 2000, the United States and the Russian Federation signed a Plutonium Management and Disposition Agreement by which each agreed to dispose of 34 metric tons of weapons-grade plutonium.

(2) The agreement with Russia is a significant step toward safeguarding nuclear materials and preventing their diversion to rogue states and terrorists.

(3) The Department of Energy plans to dispose of 34 metric tons of weapons-grade plutonium in the United States before the end of 2019 by converting the plutonium to a mixed-oxide fuel to be used in commercial nuclear power reactors.

(4) The Department has formulated a plan for implementing the agreement with Russia through construction of a mixed-oxide fuel fabrication facility, the so-called MOX facility, and a pit disassembly and conversion facility at the Savannah River Site, Aiken, South Carolina.

(5) The United States and the State of South Carolina have a compelling interest in the safe, proper, and efficient operation of the plutonium disposition facilities at the Savannah River Site. The MOX facility will also be economically beneficial to the State of South Carolina, and that economic benefit will not be fully realized unless the MOX facility is built.

(6) The State of South Carolina desires to ensure that all plutonium transferred to the State of South Carolina is stored safely; that the full benefits of the MOX facility are realized as soon as possible; and, specifically, that all defense plutonium or defense plutonium materials transferred to the Savannah River Site either be processed or be removed expeditiously.

SEC. 3182. DISPOSITION OF WEAPONS-USABLE PLUTONIUM AT SAVANNAH RIVER SITE.

(a) PLAN FOR CONSTRUCTION AND OPERATION OF MOX FACILITY.—(1) Not later than February 1, 2003, the Secretary of Energy shall submit to Congress a plan for the construction and operation of the MOX facility at the Savannah River Site, Aiken, South Carolina.

(2) The plan under paragraph (1) shall include—

(A) a schedule for construction and operations so as to achieve, as of January 1, 2009, and thereafter, the MOX production objective, and to produce 1 metric ton of mixed-oxide fuel by December 31, 2009; and

(B) a schedule of operations of the MOX facility designed so that 34 metric tons of defense plutonium and defense plutonium materials at the Savannah River Site will be processed into mixed-oxide fuel by January 1, 2019.

(3)(A) Not later than February 15 each year, beginning in 2004 and continuing for as long as the MOX facility is in use, the Secretary shall submit to Congress a report on the implementation of the plan required by paragraph (1).

(B) Each report under subparagraph (A) for years before 2010 shall include—

(i) an assessment of compliance with the schedules included with the plan under paragraph (2); and

(ii) a certification by the Secretary whether or not the MOX production objective can be met by January 2009.

(C) Each report under subparagraph (A) for years after 2009 shall—

(i) address whether the MOX production objective has been met; and

(ii) assess progress toward meeting the obligations of the United States under the Plutonium Management and Disposition Agreement.

(D) Each report under subparagraph (A) for years after 2017 shall also include an assessment of compliance with the MOX production objective and, if not in compliance, the plan of the Secretary for achieving one of the following:

(i) Compliance with such objective.

(ii) Removal of all remaining defense plutonium and defense plutonium materials from the State of South Carolina.

(b) CORRECTIVE ACTIONS.—(1) If a report under subsection (a)(3) indicates that construction or operation of the MOX facility is behind the applicable schedule under subsection (a)(2) by 12 months or more, the Secretary shall submit to Congress, not later than August 15 of the year in which such report is submitted, a plan for corrective actions to be implemented by the Secretary to ensure that the MOX facility project is capable of meeting the MOX production objective by January 1, 2009.

(2) If a plan is submitted under paragraph (1) in any year after 2008, the plan shall include corrective actions to be implemented by the Secretary to ensure that the MOX production objective is met.

(3) Any plan for corrective actions under paragraph (1) or (2) shall include established milestones under such plan for achieving compliance with the MOX production objective.

(4) If, before January 1, 2009, the Secretary determines that there is a substantial and material risk that the MOX production objective will not be achieved by 2009 because of a failure to achieve milestones set forth in the most recent corrective action plan under this subsection, the Secretary shall suspend further transfers of defense plutonium and defense plutonium materials to be processed by the MOX facility until such risk is addressed and the Secretary certifies that the MOX production objective can be met by 2009.

(5) If, after January 1, 2009, the Secretary determines that the MOX production objective has not been achieved because of a failure to achieve milestones set forth in the most recent corrective action plan under this subsection, the Secretary shall suspend further transfers of defense plutonium and defense plutonium materials to be processed

by the MOX facility until the Secretary certifies that the MOX production objective can be met.

(6)(A) Upon making a determination under paragraph (4) or (5), the Secretary shall submit to Congress a report on the options for removing from the State of South Carolina an amount of defense plutonium or defense plutonium materials equal to the amount of defense plutonium or defense plutonium materials transferred to the State of South Carolina after April 15, 2002.

(B) Each report under subparagraph (A) shall include an analysis of each option set forth in the report, including the cost and schedule for implementation of such option, and any requirements under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.) relating to consideration or selection of such option.

(C) Upon submittal of a report under paragraph (A), the Secretary shall commence any analysis that may be required under the National Environmental Policy Act of 1969 in order to select among the options set forth in the report.

(c) **CONTINGENT REQUIREMENT FOR REMOVAL OF PLUTONIUM AND MATERIALS FROM SAVANNAH RIVER SITE.**—If the MOX production objective is not achieved as of January 1, 2009, the Secretary shall, consistent with the National Environmental Policy Act of 1969 and other applicable laws, remove from the State of South Carolina, for storage or disposal elsewhere—

(1) not later than January 1, 2011, not less than 1 metric ton of defense plutonium or defense plutonium materials; and

(2) not later than January 1, 2017, an amount of defense plutonium or defense plutonium materials equal to the amount of defense plutonium or defense plutonium materials transferred to the Savannah River Site between April 15, 2002 and January 1, 2017, but not processed by the MOX facility.

(d) **ECONOMIC AND IMPACT ASSISTANCE.**—(1) If the MOX production objective is not achieved as of January 1, 2011, the Secretary shall, from funds available to the Secretary, pay to the State of South Carolina each year beginning on or after that date through 2016 for economic and impact assistance an amount equal to \$1,000,000 per day, not to exceed \$100,000,000 per year, until the later of—

(A) the date on which the MOX production objective is achieved in such year; or

(B) the date on which the Secretary has removed from the State of South Carolina in such year at least 1 metric ton of defense plutonium or defense plutonium materials.

(2)(A) If, as of January 1, 2017, the MOX facility has not processed mixed-oxide fuel from defense plutonium and defense plutonium materials in the amount of not less than—

(i) one metric ton, in each of any two consecutive calendar years; and

(ii) three metric tons total, the Secretary shall, from funds available to the Secretary, pay to the State of South Carolina for economic and impact assistance an amount equal to \$1,000,000 per day, not to exceed \$100,000,000 per year, until the removal by the Secretary from the State of South Carolina of an amount of defense plutonium or defense plutonium materials equal to the amount of defense plutonium or defense plutonium materials transferred to the Savannah River Site between April 15, 2002, and January 1, 2017, but not processed by the MOX facility.

(B) Nothing in this paragraph may be construed to terminate, supersede, or otherwise affect any other requirements of this section.

(3) If the State of South Carolina obtains an injunction that prohibits the Department from taking any action necessary for the Department to meet any deadline specified by this subsection, that deadline shall be extended for a period of time equal to the period of time during which the injunction is in effect.

(e) FAILURE TO COMPLETE PLANNED DISPOSITION PROGRAM.—If on July 1 each year beginning in 2020 and continuing for as long as the MOX facility is in use, less than 34 metric tons of defense plutonium or defense plutonium materials have been processed by the MOX facility, the Secretary shall submit to Congress a plan for—

(1) completing the processing of 34 metric tons of defense plutonium and defense plutonium material by the MOX facility; or

(2) removing from the State of South Carolina an amount of defense plutonium or defense plutonium materials equal to the amount of defense plutonium or defense plutonium materials transferred to the Savannah River Site after April 15, 2002, but not processed by the MOX facility.

(f) REMOVAL OF MIXED-OXIDE FUEL UPON COMPLETION OF OPERATIONS OF MOX FACILITY.—If, one year after the date on which operation of the MOX facility permanently ceases, any mixed-oxide fuel remains at the Savannah River Site, the Secretary shall submit to Congress—

(1) a report on when such fuel will be transferred for use in commercial nuclear reactors; or

(2) a plan for removing such fuel from the State of South Carolina.

(g) DEFINITIONS.—In this section:

(1) MOX PRODUCTION OBJECTIVE.—The term “MOX production objective” means production at the MOX facility of mixed-oxide fuel from defense plutonium and defense plutonium materials at an average rate equivalent to not less than one metric ton of mixed-oxide fuel per year. The average rate shall be determined by measuring production at the MOX facility from the date the facility is declared operational to the Nuclear Regulatory Commission through the date of assessment.

(2) MOX FACILITY.—The term “MOX facility” means the mixed-oxide fuel fabrication facility at the Savannah River Site, Aiken, South Carolina.

(3) DEFENSE PLUTONIUM; DEFENSE PLUTONIUM MATERIALS.—The terms “defense plutonium” and “defense plutonium materials” mean weapons-usable plutonium.

SEC. 3183. STUDY OF FACILITIES FOR STORAGE OF PLUTONIUM AND PLUTONIUM MATERIALS AT SAVANNAH RIVER SITE.

(a) STUDY.—The Defense Nuclear Facilities Safety Board shall conduct a study of the adequacy of the K-Area Materials Storage facility (KAMS), and related support facilities such as Building 235-F, at the Savannah River Site, Aiken, South Carolina, for the storage of defense plutonium and defense plutonium materials in connection with the disposition program provided

in section 3182 and in connection with the amended Record of Decision of the Department of Energy for fissile materials disposition.

(b) REPORT.—Not later than one year after the date of the enactment of this Act, the Defense Nuclear Facilities Safety Board shall submit to Congress and the Secretary of Energy a report on the study conducted under subsection (a).

(c) REPORT ELEMENTS.—The report under subsection (b) shall—

(1) address—

(A) the suitability of KAMS and related support facilities for monitoring and observing any defense plutonium or defense plutonium materials stored in KAMS;

(B) the adequacy of the provisions made by the Department for remote monitoring of such defense plutonium and defense plutonium materials by way of sensors and for handling of retrieval of such defense plutonium and defense plutonium materials; and

(C) the adequacy of KAMS should such defense plutonium and defense plutonium materials continue to be stored at KAMS after 2019; and

(2) include such proposals as the Defense Nuclear Facilities Safety Board considers appropriate to enhance the safety, reliability, and functionality of KAMS.

(d) REPORTS ON ACTIONS ON PROPOSALS.—Not later than 6 months after the date on which the report under subsection (b) is submitted to Congress, and every year thereafter, the Secretary and the Board shall each submit to Congress a report on the actions taken by the Secretary in response to the proposals, if any, included in the report.

GLOSSARY

Board	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DOE-SR	Department of Energy Savannah River Operations Office
KAMS	K-Area Materials Storage
MOX	mixed-oxide
SRS	Savannah River Site
WIPP	Waste Isolation Pilot Plant
235-F	Building 235-F

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