FY 2012

BUDGET REQUEST

TO THE CONGRESS

Defense Nuclear Facilities Safety Board

February 14, 2011

GOVERNMENT PERFORMANCE & RESULTS ACT

GPRA Strategic Planning Reporting Requirements

The Government Performance and Results Act of 1993 (GPRA), as amended, requires each agency to prepare and submit a strategic plan establishing long-term programmatic, policy, and management goals. The Defense Nuclear Facilities Safety Board's Strategic Plan is available on the Internet at www.dnfsb.gov. In addition, agencies are also required to develop a performance budget with annual performance objectives that indicate the progress toward achievement of the strategic plan's goals and objectives. The Board's performance objectives for FY 2012, as well as representative accomplishments for FY 2007 through FY 2010, are included in this budget request in accordance with the requirements of OMB Circular A-11.

For a comprehensive review of the Board's activities to improve public and worker safety of the Department of Energy's defense nuclear facilities see the Board's Reports to Congress, which may be reviewed at the Board's Web address (referenced above).

TABLE OF CONTENTS

TABLE OF CONTENTS

1. INTRODUCTION

Defense Nuclear Facilities Safety Board
FY 2012 Congressional Budget Request

APPROPRIATION & EXPENSE SUMMARY

(Dollars in thousands)

OPERATING EXPENSES

	ACTUAL FOR FY 2010	BUDGET REQUEST FOR FY 2012
New Budget Authority	$26,086*	$29,130
Obligations	$26,574	$30,124
Outlays	$25,472	$29,521

* Pub. L. 111-85, "Energy & Water Development and Related Agencies Appropriations Act, 2010."

Enabling Statute:

National Defense Authorization Act, Fiscal Year 1989 (Pub. L. 100-456, September 29, 1988), amended the Atomic Energy Act of 1954 (42 U.S.C. 2286 et seq.) by adding new Chapter 21– Defense Nuclear Facilities Safety Board,

As Amended by:

National Defense Authorization Act for Fiscal Year 1991
(Pub. L. 101-510, November 5, 1990),

National Defense Authorization Act for Fiscal Years 1992 and 1993 (Pub. L. 102-190, December 5, 1991),

Energy Policy Act of 1992 (Pub. L. 102-486, October 24, 1992), and National Defense Authorization Act for Fiscal Year 1994 (Pub. L. 103-160, November 30, 1993),

Federal Reports Elimination Act of 1998 (Pub. L. 105-362, November 10, 1998) and National Defense Authorization Act for Fiscal Year 2001 (Pub. L. 106-398, October 30, 2000),

National Defense Authorization Act for Fiscal Year 2003 (Pub. L. 107-314, December 2, 2002).

Defense Nuclear Facilities Safety Board
FY 2012 Congressional Budget Request

PERSONNEL SUMMARY

	ACTUAL FOR FY 2010	BUDGET REQUEST FOR FY 2012
Statutory Personnel Ceiling: (FTEs) [1/]	150	150
FTE Usage [2/]	103	120
Board Members and Permanent Employees at End of Fiscal Year	106	120

1/ National Defense Authorization Act for FY 1992 and FY 1993, Pub. L. 102-190, raised the Board's statutory employee ceiling from 100 to 150 full-time staff to accommodate mandated additional nuclear weapons oversight responsibilities. See 42 U.S.C. § 2286b (b) (1) (A).

2/ Includes five full-time Board Members appointed by the President, by and with the advice and consent of the Senate.

Defense Nuclear Facilities Safety Board
FY 2012 Congressional Budget Request

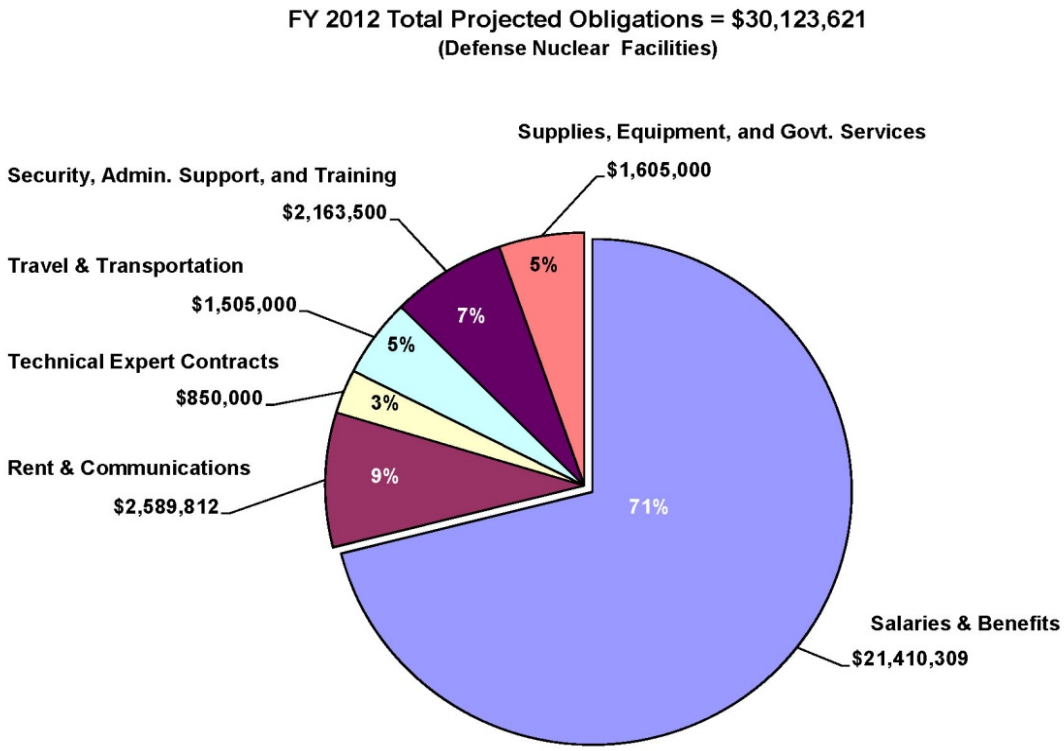
PROPOSED APPROPRIATIONS LANGUAGE

SALARIES AND EXPENSES

For necessary expenses of the Defense Nuclear Facilities Safety Board in carrying out activities authorized by the Atomic Energy Act of 1954, as amended by Public Law 100-456, section 1441 *$29,130,000*, to remain available until expended.

Defense Nuclear Facilities Safety Board
FY 2012 Congressional Budget Request

FY 2012 TOTAL PROJECTED OBLIGATIONS



2. BUDGET REQUEST SUMMARY

The Board's FY 2012 Budget Request, totaling $29,130,000 and 120 FTEs includes a program increase of 17 FTEs to address additional workload requirements under its statutory authority (safety and health independent oversight of Department of Energy (DOE) defense nuclear facilities).

A brief description of each additional funding request based upon the Energy and Water Development and Related Agencies Appropriations Act, 2010 follows (a full explanation is included on the referenced page number):

	New Budget Authority	FTEs	Page Reference
Baseline – FY 2010 enacted	$26,086,000	103	
Funding for additional FTEs	$3,400,000	17	7-11
Funding for increases in Communications and Utilities costs). [Note: additional funding required to implement Managed Trusted Internet Protocol Services (MTIPS) and other cyber security initiatives.	$130,000		11
Less: Decrease in Rental Payments to GSA.	($59,000)		11
Funding for Other Net Increases	$78,000		11
Less: Increased Unobligated Balances	($505,000)		11
Total Additional Funding Requirements in FY 2012 Budget Request	$3,044,000	17	
FY 2012 New Budget Authority	$29,130,000	120.0	

3. EXECUTIVE SUMMARY

Congress created the Defense Nuclear Facilities Safety Board (Board) as an independent agency within the Executive Branch (42 U.S.C. § 2286, *et seq.)* to identify the nature and consequences of potential threats to public health and safety at the Department of Energy's (DOE's) defense nuclear facilities, to elevate such issues to the highest levels of authority, and to inform the public. To accomplish its mission in Fiscal Year (FY) 2012, the Board is requesting $29.130, million in new budget authority and 120 FTEs.

In FY 2012, the Board will continue to execute its oversight mission of ensuring adequate protection of public health and safety at DOE's defense nuclear facilities.

The National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling concluded that the Macondo well blowout revealed such systematic failures in risk management that they place in doubt the safety culture of the entire industry. A key finding in the commission's January 2011 report is that fundamental reform will be needed in both the structure of those in charge of regulatory oversight and their internal decision-making process to ensure their political autonomy, technical expertise, and their full consideration of environmental protection concerns. Likewise, a nuclear accident is unacceptable to the public and the Administration. The Board is the only agency that provides independent scientific and technical safety oversight of DOE's defense nuclear facilities.

The Board remains the last line of defense to ensure such accidents do not happen within the defense nuclear weapons complex. DOE is undertaking initiatives to create and test new governance models that rely more heavily on the objectivity of its line organizations for safety oversight, eliminate or streamline its directives, and eliminate or streamline contractor requirements to achieve more efficient operations. This increases the overall reliance on the Board to provide independent oversight. The DOE-Board independent safety model has yielded a positive safety performance record in DOE's defense nuclear complex since the Congress established the Board.

The Board's Congressional oversight and appropriations committees have periodically directed the Board to increase both the scope and pace of its independent health and safety oversight reviews at all DOE defense nuclear facilities, with special attention on new facilities in various design and construction stages, while continuing to ensure that legacy facilities are properly and competently maintained, operated, and decommissioned. Having noted repeated problems with DOE's new construction programs and associated cost overruns where significant safety flaws were not identified by DOE or its contractors early in the project development cycle, these committees have called upon the Board to apply its health and safety expertise at higher and higher levels of scrutiny. For example, the FY 2011 Senate Authorization Bill's report (Report 111–201, National Defense Authorization Act for Fiscal Year 2011) includes the following language:

> *The committee is concerned that with several major new nuclear facilities planned, including the uranium processing facility, the chemical and metallurgical research replacement facility, as well as new work on plutonium pit disassembly and plutonium*

oxide production, the DNFSB will need additional technical staff to review fully the operational nuclear safety for the new projects.

In addition, in its report GAO-09-61, the Government Accountability Office (GAO) stated:

We have reported on the need for effective independent oversight of nuclear safety across the DOE complex, finding that a strong management and oversight program is needed to assure that DOE's nuclear operations are carried out in a safe and environmentally acceptable manner.

Congressional committees and GAO continually reaffirm the conclusion that independent technical oversight is required for DOE's defense nuclear facilities.

This Budget Request continues the strategy started in FY 2009 to increase the Board's staff over several budget cycles to meet the increasing workload generated in the DOE's defense nuclear facility complex. As of February 1, 2011, the Board had 109 personnel onboard (with four additional job offer acceptances), up from 95 personnel onboard at the start of FY 2009. The Board plans to increase its manning in FY 2012 to achieve its goal of 120 personnel. The Board believes 120 personnel are necessary to provide oversight of DOE's defense nuclear facilities at this time. The Board continues to devote considerable resources to recruiting highly-qualified technical personnel and will continue to do so in FY 2012.

The Board notes that the cost of re-engineering and making post-construction modifications to complex DOE defense nuclear facilities, due to the late identification of significant design flaws that could impact public and worker health and safety, would require significantly more resources than the Board's requested budget. When incomplete or incorrect safety features are identified late in the design stage (or worse, in the construction stage) project costs are typically increased and schedules are delayed while corrections are made. With DOE's design and construction budget exceeding $20 billion, each increase in project cost of one percent (1%) equates to an increase of more than $200 million. Increases in project cost well in excess of this amount have driven the Congress, as discussed above and elsewhere, to insist on identification and resolution of safety issues early in the design stage. In this context, and given that the DOE's Defense Environmental Cleanup and National Nuclear Security Administration (NNSA) Weapons Activities accounts' FY 2010 obligations exceed $5.7 billion and $8.4 billion respectively, the Board provides cost-effective oversight while protecting public and worker health and safety.

In line with Congressional actions thus far, the Board believes it is prudent to proactively address DOE's safety issues and requires the resources addressed in this budget submission to accomplish an expanded workload. The Board's FY 2012 budget request of $29.130 million in new budget authority and 120 FTEs is necessary to ensure that the scientific and technical resources required to address nuclear safety issues are available to review expanding DOE design and construction, remediation, and future weapons programs in a timely and efficient manner, and address Congressional and other concerns.

4. FY 2012 BUDGET REQUEST

FY 2012 Request Summary	*Permanent Positions*	*FTE*	*Amount ($000)*
FY 2010 Actual	106	103	$26,086
FY 2012 Budget Request	120	120	$29,130
Total Change 2010-2012	14	17	$3,044

The Board Mission

Congress created the Defense Nuclear Facilities Safety Board (Board) as an independent agency within the Executive Branch (42 U.S.C. § 2286, *et seq.)* to identify the nature and consequences of potential threats to public health and safety at the Department of Energy's (DOE's) defense nuclear facilities, to elevate such issues to the highest levels of authority, and to inform the public. Since DOE is a self-regulating entity, the Board constitutes the only independent technical oversight of operations at the Nation's defense nuclear facilities. Under its legislative mandate (Exhibit B), the Board plays a key role in maintaining the future viability of the Nation's nuclear deterrent capability by:

- Ensuring that the health and safety of the public and the workers at DOE's defense nuclear facilities located throughout the United States are adequately protected, as DOE maintains the readiness of the nuclear arsenal, dismantles surplus weapons, disposes of excess radioactive materials, cleans up surplus defense nuclear facilities, and constructs new defense nuclear facilities;

- Enhancing the safety and security at our Nation's most sensitive defense nuclear facilities when hazardous nuclear materials and components are placed in more secure and stable storage; and

- Providing for the early identification of health and safety vulnerabilities, allowing the Secretary of Energy to address issues before they become major problems.

The Challenge

The Board uses its oversight authorities to reduce the nuclear safety risks that exist in the defense nuclear complex such that public and worker health and safety are protected. DOE's safety performance has greatly improved since the establishment of the Board, yet DOE's nuclear weapons program remains a technically challenging and hazardous operation. Reductions in the pace and scope of the Board's oversight could allow the nuclear weapons complex to deteriorate again to the conditions that resulted in the creation of the Board. Many tons of radioactive and toxic materials exist throughout DOE's defense nuclear complex, either in storage or in use. There are multiple pathways by which these hazards might be released in the environment, creating risks to the workers and the public. A large number of the complex's facilities were constructed decades ago and are deteriorating.

The Board oversees defense nuclear facilities primarily at 10 DOE sites. It currently maintains Site Representatives at six of the sites. The Board also maintains a cadre of technical

staff at its Headquarters organized to perform oversight roles as required. For the next several years, the Board will focus its defense nuclear facility oversight on the following:

- **Pantex Plant in Texas.** Stewardship and maintenance of the nuclear weapons stockpile, including assembly and disassembly, evaluation, maintenance, and dismantlement of nuclear weapons and the storage of special nuclear material, particularly plutonium pits.

- **Oak Ridge National Laboratory / Y-12 National Security Complex in Tennessee.** Stewardship and maintenance of the nuclear weapons stockpile, including assembly and disassembly, evaluation, maintenance, and dismantlement of nuclear weapon components; fabrication of nuclear weapon components, including highly enriched uranium processing; and storage of nuclear materials, including uranium from weapon components**.**

- **Savannah River Site (SRS) in South Carolina.** Tritium operations, storage of special nuclear material, the stabilization of high-level waste and residual nuclear materials from previous defense nuclear operations, and the disposition of excess plutonium.

- **Los Alamos National Laboratory (LANL) in New Mexico.** Stockpile management and stewardship of the nation's nuclear weapons stockpile, including research and enhanced surveillance of weapons, processing of nuclear materials, and pit production.

- **Lawrence Livermore National Laboratory (LLNL) in California.** Management and stewardship of the nuclear weapons stockpile, including research and enhanced surveillance of weapons, and the processing of nuclear materials.

- **Nevada National Security Site.** Stewardship of the nuclear weapons stockpile, including subcritical experiments and criticality experiments, the packaging and disposal of radioactive waste, potential nuclear weapon assembly and disassembly operations, and potential operations with damaged nuclear weapons and improvised nuclear devices.

- **Sandia National Laboratories (SNL) in New Mexico and California.** Management and stewardship of the nuclear weapons stockpile, including research, enhanced surveillance of weapons, and packaging of radioactive wastes.

- **Hanford Site in Washington.** Storage and stabilization of high-level waste, stabilization of residual sludge from corroded spent nuclear fuel, stabilization of other residual nuclear material from previous operations, and the dismantling and disposition of excess defense nuclear facilities.

- **Idaho National Laboratory (INL) in Idaho.** Storage and stabilization of high-level waste, storage of spent nuclear fuel, packaging and disposition of radioactive waste, and the dismantling and disposition of excess defense nuclear facilities.

- **Waste Isolation Pilot Plant (WIPP) in New Mexico.** Receipt, handling, and permanent deep geological disposal of transuranic wastes.

The Risks

The potential for release of hazardous materials to the environment at DOE's defense nuclear facilities continues to pose health and safety risks to the public and the facility workers. Many current facilities are old and deteriorating, while containing significant amounts of hazardous materials, especially nuclear waste. These current facilities require careful risk analysis as operations continue or as they undergo decommissioning and cleanup. New facilities being built to replace current ones or to process, stabilize, and dispose of nuclear waste stockpiles in turn create their own new waste streams, and require extensive planning to mitigate risks of environmental release. The design of new and old facilities or structures to prevent the release of hazardous materials must be equal to the challenges provided by earthquakes, extreme winds, floods, lightning, and other such natural phenomena.

Other potential release mechanisms include inadequate safety controls in new and old facility designs, human errors, equipment malfunctions, chemical reactions, fire, detonation of explosives, and inadvertent nuclear criticality events. Many DOE facilities continue to contain sufficient amounts of fissionable material such that the risk of an accidental nuclear criticality exists and must be controlled. Chemical reactions in materials used in nuclear work need to be carefully monitored. As the massive DOE nuclear waste cleanup effort continues, the use of leading edge technologies in new facilities can create additional nuclear safety risks due to lack of experience in designing, constructing, operating, and maintaining these facilities.

DOE's nuclear weapons stockpile stewardship and management operations are unique in that they include nuclear explosive activities and experiments involving co-located high explosives and nuclear material. Unlike commercial nuclear facilities, the risks at defense nuclear facilities are not solely a function of the quantities of nuclear material present, but more importantly, the processes involved and the potential for explosive dispersal of radioactive materials or inadvertent nuclear detonation.

The National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling concluded that the Macondo well blowout revealed such systematic failures in risk management that they place in doubt the safety culture of the entire industry. A key finding in the commission's January 2011 report is that fundamental reform will be needed in both the structure of those in charge of regulatory oversight and their internal decision-making process to ensure their political autonomy, technical expertise, and their full consideration of environmental protection concerns. Likewise, a nuclear accident is unacceptable to the public and the Administration. The Board is the only agency that provides independent scientific and technical safety oversight of DOE's defense nuclear facilities.

Strategic Goals

The Board is publishing an updated strategic plan for FY 2011 through FY 2016.

Technical Nuclear Safety Oversight is the number one priority for the Board and encompasses activities as outlined in the Board's enabling legislation and other Congressional direction included in authorization and/or appropriations legislation. As will be discussed in

more detail later in this budget request, the Board focuses its Technical Nuclear Safety Oversight through four interdependent strategic goals:

- Strategic Goal # 1: Safe Nuclear Weapons Operations
- Strategic Goal # 2: Safe Processing and Stabilization of Nuclear Material
- Strategic Goal # 3: Safety in Nuclear Facilities Design and Infrastructure
- Strategic Goal # 4: Effective Nuclear Safety Programs and Analysis

In order to properly support and manage its technical nuclear safety oversight mission, the Board has identified a fifth goal that supports the other strategic goals.

- Strategic Goal # 5: Management Excellence

Human Capital - The Board's Greatest Asset

Seventy-one (71) percent of the Board's budget request is dedicated to salaries and benefits for its staff and Board Members. The Board must function as an oversight organization comprising leading technical experts who quickly recognize problems in the hundreds of hazardous operations conducted daily throughout DOE's defense nuclear complex. The Board relies on a determined, focused, and well-executed human capital program that uses all available tools to attract and retain the technical talent necessary to accomplish the Board's congressionally mandated mission. After years of experience, the Board has determined that its technical staffing requires scientists and engineers with extensive backgrounds in technical disciplines such as nuclear-chemical processing; conduct of operations; facility safety analysis; conventional and nuclear explosive technology and safety; nuclear weapons safety; storage of nuclear materials; nuclear criticality safety; and waste management. Eighty-seven percent of the Board's technical staff holds advanced science and engineering degrees, with 24 percent at the doctoral level. Because the Board's health and safety Recommendations and other advisories to the Secretary of Energy are based on in-depth technical information and detailed safety analyses, recruitment and retention of scientific and technical staff members with outstanding qualifications continues to be critical to successful accomplishment of the Board's mission.

The Board increased its staff from 95 personnel at the beginning of FY 2009 to 109, as of February 1, 2011, despite a number of losses. In addition, as of February 1, 2011 the Board has received four acceptances of job offers made to qualified candidates. The Board continues to make hiring a priority and plans to achieve manning of 120 personnel in FY 2012. The Board believes 120 personnel are necessary to provide oversight of DOE's defense nuclear facilities at this time. The combination of an aging workforce and high demand for experienced scientists and engineers by other organizations may impact Board operations if not dealt with in an aggressive manner. Approximately 17 percent of the Board's technical staff is eligible for regular retirement today. Competition for scientists and engineers with the Board's required expertise continues due to competition for talent with the commercial nuclear industry, the Nuclear Regulatory Commission, the Department of Defense's emphasis on combating weapons of mass destruction, and DOE's nuclear weapons complex activities. Consequently, the Board

expects the need to spend more resources on recruiting highly qualified technical personnel in a competitive job market.

In addition to continuing to recruit experienced scientific and engineering talent to fill immediate staff needs, the Board will continue to focus on attracting the next generation of scientists and engineers. The Board will continue its highly competitive three-year Professional Development Program (PDP), which brings entry-level technical talent into professional positions within the Board straight from college. Through a technical mentor, individuals are provided a series of individually tailored developmental assignments, formal academic schooling, and a one-year, hands-on field assignment. The Board met its goal of recruiting three people into the PDP in FY 2010, and now has a total of six in the program at various stages of development. The Board will expand its educational program to include a competitive PhD program for talented staff to further increase the Board's technical expertise.

Health and Safety Oversight Resource Requirements

Factors. In order to maintain an effective, independent oversight program over a vast array of DOE defense nuclear programs and projects in geographically dispersed locations, the Board must continually balance and redirect its health and safety oversight resources with careful consideration of the following factors:

(1) Nuclear safety oversight activities are prioritized predominantly on the basis of risks to the public and the workers, the types and quantities of nuclear and hazardous material at risk, and the process and setting of the operations involved.

(2) Identifying potential accident conditions and mitigating their consequences are very important for risk management. Safety is assured by working to understand and reduce the likelihood of events that adversely affect safety and by limiting the consequences of events if they do occur. In addition, safety is assured through robust systems that employ defense in depth, using multiple layers of protection such that no single layer is depended upon to ensure safety. The Board is actively working to identify "leading indicators" that can be used to prevent accidents.

(3) Safety is not an afterthought in the design-bid-build process. "Safety-in-design" requires integration of safety considerations early in the design and construction process of DOE's nuclear facilities. The result of DOE adhering to this concept should be decreased project costs associated with retrofitting or redesigning facilities as they are constructed.

(4) Equally important to safety-in-design is ensuring that facility safety systems will meet the functional design requirements through careful oversight of the quality assurance practices and testing programs as the facilities are built and placed into operation. Evaluating the transition of a facility from construction to operation requires additional oversight during the startup process and into operation.

(5) Another key facet to a facility's nuclear safety posture is the proper development of Technical Safety Requirements during the construction phase. Typically, Technical Safety Requirements are only preliminary when construction commences; as the facility

approaches operation, these key safety provisions are fully developed and implemented. Technical Safety Requirements must be conservatively determined based on a thorough understanding of the safety features in the design and properly implemented during the transition to facility operation; otherwise, the facility will not achieve the required level of safety in operation.

In preparing this budget request, the Board reviewed its current resources and capabilities against the projected defense nuclear facility workload, which was derived from four sources: Presidential priorities regarding nuclear weapons, Congressional concerns about the DOE's facilities and operations, current DOE programs and projects, and new DOE projects and programs.

Administration Priorities. The Administration has established a vision and goal of taking concrete steps toward a world without nuclear weapons while (as long as these weapons still exist) maintaining a safe, secure, and effective arsenal to deter any adversary, and guarantee that defense to our allies. NNSA has developed a plan for maintaining and evolving the nuclear weapons stockpile and infrastructure that includes completing a series of life extension activities that will enhance stockpile safety, security, and effectiveness without requiring additional underground nuclear tests. The White House published a fact sheet on November 17, 2010 expressing the Administration's commitment toward continued funding increases for NNSA over the next decade to ensure the modernization of the Nation's nuclear infrastructure. These activities require Board oversight. The Board's planned growth to 120 personnel, for oversight of defense nuclear facilities, is a critical and cost-effective investment in ensuring proper oversight of activities resulting from NNSA's growth, as well as the ongoing challenge of addressing the shortcomings of NNSA's aging infrastructure.

Congressional Concerns about Facilities and DOE's Operations. Congress has periodically expressed its concern, both during hearings and in legislation, with DOE's ability to manage its nuclear programs. With its well-recognized technical expertise and cost-effective methods for conducting nuclear health and safety oversight, the Board has been asked to do more to assist DOE in meeting mission requirements. Recent indications of Congressional intent and concerns are:

- The report accompanying the Senate Authorization Bill (Report 111–201, National Defense Authorization Act for Fiscal Year 2011), which includes:

  The committee recommends an increase for the PF–4 facility at Los Alamos National Laboratory to address the active ventilation system issues that have been identified by the Defense Nuclear Facility Safety Board.

  The Defense Nuclear Safety Board (DNFSB) has a statutory responsibility to oversee operational nuclear safety aspects of the WTP [Waste Treatment Plant] *project. Part of this responsibility includes oversight of the facility construction and design to ensure that the design meets DOE industry standards and guidance for nuclear safety. The committee notes that the EM* [DOE Office of Environmental Management] *program has committed to provide to the DNFSB the documentation and safety analysis to allow the DNFSB to carry out its responsibilities effectively.…*

The committee continues to expect this whole review and design change process to be carried out expeditiously but also thoroughly and to be kept informed by both DOE and the DNFSB as the effort progresses.

The committee is concerned that with several major new nuclear facilities planned, including the uranium processing facility, the chemical and metallurgical research replacement facility, as well as new work on plutonium pit disassembly and plutonium oxide production, the DNFSB will need additional technical staff to review fully the operational nuclear safety for the new projects.

The committee notes that the efforts of the National Nuclear Security Administration (NNSA) at the new highly enriched uranium storage facility at the Y–12 facility in Oak Ridge, Tennessee, to work with the DNFSB to identify and to resolve safety issues early on in the design process was a successful model. The committee hopes that the NNSA will follow this model as they design and construct the new facilities.

Currently the DNFSB has been heavily focused on design changes that the DOE has proposed to the Waste Treatment Plant (WTP) at the DOE Hanford facility. While the committee supports efforts to improve the overall operability and reliability of the WTP, this facility must also operate safely and for many years to process all of the waste at Hanford. As a result, the proposed changes must be understood and analyzed from both throughput and operational safety perspectives. The committee urges the DOE to continue to conduct the analysis necessary to justify the changes to the WTP.

- Likewise, the House Armed Services Committee expressed its safety concerns in House Report 111–491, National Defense Authorization Act for Fiscal Year 2011:

  Over the past few years, increasing concern has been voiced regarding the NNSA's ability to maintain the safety, security, and reliability of the nuclear weapons stockpile into the indefinite future.

  While the committee recognizes this progress, the committee is aware that the Defense Nuclear Facilities Safety Board continues to work with the Office of Environmental Management to resolve certain technical and safety issues associated with the design of the WTP. The committee is concerned that a technical issue identified in 2006, relating to the adequacy of pulse jet mixing in process vessels, remains unresolved and that new technical and safety issues have since emerged.

Increased Activity at DOE's Defense Nuclear Facilities. The risks and challenges facing DOE continue to grow. DOE is pursuing 18 major design and construction projects to build defense nuclear facilities for programmatic work and cleanup activities (Exhibit A). The Board is required by law to review DOE's design and construction projects to ensure that the health and safety of the public and the workers is addressed early in the design process. In FY 2012, the Board will be required to expend considerable resources to review ongoing design efforts, as well as construction and startup activities. More DOE defense nuclear facility design and construction projects are planned for the near future.

Review of DOE Directives. DOE Order 251.1C, *Departmental Directives Program*, was approved in January 2009. This directive codifies a set of principles for the DOE's directives system intended to simplify and clarify requirements, reduce redundancy and unnecessary burden, and support improved management and mission accomplishment as outlined in a memorandum issued by the Secretary of Energy on September 10, 2007. Because DOE Order 251.1C establishes the framework for the entire directives system, it affects all DOE safety directives. Further, DOE's Office of Health, Safety and Security (HSS) has been leading a multi-phased, multi-year effort to review and streamline key safety directives to ensure they meet the Secretary of Energy memorandum on an individual basis. DOE's directives revision effort is occupying a significant portion of the Board's resources. As DOE reissues its directives to comply with the new program, and continues the HSS directive-by-directive reviews under the auspices of the *Department of Energy 2010 Safety and Security Reform Plan*, the Board is reviewing all of them to ensure health and safety requirements are properly included.

Government Accountability Office. The Government Accountability Office (GAO) has voiced its concern over a number of years about the ability of DOE to self-regulate and oversee its nuclear facilities. The most recent GAO report on this subject (GAO-09-61**,** *Nuclear Safety, Department of Energy Needs to Strengthen Its Independent Oversight of Nuclear Facilities and Operations*, dated October 2008) summarized previous and current concerns.

> *We* [GAO] *have reported on the need for effective independent oversight of nuclear safety across the DOE complex, finding that a strong management and oversight program is needed to assure that DOE's nuclear operations are carried out in a safe and environmentally acceptable manner. Starting in 1977, we argued for creating and strengthening an independent oversight office within DOE and its predecessor organization, the Energy Research and Development Administration. Notwithstanding our support for this office, we found that internal oversight alone was not sufficient to provide a fully independent review process. In a 1986 report, we recommended that an external organization also review the safety basis for each new DOE nuclear facility, and we supported the establishment of the* [Defense Nuclear Facilities] *Safety Board. Even with the advisory oversight provided by the Safety Board, in the mid-1990s, the Congress considered legislation to externally regulate nuclear safety at DOE facilities and held hearings on this issue. Although no legislation was enacted, DOE responded by creating advisory committees to help formulate its position and to assess the benefits and costs of shifting away from self-regulation, if so directed. A 1995 DOE advisory committee report recommended that all aspects of nuclear safety should be externally regulated by an existing agency, either a restructured and enlarged Safety Board or NRC* [Nuclear Regulatory Commission]. *Over the next 3 years, a diverse team of DOE senior managers, NRC representatives, and interested stakeholders continued to review the external regulation approach for the department. In 1999, DOE decided not to pursue external regulation legislation based on its conclusion that the safety benefits of this change would be minimal when compared to the cost of external regulation. In contrast, we testified in 1999 and 2000 that transitioning DOE's nondefense research laboratories to regulation by NRC and the Occupational Safety and Health Administration seemed workable, followed by a phasing in of the defense nuclear facilities. In 2002 and 2003, we reported that external regulators could potentially regulate DOE more effectively and at less cost than the department.*

GAO-09-61 further states during the 2008 review:

HSS falls short of fully meeting GAO's elements of effective independent oversight of nuclear safety: independence, technical expertise, ability to perform reviews and have findings effectively addressed, enforcement, and public access to facility information. For example, HSS's ability to function independently is limited because it has no role in reviewing the "safety basis"—a technical analysis that helps ensure safe design and operation of these facilities—for new high-hazard nuclear facilities and because it has no personnel at DOE sites to provide independent safety observations.

DOE has structured its independent oversight office, HSS, in a way that falls short of meeting our key elements of effective independent oversight of nuclear safety.

We [GAO] *recommend that the Secretary of Energy take actions to strengthen HSS's independent oversight of nuclear safety by giving it the appropriate responsibilities, technical resources, and policy guidance. If DOE does not take appropriate actions, we are also including a matter for congressional consideration to strengthen independent oversight.*

Additional Funding Needs

In addition to the $3,400,000 in funding needed for the increased 17 FTEs required to fund 120 positions (each FTE is estimated to require $200,000 in obligations including salaries, benefits, travel, and other miscellaneous expenses), the Board's budget request includes $130,000 in funding to pay for cyber security initiatives and $78,000 for other net cost increases. However, $59,000 will be offset by a reduction in rental obligations to GSA from actual 2010 obligations (primarily due to lower estimated operating and real estate tax costs) and $505,000 will be offset by net changes in beginning and ending unobligated balances available as an additional budgetary resource (in lieu of new budget authority) in FY 2012 as compared to FY 2010).

The Administration has identified implementing a baseline of cyber security measures throughout the Federal Government as one of its priorities in implementing its broader Cyber Security Strategy. This is being accomplished through Managed Trusted Internet Protocol Services (MTIPS) and a suite of cyber security measures available through the General Services Administration's (GSA) Networx contract. These services are prohibitively expensive to micro agencies such as the Board and $130,000 in additional funding is needed to ensure the Board is able to make the transition to MTIPS and a basic level of cyber security under the Networx contract.

The Board is experiencing increased costs due to inflation in non-personnel accounts (excluding rent) such as other services, supplies and materials, software licenses, etc. The Board requires an additional $78,000 to fund these increased costs (based on an estimate of 1.5% of FY 2010 budgeted non-personnel costs).

Conclusion

The Defense Nuclear Facilities Safety Board's current mandate is to provide vital, independent, technical health and safety oversight of DOE's defense nuclear facilities and activities in order to protect the health and safety of the public and the workers. To accomplish this mission in FY 2012, the Board is requesting a total of $29.130 million in new budget authority, and 120 FTEs.

The Board seeks to avoid costly post-construction modifications to complex DOE defense nuclear facilities, due to the late identification of significant design flaws that could impact public and worker health and safety. Such modifications would require significantly more resources than the Board's budget. DOE plans to spend more than $20 billion in new DOE design and construction. Based upon prior experience, the Board's oversight early in the design phase provides a way to avoid hundreds of millions of dollars of increased program cost. In this regard, the Board's requested funding is a cost-effective insurance policy to address Administration and Congressional priorities. But even more importantly, the Board works with the DOE to prevent a nuclear accident that would be catastrophic to public and worker safety and adversely impact DOE's national security mission.

The Board further believes that over-reliance on contractor assurance systems and/or inadequate federal safety oversight in a hazardous field carries significant risks for the public, the workers, and the environment. In the case of DOE's defense nuclear weapons complexes, the potential hazards dwarf even the impacts of the Deepwater Horizon accident.

Exhibit A. Planned or Underway DOE Design/Construction Projects

SITE	FACILITY	TOTAL PROJECT COST ($M)	STATUS – December of 2010		
			Critical Decision Approved	Design Completion	Construction Completion
Hanford Site	**Waste Treatment and Immobilization Plant**	12,263			**(*Operational 2019*)**
	a. Pretreatment Facility		CD-3	82%	34%
	b. High-Level Waste Treatment Facility		CD-3	87%	32%
	c. Low Activity Waste Facility		CD-3	93%	65%
	d. Analytical Laboratory Facility		CD-3	82%	68%
	K-Basin Closure Project Sludge Treatment	268	Phase 1: CD-1 Phase 2: CD-0	Phase 1: 40% Phase 2: 5%	Phase 1: ***(Operational 2013)*** Phase 2: ***(Operational to be determined)***
	Large Package and Remote Handled Waste Packaging Facility	390	CD-0	0%	Deferred ***(Operational to be determined)***
	Tank Retrieval and Waste Feed Delivery System	1,140	One sub-project not using the formal CD process.	Various degrees of completion.	Various degrees of completion and operations
Idaho National Laboratory	**Integrated Waste Treatment Unit Project (IWTU)**	570.9	CD-3	100%	90% ***(Operational 2011)***
	Calcine Disposition Project	600-900	CD-0	< 30%	Will utilize portions of IWTU ***(Operational 2022)***

Exhibit A. Planned or Underway DOE Design/Construction Projects (Cont.)

SITE	FACILITY	TOTAL PROJECT COST ($M)	STATUS – December of 2010		
			Critical Decision Approved	Design Completion	Construction Completion
Los Alamos National Laboratory	**Chemistry and Metallurgy Research Replacement Project - Nuclear Facility**	> 2,000 Being reevaluated	CD-1	100% Preliminary design	Some ground work (***Operational to be determined***)
	Technical Area-55 Reinvestment Project	Phase 2: 100	Phase 2: CD-2A	Various degrees of completion	(Phase 2 *Complete 2016*)
	Upgrades to Pit Manufacturing Capability at Tech Area 55	Annual funding	Not formally implementing critical decision process	Various degrees of completion	Work ongoing
	Radioactive Liquid Waste Treatment Facility Upgrade Project	Under Review	CD-1	99% Preliminary Design	On Hold ***(Operational to be determined)***
	Transuranic Waste Facility Project	71-124	CD-1	Phase A: 35% Phase B: 5%	**(*Operational 2015)***
Nevada National Security Site	**Device Assembly Facility -- Criticality Experiments Facility**	150	CD-3	100%	100% **(*Operational 2011*)**
Oak Ridge National Laboratory	**Building 3019 -- Uranium-233 Downblending and Disposition Project**	477	CD-2/3A	85%	**(*Operational 2014*)**
Savannah River Site	**Pit Disassembly and Conversion Project (in existing K-Area facilities)**	Under Evaluation	CD-0	95%	***(Operational being evaluated)***
	Salt Waste Processing Facility	1,340	CD-3	> 98%	35% **(*Operational 2015*)**
	Tank 48 Treatment Process Project	156-181	CD-1	35%	***(Operational 2016)***
	Waste Solidification Building	345	CD-2/3	100%	42% ***(Operational 2013)***
Y-12 National Security Complex	**Uranium Processing Facility**	1,400-3,500	CD-1	48%	***(Operational 2018)***

Exhibit B. The Board's Legislative Mandate

The Board's specific duties and responsibilities are delineated in its enabling statute, 42 U.S.C. § 2286, *et. seq.*, which states:

- The Board shall review and evaluate the content and implementation of the standards relating to the design, construction, operation, and decommissioning of defense nuclear facilities of the Department of Energy (including all applicable Department of Energy orders, regulations, and requirements) at each Department of Energy defense nuclear facility. The Board shall recommend to the Secretary of Energy those specific measures that should be adopted to ensure that public health and safety are adequately protected. The Board shall include in its recommendations necessary changes in the content and implementation of such standards, as well as matters on which additional data or additional research is needed.

- The Board shall investigate any event or practice at a Department of Energy defense nuclear facility which the Board determines has adversely affected, or may adversely affect, public health and safety.

- The Board shall have access to and may systematically analyze design and operational data, including safety analysis reports, from any Department of Energy defense nuclear facility.

- The Board shall review the design of a new Department of Energy defense nuclear facility before construction of such facility begins and shall recommend to the Secretary, within a reasonable time, such modifications of the design as the Board considers necessary to ensure adequate protection of public health and safety. During the construction of any such facility, the Board shall periodically review and monitor the construction and shall submit to the Secretary, within a reasonable time, such recommendations relating to the construction of that facility as the Board considers necessary to ensure adequate protection of public health and safety. An action of the Board, or a failure to act, under this paragraph may not delay or prevent the Secretary of Energy from carrying out the construction of such a facility.

- The Board shall make such recommendations to the Secretary of Energy with respect to Department of Energy defense nuclear facilities, including operations of such facilities, standards, and research needs, as the Board determines are necessary to ensure adequate protection of public health and safety. In making its recommendations, the Board shall consider the technical and economic feasibility of implementing the recommended measures.

Annual Performance Budgeting Objectives for Fiscal Year 2012

The Defense Nuclear Facilities Safety Board (Board) is an independent, Executive Branch federal agency charged by statute with providing technical safety oversight of the Department of Energy's (DOE) defense nuclear facilities and activities in order to protect the health and safety of the public and the workers.

The Board's Strategic Plan presents the four Technical Nuclear Safety Oversight performance goals, summarized below, from which annual performance objectives are derived.

1. **Safe Nuclear Weapon Operations:** DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of the health and safety of the public, the workers, and the environment.

2. **Safe Processing and Stabilization of Nuclear Material:** The processing, stabilization, and disposition of DOE's defense nuclear materials and facilities are performed in a manner that ensures adequate protection of the health and safety of the public, the workers, and the environment.

3. **Safety in Nuclear Facilities Design and Infrastructure:** DOE's new defense nuclear facilities and major modifications to existing facilities are designed and constructed in a manner that ensures adequate protection of the health and safety of the public, the workers, and the environment.

4. **Effective Nuclear Safety Programs and Analysis:** DOE Regulations, requirements, and guidance are developed, implemented, and maintained; and safety programs at defense nuclear facilities are established and implemented as necessary to adequately protect the health and safety of the public, the workers, and the environment.

In order to properly support and manage its technical nuclear safety oversight mission, the Board has identified a fifth goal that supports the other strategic goals.

5. **Management Excellence:** Management excellence in support of the Board's mission.

Each of these five performance goals is reviewed in the sections that follow.

To facilitate strategic management, the Board has organized its technical staff into four groups. The Group Lead of each group is assigned responsibility for one of the four technical performance goals in the strategic plan, and for executing the performance objectives associated with that goal. As required by Office of Management and Budget guidance governing compliance with the Government Performance and Results Act of 1993, the Board has produced measurable performance goals for FY 2012 that, when executed, will demonstrate continued progress toward the Board's goals. These annual performance objectives and measures establish projected levels of performance and reflect the nature of the Board's independent oversight function.

The Board's objectives as outlined in its strategic plan address multi-year efforts and encompass a broad spectrum of technical areas relevant to the safety of DOE's defense nuclear mission. This submission includes the Board's *Annual Performance Plan for FY 2012*, which identifies annual performance objectives that consist of technical issues to be evaluated in support of the Board's strategic plan, and the identification of specific candidate topics for these reviews. An outcome measure for each objective is described as part of the discussion of each annual performance goal. Assessments of the outcome associated with each annual performance goal are provided in the Board's annual performance reports.

The Board measures progress toward achieving each annual technical performance goal in three stages by evaluating:

- DOE's acknowledgment that a safety enhancement is needed after the Board communicates the results of its technical reviews;

- DOE's subsequent development of appropriate corrective actions to resolve the Board-identified safety issue; and

- DOE's implementation of the necessary corrective actions, leading to the successful resolution of the safety issue and resulting in improved protection of the public, the workers, and the environment.

The basis of measurement for the qualitative assessment includes formal correspondence from DOE and its contractors, the Board's correspondence, reports from the Board's staff, public testimony by DOE and contractor personnel, and other sources. Past reporting (see the Board's Annual Reports to Congress) of Board-identified issues and associated DOE responses demonstrates that the Board has a sustained, clear, and substantial positive impact on the safety of DOE's defense nuclear activities.

Because of the variability of DOE's plans and schedules, some candidate areas identified in the Board's annual performance plan may not be addressed during a performance period. However, the Board's annual performance report will document that an equivalent level of effort was expended in support of the strategic objective, and describe the alternative area that was selected for review.

To facilitate an integrated review, the tables in the four technical performance goals that follow are formatted to show the flow-through from the general objective set forth in the Board's Strategic Plan to the specific Annual Performance Objectives for FY 2011 and FY 2012. To place this planning information in context, the performance goals are followed by examples of the Board's accomplishments during the years FY 2007 through FY 2012, as required by OMB's instructions on preparing and submitting a performance budget. Accomplishments are not included for the fifth strategic goal as it is newly established. (Note: the updated strategic plan slightly revised the titles and outcomes of the four technical program goals which are used for the FY 2012 performance objectives; the former titles and outcomes are used for the FY 2007 through FY 2010 performance accomplishments. For example, Performance Goal 1 "Nuclear Weapon Operations" was changed to "Safe Nuclear Weapons Operations.")

A comprehensive assessment of progress during Calendar Year (CY) 2009 appears in the Board's *Twentieth Annual Report to Congress*. The Board's annual performance reports are available for review on the Internet at www.dnfsb.gov under the *Public Documents/Reports to Congress* search headings.

5. PERFORMANCE GOAL 1:
SAFE NUCLEAR WEAPONS OPERATIONS

DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of the health and safety of the public, the workers and the environment.

OUTCOME: DOE will have acknowledged, acted upon, and/or resolved the health and safety issues raised by the Board, and the facilities are operated to approved safety standards, rules, orders, and directives. Follow-up technical evaluation of DOE's nuclear stockpile activities will verify necessary improvements in safety.

SUMMARY:

Focused oversight of nuclear weapon activities at the Pantex Plant, in response to stockpile reduction initiatives, life extension programs, and stockpile surveillance requirements, will continue to be a major priority for the Board in FY 2012. Ongoing programmatic operation of aged facilities at the Y-12 National Security Complex (Y-12), in parallel with preparations to construct and transition into modern facilities, will likewise present the need for significant safety oversight activities by the Board. The relocation of hazardous missions to the Nevada National Security Site (NNSS), which was called the Nevada Test Site (NTS) until August 2010, will also be a focus area for the Board's safety oversight. Key areas of safety oversight for the Board in FY 2012 will include:

- *Nuclear Explosive Operations*—DOE's efforts to maintain an increased operational tempo at Pantex are expected to continue, due to life extension programs for aging weapon systems and dismantlement of weapons retired as the nuclear weapons stockpile is reduced. DOE has completed implementation of "safety by design" re-engineering known as Seamless Safety for the 21st Century (SS-21) for proposed B53 dismantlement operations and W84 operations at Pantex and is expected to complete implementation for B83 disassembly and inspection operations.

- *Y-12 Modernization*—The Board will need to carefully evaluate continued programmatic operations at Y-12, particularly the need for upgrades to preserve safety in aging facilities that are overdue for replacement. Safety oversight is also needed for activities required to transition to new facilities (e.g., processing and packaging materials for transfer to the new Highly Enriched Uranium Materials Facility).

- *Nevada National Security Site Nuclear Activities*—Significant work remains to be done for DOE to develop a capability at NNSS to disposition a damaged nuclear weapon or improvised nuclear device. In addition, further subcritical experiments are expected to be conducted at NNSS in support of nuclear weapon programs. Finally, the Nation's single capability to perform nuclear criticality experiments has moved from Los Alamos National Laboratory (LANL) to NNSS. The Board will be required to assess the safety of criticality operations and experiments at NNSS in FY 2012.

- *Safety Upgrades at the National Laboratories*—Safety-related events in FY 2005 led to the shutdown of nonessential activities at LANL, and operations at the Lawrence Livermore National Laboratory (LLNL) Plutonium Facility later were curtailed based on assessments of its safety programs. Similarly, reviews by the Board at the Sandia National Laboratories (SNL) found deficiencies in the authorization bases and safety programs for its nuclear facilities. Progress is being made, but resolution of the underlying safety-related deficiencies still requires years of effort by DOE, and the safety of operations at the laboratories and will require continued Board oversight. In particular, significant improvements in safety analysis and safety-related structures, systems, and components are needed at LANL to implement the Board's Recommendation 2009-2, *Los Alamos National Laboratory Plutonium Facility Seismic Safety*.

Performance Goal 1	**Safe Nuclear Weapons Operations.** DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of the health and safety of the public, the workers, and the environment.

FY 2012 Performance Objectives

The Board and its staff will verify the safety of DOE's defense nuclear facilities and activities relating to the maintenance, storage, and dismantlement of the nuclear weapon stockpile, quality assurance of the stockpile, as well as its associated research and development, and the capability to test nuclear weapons and disposition damaged or improvised nuclear devices (such as a terrorist device).

The Board and its staff will conduct assessments of DOE's efforts to develop and implement safety management systems for stockpile management activities. The Board's evaluations will be split between DOE's efforts to develop safety systems (e.g., system and process designs, safety bases, control schemes, and administrative programs) and DOE's efforts to implement safety management systems. These reviews will focus on activities at the Pantex Plant, Y-12 National Security Complex (Y-12), Savannah River Site (SRS) tritium facilities, Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), Sandia National Laboratories (SNL), and the Nevada National Security Site (NNSS).

Representative areas for Board and staff review include:

- Development, implementation, and refinement of site-wide and facility-specific safety analyses and controls for nuclear facilities and activities (e.g., safety analysis reports and annual updates developed per 10 CFR 830).
- Weapon-specific safety analyses and controls identification and implementation for nuclear weapon activities (e.g., B53, W76, W84, and W88).
- Nuclear explosive operations at Pantex (e.g., conduct of operations, procedures, lightning protection, electrostatic discharge controls), and adequacy of the Nuclear Explosive Safety Study process.
- Laboratory support of nuclear explosive operations at Pantex (e.g., sensitivity testing of high explosives, electrostatic discharge and lightning protection studies, and weapon response evaluation and documentation).
- Cross-cutting functional areas at Pantex, Y-12, NNSS, LANL, LLNL, SNL, or SRS tritium facilities (e.g., legacy material disposition, nuclear criticality safety, fire protection, nuclear explosive safety, seismic design, conduct of operations, work planning, training and qualification, maintenance, and configuration management).
- Special studies of unique or significant hazards at DOE's nuclear facilities (e.g., classified projects, process technology alternatives, and disposition of special items and by-product materials).
- Modernization plans and infrastructure upgrades at Y-12.
- Uranium chemical processing and component assembly/disassembly operations at Y-12 (e.g., conduct of operations, criticality safety, and fire protection).
- Plutonium pit manufacturing and certification at LANL.
- Corrective actions to strengthen institutional safety programs and infrastructure at LANL, LLNL, and SNL including reviews of the adequacy of vital safety system assessments and the implementation of conduct of operations and engineering at various LANL facilities.
- Readiness to dispose of damaged nuclear weapons or improvised nuclear devices at NNSS.
- Subcritical experiments at NNSS.

- Nuclear explosive operations at the Device Assembly Facility at NNSS
- Operation of the Criticality Experiments Facility at NNSS.
- Implementation of Recommendation 2009-2, *Los Alamos National Laboratory Plutonium Facility Seismic Safety.*

While performing its reviews, the staff will assess the effectiveness of integrated safety management implementation and the safety controls identified for ongoing operations as well as any new weapon system surveillance, life extension, or dismantlement projects at Pantex, Y-12, or NNSS that start in FY 2012.

Performance Goal 1	**Nuclear Weapon Operations.** DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of health and safety of the workers and the public.

FY 2010 Performance Accomplishments

Continued Operation of the LANL Chemistry and Metallurgy Research Facility. In letters dated October 23, 2007, and May 16, 2008, the Board questioned DOE's decision to operate the 55-year-old Chemistry and Metallurgy Research facility an estimated six years past the previously planned shutdown date of 2010. Given the age, material condition, nuclear material inventory, and seismic fragility of the facility, the Board encouraged DOE to assess these risks promptly and evaluate alternative means of accomplishing programmatic requirements. In May 2009, the Board reviewed LANL's proposed safety basis for operations beyond 2010, identified inconsistent or inadequate assumptions in the safety analysis, and pointed out opportunities to improve safety by reducing the radioactive material at risk. LANL is revising the proposed safety basis. The Board reviewed an updated version of the safety basis in August 2010 and is preparing a response at this time.

Integrated Nuclear Planning. The Board identified that DOE had not demonstrated formal mechanisms to ensure that design requirements and interfaces for pit manufacturing at LANL were appropriately managed and controlled across the suite of projects that contribute to the future plutonium processing infrastructure. In response, DOE developed an Integrated Nuclear Planning process to improve coordination among its projects as national security mission requirements are refined. The Board has participated in three Integrated Nuclear Planning workshops this fiscal year and believes the process is effective.

Transuranic Waste Operations at LANL. In a letter dated January 18, 2007, the Board urged NNSA to promptly develop a viable pathway for shipping high-activity transuranic waste drums from LANL to the Waste Isolation Pilot Plant for disposal. In response, DOE has bolstered waste disposition work at LANL by facility infrastructure upgrades, new safety basis documents, and training and qualification of operators. By April 2008, NNSA had remediated all of the high-activity drums then available for processing. LANL continues to accelerate offsite shipment of transuranic waste in an effort to comply with a Consent Order agreement with the state of New Mexico that mandates closure of the current LANL transuranic waste site by 2015.

Nuclear Criticality Safety at LANL. In a September 10, 2007, letter to NNSA, the Board expressed concern that a software tool (MASS) was being relied upon by operators as a control to ensure compliance with criticality safety limits without appropriate Software Quality Assurance. Overall, the actions that were taken by LANL in response resulted in a strengthened safety posture, and the schedule for bringing the nuclear criticality safety program into full compliance with industry standards and DOE directives appears acceptable. LANL began implementing a new software tool (MARTracker) in FY 2010. LANL has experienced twelve criticality safety infractions thus far in FY 2010, up from eight in FY 2009.

LANL Plutonium Facility Confinement Ventilation. The decade-old safety basis for the Plutonium Facility credited a passive confinement strategy instead of active confinement ventilation as a safety-class control to protect the public from postulated accidents. As part of DOE's implementation plan for the Board's Recommendation 2004-2, NNSA and its contractor evaluated the facility's confinement strategy in parallel with an effort to develop a new safety basis for the facility. In its June 16, 2009, report to the Board, NNSA asserted that some modifications identified as needed in the confinement ventilation evaluation may not be needed to meet the overall safety strategy and goals under the final approved documented safety analysis. The NNSA response contained inconsistencies regarding the course of action to address the scenario of a seismic event followed by a fire, and the revised safety basis approved by NNSA accepted accident consequences that far exceeded the applicable evaluation guidelines for dose to the public. As a result, the Board issued Recommendation 2009-2, *Los Alamos National Laboratory Plutonium Facility Seismic Safety*, on October 26, 2009, to which DOE responded with an Implementation Plan on July 13, 2010. The Board is closely following the implementation of near-term improvements in the facility's safety posture and NNSA's development of a strategy for long-term improvements in the facility's safety systems.

LANL Plutonium Facility Vault Water Bath. The Board identified issues with the storage of plutonium-238 materials in the cooling water bath in the LANL Plutonium Facility's storage vault. Many of the containers lacked manufacturing pedigree and data on the condition of their contents and were vulnerable to rupture if cooling was

lost. In response, the laboratory developed a plan to repack or overpack all questionable containers into robust packaging by June 2010. LANL completed these operations as scheduled in June 2010, thereby eliminating a significant hazard.

LANL Weapons Engineering Tritium Facility. In October 2008, LANL ceased operations at the tritium facility due to a Technical Safety Requirement violation and problems with the pressure safety program. These issues were initially identified by a Board review in July 2007 and communicated to DOE by letter on October 16, 2007. To comply with the facility's safety basis, the laboratory made changes to the piping system, pressure relief components, and the facility's pressure safety procedures. The Board carefully tracked these changes and questioned the laboratory's plan (viewed as acceptable by the NNSA Los Alamos Site Office) to restart operations without a formal readiness review. In response to the Board's concerns, NNSA-Headquarters held discussions with its site office and the laboratory, ultimately resulting in the decision to perform formal contractor and federal Operational Readiness Reviews. LANL's approach has been to divide the return to operation into three phases. The Phase I readiness review authorizing low pressure operations was successfully completed in June 2010. The remaining phases are planned for completion later this year.

Nuclear Explosive Safety. The Board evaluated 10 Nuclear Explosive Safety (NES) studies or change evaluations conducted at Pantex, including the B53 and W84 dismantlement NES studies and the W78 Operational Safety Review.

Quality of Safety-Related Information for Nuclear Explosive Operations. The Implementation Plan for Recommendation 98-2, *Safety Management at the Pantex Plant*, addressed the need for DOE to issue further guidance on its expectations for the evaluation and documentation of weapon response to potential accident environments and stimuli. The Board and DOE agreed that the revised DOE-STD-NA-3016-2006 would include the needed requirements for these analyses. In FY 2010, the Board began a comprehensive review of the design laboratories' implementation of the standard, identifying strengths and weaknesses of the program.

Lightning and Electrostatic Discharge Protection at Pantex. The Board issued a letter on March 30, 2007, identifying work that was needed to address the hazards posed by the indirect effects of a lightning strike on Pantex facilities. DOE responded by forming the Nuclear Security Enterprise Electromagnetic Committee to analyze both lightning and electrostatic discharge (ESD) hazards. The committee is systematically addressing the Board's concerns and is improving the safety of operations at Pantex relative to lightning and ESD hazards. The Board has engaged experts in the field of lightning effects to verify DOE's analyses. In FY 2010, the Board met with the committee and presented the findings of lightning experts, verifying the DOE results and highlighting areas that needed further study and clarification.

Pantex Procedures. In 2009, the Board completed a series of onsite reviews and provided immediate feedback to Pantex on areas where improvements could be made in nuclear explosive operating procedures. On October 15, 2009, the Board issued a letter detailing shortcomings in the process for developing and implementing technical procedures at Pantex. Pantex is making improvements in the areas identified by the Board.

Processing Anomalous W76-1 Units. In June 2009, Pantex stopped processing W76-1 units due to safety concerns with an anomalous component. In a letter dated January 25, 2010, the Board detailed concerns with the failure to ensure that the safety implications of the anomalies were communicated by the design laboratory to Pantex. NNSA directed an extensive review of the event and is instituting measures to prevent such communication breakdowns.

Hazard Analysis Reports. The Board issued a letter on July 6, 2010, detailing specific issues concerning Pantex's compliance with DOE-NA-STD-3016-2006 in developing Hazard Analysis Reports and establishing sufficient controls. NNSA is working to response to the Board's issues.

Y-12 Nuclear Criticality Safety. The Board completed a review of nuclear criticality safety evaluations that found that certain evaluations failed to meet select requirements, potentially compromising the safety margin for fissionable material operations. In response to the Board's January 23, 2009, letter documenting the review, the contractor took actions to strengthen the evaluations and correct any weaknesses identified during an extent-of-condition review. The Board noted that the approach planned on the extent-of-condition reviews included only a small sampling of the active criticality safety evaluations. In response, NNSA committed to review all active

criticality safety evaluations.

Highly Enriched Uranium Materials Facility Readiness. The Board observed the NNSA Operational Readiness Review for startup of the new Highly Enriched Uranium Materials Facility. The operations will involve receipt, re-containerization, and storage of enriched uranium materials. NNSA completed packaging and moving all enriched uranium from the old warehouse to the new facility, which represents a major improvement in storage conditions.

Special Capability Glovebox Project at Y-12. The Board's review of the Special Capability Glovebox design in 2007 found no major design issues but identified questions regarding administrative controls. The Board continued its review in FY 2010 and found no issues that would impact the plan to begin operations in late calendar year 2010.

Conduct of Operations at Y-12. After several operational events, the Board urged NNSA to consider action to achieve consistent, disciplined operations. NNSA developed and began to implement corrective actions to address these issues including additional periodic training. The Board also noted that procedure use practices were inconsistent and that poor procedural compliance had been a contributor to many operational events. NNSA issued a Y-12 procedure use policy and is making progress toward reviewing all procedures authorized for use during nuclear operations for potential improvements, including identifying the appropriate use category for each procedure.

Y-12 Activity-Level Work Planning. The Board provided the results of its review of Y-12 activity-level work planning in a letter to DOE dated January 22, 2009. The Board identified several weaknesses with the planning, control, and oversight of work. In response to the Board's concerns, the contractor placed some work activities on hold until work planning problems could be resolved and corrected.

Continued Operations of the Enriched Uranium Operations Building. Due to concerns over NNSA's ability to safety operate the Enriched Uranium Operations Building for an extended period of time, the Board advocated that NNSA regularly assess the physical condition of the building in a letter dated March 13, 2007. Per the Board's request, NNSA has provided the Board with three annual reports (in March 2008, March 2009 and April 2010) that included specific actions NNSA has planned and taken to improve the safety posture of the Enriched Uranium Operations Building.

Freeze Protection Program at Y-12. In 2008 and 2009, fire suppression systems in nuclear facilities at Y-12 were compromised during periods of extended freezing weather. The Board urged NNSA to clearly define freeze protection responsibilities for operations managers of nuclear facilities and to preplan facility-specific actions to be taken during the onset of freezing weather (e.g., verifying actuation of heaters). NNSA has revised applicable site procedures to incorporate these improvements. Facility-specific plans and checklists have been developed.

LLNL Tritium Process Station Startup. On January 27, 2010, The Board issued a letter which communicated deficiencies in the safety basis of the Tritium Process Station, including weaknesses in the hazard analysis and the associated safety controls. As a result of the letter, LLNL committed to revising the hazard analysis in the annual update to the Documented Safety Analysis as well as implementing additional managerial oversight in operations.

Work Planning and Control at LLNL. The Board issued a letter on June 14, 2010, conveying concern over the activity-level work planning and control processes utilized at LLNL. The Board assessed that the laboratory guidance was vague and that the work planning process suffered as a result. Guidance issued by NNSA in 2006 concerning work-planning best practices was not being utilized by the laboratory, and the Livermore Site Office was not enforcing the guidance. NNSA is developing its response to the issues identified by the Board.

NNSS Device Assembly Facility (DAF) Fire Suppression System. In 2008, the Board determined that the DAF fire suppression had significant deficiencies that should be corrected before beginning more hazardous operations. In response, NNSA initiated a project to assess the condition of the system and analyze and prioritize needed improvements, developed improvement options, and began improvements to the system. In FY 2010, NNSA installed new debris strainers in fire suppression system piping, initiated a procurement to repair the water supply tank, initiated procurement of a standalone fire suppression unit to potentially replace or augment the suppression system, and submitted line item requests to replace the water tank and lead-in pipes.

Readiness to Dispose of a Damaged Nuclear Weapon or Improvised Device at NNSS. NNSA developed a plan for implementation of safety controls and upgrades appropriate for the scope of operations for the facility at NNSS (G tunnel) that would be used in disposition of an improvised nuclear device. As a result of the Board's interactions and discussions in FY 2010, NNSA completed tunnel ventilation improvements and began preparing for operational safety improvements.

Conduct of Operations and Configuration Management at NNSS. Previously the Board addressed concerns with the state of vital safety systems and safety management programs of nuclear facilities at NNSS, particularly at the Device Assembly Facility. In 2009 and 2010 there were numerous reports of issues with the conduct of operations and the configuration of safety systems. As a result of interactions with the Board, in FY 2010 NNSA implemented compensatory measures to improve the conduct of operations and configuration of safety systems at nuclear facilities at NNSS.

Hazard Categorization of Sandia National Laboratories Z Machine. On May 21, 2010, the Board issued a letter detailing concerns regarding the hazard categorization of the Z Machine at Sandia National Laboratories. In response, Sandia National Laboratories performed additional calculations and is planning to write a new hazard categorization position paper to justify the categorization of the Z Machine.

Auxiliary Hot Cell Facility at Sandia National Laboratories. The Board evaluated start-up activities for the Auxiliary Hot Cell Facility at Sandia National Laboratories. The facility will be used to repackage radioactive waste for shipment off-site. In response to issues identified by the Board, NNSA committed to implement additional controls to ensure adequate confinement of radiological materials. The Board will assess the implementation of these controls.

Performance Goal 1	**Nuclear Weapon Operations.** DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of health and safety of the workers and the public.

FY 2009 Performance Accomplishments

Continued Operation of the LANL Chemistry and Metallurgy Research Facility. In letters dated October 23, 2007, and May 16, 2008, the Board questioned DOE's decision to operate the 55-year-old Chemistry and Metallurgy Research facility an estimated six years past the previously planned shutdown date of 2010. Given the age, material condition, nuclear material inventory, and seismic fragility of the facility, the Board encouraged DOE to assess these risks promptly and evaluate alternative means of accomplishing programmatic requirements. In May 2009, the Board reviewed LANL's proposed safety basis for operations beyond 2010, identified inconsistent or inadequate assumptions in the safety analysis, and pointed out opportunities to improve safety by reducing the radioactive material at risk. LANL is revising the proposed safety basis.

Integrated Nuclear Planning. The Board identified that DOE had not demonstrated formal mechanisms to ensure that design requirements and interfaces for pit manufacturing at LANL were appropriately managed and controlled across the suite of projects that contribute to the future plutonium processing infrastructure. In response, DOE developed an Integrated Nuclear Planning process to improve coordination among its projects as national security mission requirements are refined. The Board has participated in four Integrated Nuclear Planning workshops this fiscal year and believes the process is effective and continues to improve.

Transuranic Waste Operations at LANL. In a letter dated January 18, 2007, the Board urged NNSA to promptly develop a viable pathway for shipping high-activity transuranic waste drums from LANL to the Waste Isolation Pilot Plant for disposal. Postulated accident scenarios involving these drums predict high consequences to the public because of their radiological loading, the proximity of the storage area to the site boundary, and the lack of robust engineered controls. In response, DOE has bolstered waste disposition work at LANL by facility infrastructure upgrades, new safety basis documents, and training and qualification of operators. By April 2008, NNSA had remediated all of the high-activity drums then available for processing. Preparations are underway to vent the remaining drums to allow processing and disposal.

Nuclear Criticality Safety at LANL. In a September 10, 2007, letter to NNSA, the Board expressed concern that a software tool (MASS) was being relied upon by operators as a control to ensure compliance with criticality safety limits without appropriate Software Quality Assurance. In response to the Board letter, NNSA committed to modifying procedures and retraining facility staff at LANL to ensure that MASS is not used to determine compliance with criticality safety limits. NNSA also stated that the Los Alamos Site Office (LASO) would review this issue during planned assessments. Overall, the actions that were taken by LANL resulted in a strengthened safety posture, and the schedule for bringing the nuclear criticality safety program into full compliance with industry standards and DOE directives appears acceptable.

LANL Plutonium Facility Confinement Ventilation. The decade-old safety basis for the Plutonium Facility credits a passive confinement strategy instead of active confinement ventilation as a safety-class control to protect the public from postulated accidents. As part of DOE's implementation plan for the Board's Recommendation 2004-2, an evaluation of the facility's confinement strategy was conducted along with a parallel effort to develop a new safety basis for the facility. The Board issued DOE a reporting requirement on January 13, 2009, to follow through on the DOE's commitment to deliver the Ventilation System Evaluation Report to the Board (originally due December 21, 2006) and provide Program Secretarial Office concurrence with and approval of the upgrades in coordination with the Central Technical Authority (originally due March 20, 2007). In its June 16, 2009, response, DOE asserted that some modifications identified as needed in the confinement ventilation evaluation may have subsequently been determined to be unnecessary to meet the overall safety strategy and goals under the final approved documented safety analysis. The DOE response contained inconsistencies regarding the course of action to address the scenario of a seismic event followed by a fire. The Board is continuing to engage DOE to ensure support for improvements to the safety posture of defense nuclear facilities is appropriate and timely.

LANL Plutonium Facility Vault Water Bath. The Board identified issues with the storage of plutonium-238 materials in the cooling water bath in the LANL Plutonium Facility's storage vault. Many of the containers lacked

manufacturing pedigree and data on the condition of their contents. In response, the laboratory developed a plan to repack or overpack all questionable containers into robust packaging by June 2010.

LANL Weapons Engineering Tritium Facility. In October 2008, LANL ceased operations at the tritium facility due to a Technical Safety Requirement violation and problems with the pressure safety program. These issues were initially identified by a Board review in July 2007 and communicated to DOE by letter on October 16, 2007. To comply with the facility's safety basis, changes were made to the piping system, pressure relief components, and the facility's pressure safety procedures. The Board carefully tracked these changes and questioned the laboratory's plan (viewed as acceptable by the NNSA Los Alamos Site Office) to restart operations without a formal readiness review. In response to the Board's concerns, NNSA-Headquarters held discussions with its site office and the laboratory, with the result that LANL developed a detailed Plan of Action for a formal contractor Readiness Assessment that will also include significant Federal oversight.

Nuclear Explosive Safety. The Board evaluated 9 Nuclear Explosive Safety (NES) studies or change evaluations conducted at Pantex, including Master Studies of Pantex Special Purpose facilities and Support Activities. In a letter dated December 12, 2008, the Board identified shortcomings in the current NES process, including the designation of findings that must be addressed before or after nuclear operations are allowed to continue or start. In response, NNSA held a workshop to discuss these shortcomings and is pursuing actions to address the Board's concerns.

Revised Nuclear Explosive Safety Directives. In response to changes in operational and organizational realities and observations communicated by the Board, DOE completed the revision and implementation of key nuclear explosive safety directives, including DOE Order 452.1C, *Nuclear Explosive and Weapon Surety Program*; DOE Order 452.2C, *Safety of Nuclear Explosive Operations*; and DOE-STD-NA-3016-2006, *Hazard Analysis Reports for Nuclear Explosive Operations*.

Quality of Safety-Related Information for Nuclear Explosive Operations. The Implementation Plan for Recommendation 98-2, *Safety Management at the Pantex Plant*, addressed the need for DOE to issue further guidance on its expectations for the evaluation and documentation of weapon response to potential accident environments and stimuli. The Board and DOE agreed that the revised DOE-STD-NA-3016-2006 would include the needed requirements for these analyses. In FY 2009, the Board reviewed the design laboratories' implementation of the standard and closed Recommendation 98-2 based on the finding that each laboratory had developed a process that would meet the standard.

Lightning and Electrostatic Discharge Protection at Pantex. The Board issued a letter on March 30, 2007, identifying that work remained to adequately address the hazards posed by the indirect effects of a lightning strike on Pantex facilities. DOE responded by forming the Nuclear Weapons Complex Electromagnetics Committee to analyze both lightning and electrostatic discharge (ESD) hazards. The Committee has begun to execute a plan to systematically address the Board's concerns and to improve the safety of operations at Pantex relative to lightning and ESD hazards. In FY 2009, the concern for concrete spalling was addressed, and testing for intrinsic bonding in nuclear explosive facilities was initiated. The Board has engaged experts in the field of lightning effects to verify DOE's analyses.

Pantex Procedures. In 2009, the Board completed a series of onsite reviews and provided immediate feedback to Pantex on areas where immediate improvements could be made in nuclear explosive operating procedures. Pantex took action to address the deficiencies identified during the reviews.

W76 Restart at Pantex. On August 8, 2008, the Board issued a letter detailing concerns with the process DOE used to authorize restarting W76 nuclear explosive operations following a safety-related work suspension. The Board reviewed the technical basis for the controls that were put in place to address the hazards that caused the work suspension and determined the controls were adequate to ensure public health and safety.

Pantex Safety Basis. In a letter dated July 30, 2007, the Board identified issues with the Pantex safety basis, including the treatment of beyond design basis accidents, the level of detail in some technical safety requirements, and a systematic lack of timeliness in declaring potential inadequacies in the safety basis. In December 2008, DOE began work to upgrade the safety basis at Pantex by reviewing all Technical Safety Requirements and recategorizing all Specific Administrative Controls to be consistent with DOE-STD-1186-2004, *Specific Administrative Controls*.

The Board is reviewing the progress of this initiative and its impact on nuclear explosive operations.

Pantex Training and Qualification. The Board conducted a review of training and qualification procedures at Pantex. The Board issued a letter on July 8, 2008, noting concerns with the DOE program for providing weapons training units sufficient to conduct high fidelity training and with the lack of design agency training for Pantex employees on specific skills critical to nuclear explosive operations. DOE developed a program to periodically review the training needs of each weapon program and incorporate provision of high fidelity trainer units into the budget. In FY 2009, Pantex completed this review on several programs.

Pantex Tooling Review. In 2009, the Board completed a review of the Pantex tooling program and provided immediate feedback on the strengths and weaknesses of the administrative procedures that govern the tooling program.

Y-12 Activity-Level Work Planning. The Board provided the results of its review of Y-12 activity-level work planning in a letter to DOE dated January 22, 2009. The Board identified several weaknesses with the planning, control, and oversight of work. In response to the Board's concerns, some activities were placed on hold until work planning problems could be resolved and corrected.

Y-12 Nuclear Criticality Safety. The Board completed a review of nuclear criticality safety evaluations that found that certain evaluations failed to meet select requirements, potentially compromising the safety margin for fissionable material operations. In response to the Board's January 23, 2009 letter documenting the review, evaluations were strengthened and weaknesses identified during an extent of conditions review were corrected.

Special Capability Glovebox Project at Y-12. The Board's review of the Special Capability Glovebox design in 2007 found no major design issues but identified questions regarding administrative controls. The Board continued its review in FY 2009 and found no issues that would impact the plan to begin operations in FY 2010.

Conduct of Operations at Y-12. After several operational events, the Board urged NNSA to consider action to achieve consistent, disciplined operations. NNSA developed and began to implement corrective actions to address these issues including additional periodic training. The Board also noted that procedure use practices were inconsistent and that poor procedural compliance had been a contributor to many operational events. NNSA issued a Y-12 procedure use policy and began a campaign to review all procedures authorized for use during nuclear operations for potential improvements, including identifying the appropriate use category for each procedure.

Continued Operations of the Enriched Uranium Operations Building. Due to concerns over NNSA's ability to safety operate the Enriched Uranium Operations Building for an extended period of time, the Board advocated that NNSA regularly assess the physical condition of the building in a letter dated March 13, 2007. Per the Board's request, NNSA has provided the Board with two annual reports (in March 2008 and March 2009) that included specific actions NNSA has planned and taken to improve the safety posture of the Enriched Uranium Operations Building.

Work Planning and Control at LLNL. As part of the implementation plan for the Board's Recommendation 2004-1, *Oversight of Complex, High-Hazards Operations*, DOE promulgated a document in 2006 that provided the attributes and best practices of a successful work planning and control process. LLNL recently issued revised work planning processes for the laboratory as a whole and the Nuclear Materials Technology Program nuclear facilities. These processes were developed to meet the guidance document.

NNSS Device Assembly Facility (DAF) Fire Suppression System. In 2008, the Board determined that DAF had significant weaknesses in the fire suppression system, weaknesses that should be corrected before beginning more hazardous operations. In response, NNSA initiated an improvement project for the fire suppression system to assess the condition of the system, analyze and prioritize needed improvements, and plan to improve the system. In FY 2009, NNSA evaluated the results of the condition assessment, developed improvement options, presented a path forward, and began improvements to the system.

Readiness to Dispose of a Damaged Nuclear Weapon or Improvised Device at NNSS. NNSA is developing a plan for implementation of safety controls and upgrades appropriate for the scope of operations for the facility at NNSS (G tunnel) that would be used in disposition of an improvised nuclear device. The Board expects the new plan to be available in 2010. As a result of the Board's interactions and discussions in FY 2009, NNSA continued to complete some facility improvements and implement the results of the cost/risk benefit analysis of proposed controls and improvements. FY 2009 improvements have focused on significant occupational safety issues, e.g., tunnel ventilation.

Criticality Experiments in DAF. NNSA has been preparing for Criticality Experiment Facility operations at the Device Assembly Facility. Previously the Board has reviewed and commented on the design for facility modifications and modification of the critical assembly machines. In FY 2009, the Board reviewed construction activities and the re-build and testing of the four machines. The Board will evaluate startup activities in 2010.

Performance Goal 1	**Nuclear Weapon Operations.** DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of health and safety of the workers and the public.

FY 2008 Performance Accomplishments

Nuclear Explosive Safety. The Board evaluated 10 Nuclear Explosive Safety (NES) studies, operational safety reviews, or change evaluations conducted at Pantex, including Master Studies of Pantex onsite transportation and staging and Special Purpose facilities. The Board noted technical and administrative areas of concern regarding the process used in conducting NES activities that if addressed will increase the value of the NES study in consistently ensuring nuclear explosive safety.

Revised Nuclear Explosive Safety Directives. In response to changes in operational and organizational realities and observations communicated by the Board, DOE is revising key nuclear explosive safety directives, including DOE Order 452.1C, *Nuclear Explosive and Weapon Surety Program*; DOE Order 452.2C, *Safety of Nuclear Explosive Operations*; and DOE-STD-NA-3016-2006, *Hazard Analysis Reports for Nuclear Explosive Operations*.

Quality of Safety-Related Information for Nuclear Explosive Operations. The Implementation Plan for Recommendation 98-2, *Safety Management at the Pantex Plant*, addresses the need for DOE to issue further guidance on its expectations for the evaluation and documentation of weapon response to potential accident environments and stimuli. The Board and DOE agreed that the revised DOE-STD-NA-3016-2006 would include the needed requirements for these analyses. In FY 2007, the Board issued a letter requesting that DOE provide a schedule for implementing these requirements at the weapon design laboratories and the criteria to be used to verify implementation. In FY 2008, DOE evaluated implementation of these requirements at the laboratories and requested significant improvements. The laboratories have now revised their procedures.

Lightning and Electrostatic Discharge Protection at Pantex. The Board issued a letter on March 30, 2007, identifying that work remains to adequately address the hazards posed by the indirect effects of a lightning strike on Pantex facilities. DOE has responded by forming the Nuclear Weapons Complex Electromagnetics Committee to analyze both lightning and electrostatic discharge (ESD) hazards. The Committee has prepared a plan to systematically address the Board's concerns and to improve the safety of operations at Pantex relative to lightning and ESD hazards. The Board has engaged experts in the field of lightning effects to verify DOE's analyses. The Board also evaluated the modeling of ESD environments at Pantex as well as the development and implementation of effective ESD controls for tooling and facilities for nuclear explosive operations.

Pantex Procedures. In a letter dated April 23, 2007, the Board provided recent examples of inadequacies in technical procedures and noted that improvements are needed in the processes for development, review, validation, and configuration management for procedures at Pantex. In 2008, Board conducted two onsite reviews of procedures and provided immediate feedback to Pantex in an effort to improve nuclear explosive operating procedures.

Pantex Safety Basis. In a letter dated July 30, 2007, the Board identified issues with the Pantex safety basis, including the treatment of beyond design basis accidents, the level of detail in some technical safety requirements, and a systematic lack of timeliness in declaring potential inadequacies in the safety basis. The Board also noted in its letter that DOE has lost configuration control of the safety basis. In response, Pantex developed and implemented a plan to update its safety basis, incorporating outstanding changes and reestablishing configuration control. Pantex also initiated an effort to assess the risk of beyond design basis accidents and evaluate needed controls.

W76 Restart at Pantex. On August 8, 2008, the Board issued a letter detailing concerns with the process DOE used to authorize restarting W76 nuclear explosive operations following a safety-related work suspension. The Board was concerned with the process used to develop the technical basis for new controls and the administrative controls for new operations. DOE responded to the concerns raised in the Board's letter and issued a clear plan for controlling W76 operations as they were restarted. DOE committed to review all similar operations for the hazards that caused the work suspension on the W76.

B53 Dismantlement Planning. On March 20, 2008, the Board issued a letter to DOE raising the issue that the Pantex contractor's planned process for dismantlement of B53 weapons departed from the established conservative practice of performing operations involving uncased conventional high explosives only in nuclear explosive cell facilities, which provide enhanced mitigation of high explosive violent reactions. The Board's letter requested an evaluation of the relative safety risks of alternative processes that could be used for B53 dismantlement. Subsequently, the Pantex contractor determined that it was feasible to perform this work in a cell facility and evaluated the relative risks of several approaches to B53 dismantlement. The contractor's planning now involves performing operations involving uncased conventional high explosives in a cell facility.

Pantex Training and Qualification. The Board conducted a review of training and qualification procedures at Pantex. The Board issued a letter on July 8, 2008, noting concerns with the DOE program for providing weapons training units sufficient to conduct high fidelity training and with the lack of design agency training for Pantex employees on specific weapon critical skills. DOE is taking action to address these shortcomings in its weapon training.

Degradation of 9212 Complex at Y-12. The Board has continued its evaluation of DOE's ability to safely operate the 60-year-old 9212 Complex at Y-12. In response to the concerns raised in the Board's letter of March 13, 2007, DOE completed its first annual assessment of the safety of continued operations of the 9212 Complex, and has committed to develop a plan to accomplish essential facility improvements necessary to ensure safe operation until completion of the planned replacement facility, the Uranium Processing Facility.

Vital Safety Systems at Y-12. The Board reviewed the design, condition, maintenance, and functionality of a sampling of vital safety systems at Y-12. The Board found that in general the systems could meet their safety functions; however, there were some minor deficiencies in design calculations and maintenance procedures that the Board communicated to DOE.

Y-12 Technology Development. The Board reviewed the development of selected technologies intended for insertion into existing facilities and the planned Uranium Processing Facility. The Board did not find any major safety hazards with these technologies given their current level of development, but identified the need to include evaluation criteria related to safety earlier in the technology development process. Y-12 project personnel informed the Board that the Technology Readiness Level process used to evaluate new technologies at Y-12 would be modified to include safety explicitly at an earlier level of development.

C**onduct of Operations at Y-12.** Following several operational events, the Board urged DOE to consider action to achieve consistent, disciplined operations. DOE developed and began to implement corrective actions to address these issues including additional periodic training. The Board also noted that procedure use practices are inconsistent and that poor procedural compliance has been a contributor to many operational events. DOE committed to evaluating procedure usage and identifying areas for improvement.

Uranium Holdup Survey Program at Y-12. The Board continued its review of the Inadvertent Accumulation Prevention Program (IAPP) and implementation of corrective actions for the IAPP and Uranium Holdup Survey Program, which play key roles in prevention of inadvertent nuclear criticality events. Although DOE has identified actions for individual measurement points, implementation of those actions will take more time, and a completion date has not been determined.

Special Capability Glovebox Project at Y-12. The Board's review of the Special Capability Glovebox design in late 2007 found no major design issues but did identify questions regarding administrative controls which DOE will revisit in early 2009 as a part of prestart readiness reviews.

Readiness to Dispose of a Damaged Nuclear Weapon or Improvised Device at NNSS. As a result of the Board's interactions and follow-up discussions in FY 2008, DOE completed some facility improvements, completed a cost/risk benefit analysis of proposed controls and improvements, and is developing a plan for implementation of safety controls and upgrades appropriate for the scope of operations for the facility at NNSS (G tunnel) that would be used in disposition of an improvised nuclear device. The Board expects the new plan to be available in 2009.

Safety Improvements at LANL. In a letter dated February 1, 2007, the Board highlighted key areas requiring action to substantially improve the laboratory's safety posture. The Board held a public hearing in Los Alamos, New Mexico, on December 5, 2007, to assess the progress made in these areas. Testimony from DOE and the Board's staff revealed that progress had been made in some areas:

- *Strengthening federal safety oversight*—DOE filled several critical oversight positions at the Los Alamos Site Office and is working to reestablish traditional safety oversight processes. DOE recognizes that significant challenges remain to strengthen federal oversight of nuclear safety at LANL.

- *Developing effective institutional safety programs*—Manuals and plans to strengthen key safety programs have been issued; however, progress toward implementation is slow.

- *Improving safety bases and ensuring the efficacy of safety systems*—While some nuclear facility safety bases were updated and implemented this year, many other nuclear facilities are operating with outdated safety bases up to 12 years old. The laboratory continues to struggle to put in place the configuration management and other engineering, maintenance, and operational elements necessary to assure safety systems will perform their credited safety functions.

- *Eliminating known hazards*—DOE has made some progress in disposing of high-activity transuranic waste drums as well as plutonium-238 and other actinide residues, but more work is needed to complete chemical stabilization of actinide residues and achieve timely disposition of the remaining transuranic waste inventory.

- *Increasing federal management of new projects*—DOE has enhanced federal oversight of the Chemistry and Metallurgy Research Building Replacement project. This project and several others are essential to the expanded mission that DOE envisions for LANL. More needs to be done to strengthen the federal oversight for the other projects essential to this expanded mission.

Continued Operation of the Chemistry and Metallurgy Research Facility. In letters dated October 23, 2007, and May 16, 2008, the Board questioned DOE's decision to operate the 55-year-old Chemistry and Metallurgy Research facility an estimated six years past the previously planned shutdown date of 2010. Continued operation of this facility in its current condition poses risks to workers and the public that have not been comprehensively evaluated since 1998. Given the age, material condition, nuclear material inventory, and seismic fragility of the facility, the Board encouraged DOE to assess these risks promptly and evaluate alternative means of accomplishing programmatic requirements. In response, DOE has committed to provide a safety rationale for continuing operations to the Board by October 2008.

Integrated Nuclear Planning. The Board identified that DOE had not demonstrated formal mechanisms to ensure that design requirements and interfaces for pit manufacturing at LANL were appropriately managed and controlled across the suite of projects that contribute to the future plutonium processing infrastructure. In response, DOE has developed an Integrated Nuclear Planning process to improve coordination among its projects as national security mission requirements are refined. While this process is immature, it should help ensure better integration of the projects and facilities that provide the required support infrastructure, with benefits for both safety and program success.

Transuranic Waste Operations at LANL. In a letter dated January 18, 2007, the Board urged NNSA to promptly develop a viable pathway for shipping high-activity transuranic waste drums to the Waste Isolation Pilot Plant for disposal. Postulated accident scenarios involving these drums predict high consequences because of their radiological loading, the proximity of the storage area to the site boundary, and the lack of robust engineered controls. In response, DOE has bolstered waste disposition work at LANL by facility infrastructure upgrades, new safety basis documents, and training and qualification of operators. By April 2008, NNSA had remediated all of the high-activity drums available for processing. Preparations are underway for venting operations on the remaining drums to allow processing and disposal.

Nuclear Criticality Safety at LANL. The Board has provided safety oversight of the laboratory's attempt to develop a standards-based nuclear criticality safety program. During 2007, the Board assessed operations in the Plutonium Facility's vault for special nuclear materials and issued a letter on September 10, 2007, expressing

concern over the laboratory's Materials Accountability and Safeguards System software and the criticality safety documentation for the vault. Subsequent to these questions, the laboratory determined the adequacy of some criticality safety evaluations to be in doubt. As a result, fissile material operations were paused until limits were reviewed and confirmed to be defensible.

LANL Plutonium Facility Confinement Ventilation. The decade-old safety basis for the Plutonium Facility credits a passive confinement strategy instead of active confinement ventilation as a safety-class control to protect the public from postulated accidents. As part of DOE's implementation plan for Recommendation 2004-2, an evaluation of the facility's confinement strategy was completed in parallel with a separate effort to develop a new safety basis for the facility. Unfortunately, the proposed safety basis upgrade continues to rely on a passive confinement strategy. DOE is currently evaluating a list of upgrades that would ultimately bring portions of the ventilation system up to safety-class status.

Documented Safety Analysis for the LANL Plutonium Facility. On May 30, 2008, the Board issued a letter identifying concerns regarding the lack of pedigree for software used by LANL to develop safety basis documents at the Plutonium Facility. This issue was the result of a site-wide failure to ensure compliance with software quality provisions of 10 CFR 830 Subpart A and DOE Order 414.1C, *Quality Assurance*. LANL responded quickly to this deficiency and revised internal procedures to apply appropriate quality assurance measures to such software.

Transition of Contract Management at LLNL. On October 1, 2007, Lawrence Livermore National Security assumed management responsibility for operations at LLNL. The Board evaluated the nuclear and radiological safety-related directives and standards contained in the new contract and the organizational restructuring of the nuclear facilities and found no issues. In particular, DOE Standard 1098, *Radiological Control Standard*, absent from the previous contract, is contained in the current contract.

Updated Documented Safety Analysis (DSA) for the Plutonium Facility at LLNL. The Board reviewed the recently submitted first annual update to the DSA for the Plutonium Facility at LLNL. The first annual update for the Plutonium Facility was delayed one year to complete implementation of the DSA approved in April 2006. The Board found the updated DSA was an improvement from the previously implemented DSA.

Work Planning and Control at LLNL. As part of the implementation plan for the Board's Recommendation 2004-1, *Oversight of Complex, High-Hazards Operations*, DOE promulgated a document in 2006 that provided the attributes and best practices of a successful work planning and control process. In a recent review, the Board noted that the LLNL contractor and the Livermore Site Office had little knowledge of the DOE attributes and best practices document. The Board also noted deficiencies with the work planning and control process and ongoing efforts at LLNL to improve and institutionalize the process across the site. The Board encouraged the current efforts to improve and standardize the process.

Recommendation 2005-1. The Board issued Recommendation 2005-1, *Nuclear Material Packaging*, to increase protection for workers involved in the storage and handling of nuclear materials. In 2007, the Board worked to ensure that DOE developed a technically justified packaging manual as part of the recommendation's implementation. In March 2008, after making improvements suggested by the Board, DOE issued DOE Manual 441.1-1, *Nuclear Material Packaging Manual*. The DOE sites are currently developing repackaging schedules in support of sending the final complex-wide implementation schedule to the Board.

Performance Goal 1	**Nuclear Weapon Operations.** DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of health and safety of the workers and the public.

FY 2007 Performance Accomplishments

Nuclear Explosive Safety. In response to a commitment made to the Board in 2005, DOE conducted a comprehensive "Top-Down Review" of its nuclear explosive safety directives. On November 2, 2006, DOE issued a corrective action plan to implement selected recommendations from the Top-Down Review. Since that time, many of these commitments have been completed; execution will continue in FY 2008.

Quality of Safety-Related Information for Pantex. The Implementation Plan for Recommendation 98-2, *Safety Management at the Pantex Plant*, addresses the need for DOE to issue further guidance on its expectations for the evaluation and documentation of weapon response to potential accident environments and stimuli. The Board issued letters on December 15, 2006, and May 10, 2007, requesting DOE's expectations for the review, approval, and implementation of the expert elicitation, expert judgment, and peer review processes that are key to improving the quality and consistency of safety-related information provided to Pantex by the design agencies. In response to the Board's letters, DOE held a workshop on July 16, 2007, to clarify its expectation that the design agencies develop these processes by the end of FY 2007. DOE is in the process of developing criteria for review and approval of these processes.

Conduct of Operations at Pantex. The Board issued a letter in May 2005 identifying deficiencies in the conduct of nuclear explosive operations at Pantex. In a March 2006 letter, the Board re-emphasized the importance of a consistently high degree of formality in the conduct of nuclear explosive operations. After a follow-up review in FY 2007, the Board noted slow but continued improvement. However, the Board observed that staffing levels for the personnel responsible for the oversight of nuclear explosive operations had dropped dramatically. The Board also observed a lack of consistency in the formality of operations. Since the review, the operating contractor has increased its oversight personnel and is continuing to seek personnel to increase its oversight staffing to an acceptable level.

Lightning Protection at Pantex. The Board issued a letter on March 30, 2007, identifying that work remains to adequately address the hazards posed by the indirect effects of a lightning strike on Pantex facilities. DOE has responded by forming the Nuclear Weapons Complex Lightning Committee to analyze these hazards.

Pantex Procedures. In a letter dated April 23, 2007, the Board provided recent examples of inadequacies in technical procedures and noted that improvements are needed in the processes for development, review, validation, and configuration management for procedures at Pantex. The Board requested that DOE identify the specific measures it plans to take to improve the quality of technical procedures at Pantex. In response, DOE is taking specific measures to improve the flowdown of safety-related requirements into procedures, the procedure validation process, and the level of detail in technical procedures.

Pantex Safety Basis. In a letter dated July 30, 2007, the Board identified several issues with the Pantex safety basis. Issues included the treatment of beyond design basis accidents, the level of detail in some technical safety requirements, and a systematic lack of timeliness in declaring potential inadequacies in the safety basis. The Board also noted in its letter that DOE has lost configuration control of its safety basis. DOE recognizes the loss of configuration control of its safety basis and has developed a project plan to remedy the problem. DOE is also addressing the other issues identified by the Board.

W76-1 Start-up Activities at Pantex. In a letter dated July 16, 2007, the Board expressed concern regarding DOE's willingness to deviate from DOE requirements and typical good practices in response to growing production demands. Specifically, the readiness activities for W76-1 operations could not be performed with the expected level of rigor in the time frame specified by DOE. The Board identified in its letter that both the Nuclear Explosive Safety Study and the contractor readiness assessment for W76-1 assembly operations were conducted without an approved safety basis in place. DOE has responded to the concerns raised in the Board's letter by ensuring that the contractor Readiness Assessment and the Nuclear Explosive Safety Study for upcoming W80 operations are conducted with an approved safety basis in place.

Electrostatic Discharge at Pantex. The Board evaluated efforts by DOE and the weapons design agencies to characterize potential electrostatic discharge effects during nuclear explosive operations and the response of sensitive components to them. To date, a generally conservative response to this threat has been maintained; however, the Board continues to evaluate whether additional measures may enhance both the understanding of the hazards and the best methods for controlling them.

Pantex Cell Gap Analysis. The Board evaluated calculations of leakage through gaps in cells used for nuclear explosive operations during postulated accident scenarios at the Pantex Plant. The Board determined that such leakage does not appear to be an issue for accident scenarios involving single-unit operations, but could present a concern for multi-unit operations involving certain systems in certain facilities. DOE will perform additional analyses to provide assurance that the evaluation guidelines will not be challenged for multi-unit operations.

Degradation of 9212 Complex at Y-12. The Board had previously evaluated DOE's ability to safely operate the 60-year-old 9212 Complex at Y-12. As a result, DOE submitted an analysis identifying facility improvements necessary to ensure safe operation until completion of the planned replacement facility, the Uranium Processing Facility. As major structural and process modifications to the 9212 Complex would be impractical, the Board advocated a regimen of increased vigilance and regular assessment of the physical condition of the 9212 Complex. In response, DOE is working to develop a detailed plan to annually assess the 9212 Complex.

Conduct of Operations at Y-12. The Board has noted improvement in conduct and formality of nuclear operations at Y-12 during recent years. However, following several operational errors and events, the Board urged DOE to consider action to achieve consistent, disciplined operations. DOE developed and began to implement a plan to address these issues.

Fire Protection at Y-12. In response to Board correspondence in 2002, DOE developed a ten-year comprehensive improvement plan for fire protection at Y-12. Significant improvements were made, but progress stalled during 2006 due to a reduction in funding. The Board queried DOE on its plans for completing the project. DOE has revised its plan and intends to complete the project in its nuclear facilities.

Conduct of Engineering at Y-12. In 2005, DOE discovered that a new vessel was not designed to preclude a nuclear criticality accident in a water intrusion scenario. DOE implemented a design change and planned an investigation. Later, the Board found that the investigation was not completed. DOE performed the investigation and developed corrective actions. The Board found that the corrective actions did not address the lack of an appropriate design review of the new installation. As a result, DOE is revising Y-12 engineering procedures to require appropriate design reviews of such new nuclear process installations or modifications.

Handling of Legacy Items at Y-12. The Board reviewed actions taken by Y-12 in response to a small fire during an operation to open and inspect a container with uranium metal items that had not been opened in more than 30 years. The Board found that Y-12 did not provide adequate restrictions and control on opening such legacy containers in air environments. In response, DOE developed additional operational controls to ensure adequate hazard analysis and review prior to opening legacy containers in an air environment.

Readiness to Dispose of a Damaged Nuclear Weapon. As a result of the Board's interactions and follow-up discussions in FY 2007, DOE stated that a revised safety analysis is being developed that will identify safety controls and upgrades appropriate for the scope of operations for the facility at NNSS (G tunnel) that would be used in disposition of a damaged nuclear weapon or threat device. The Board expects the new analysis to be available for review in 2008.

Device Assembly Facility at NNSS. The Board previously identified the need for a comprehensive assessment of safety systems and safety management programs at the Device Assembly Facility (DAF) in light of the new missions being undertaken there. In FY 2007, the Board evaluated the implementation of the safety basis and the conduct of readiness reviews for new operations in the facility. The Board determined that DOE had successfully implemented the assessments suggested by the Board and developed corrective actions for safety management programs and vital safety systems in DAF.

Concrete Cracking in DAF. The Board has identified that the extensive cracking in DAF may indicate poor construction practices that adversely affect the concrete's strength. In response, DOE began to develop plans in FY 2007 to assess the in-situ strength of the concrete.

LANL Chemistry and Metallurgy Research Facility Life Extension. The Chemistry and Metallurgy Research (CMR) facility suffers from age and known seismic vulnerabilities, which led DOE (a decade ago) to define 2010 as the facility's end of life. In fall 2006, the Board observed that DOE had diametrically opposed plans for CMR, which could pose safety concerns—plans were being made for reductions in engineering resources due to its approaching end of life, while at the same time, other plans relied on the facility to support increased programmatic missions, particularly pit manufacturing, until a replacement facility became available in approximately 2016. As a result of providing these observations to the DOE senior management, a formal life extension project has been initiated to determine the necessary steps to safely continue certain operations beyond 2010.

Pit Manufacturing at LANL. The Board evaluated the integration of safety-in-design with regard to various individual activities involving the installation of manufacturing equipment at the LANL Plutonium Facility. Ultimately, DOE intends to produce increased numbers of pits at LANL, and establish the capability to manufacture legacy pit types or, if authorized, a Reliable Replacement Warhead. The Board identified that DOE's project management efforts were narrowly focused on pit manufacturing equipment, and did not encompass the associated infrastructure and other support facilities required to safely execute an expanded pit manufacturing mission. In response, DOE is reinvigorating an Integrated Nuclear Planning effort to ensure safety is properly integrated into planning for the pit manufacturing project.

Nuclear Criticality Safety at LANL. The Board has followed closely the Criticality Safety Program Improvement Plan developed by LANL in response to the findings of an October 2005 DOE review that revealed non-compliances with applicable ANSI/ANS standards and DOE Orders. In a letter dated September 22, 2006, the Board observed that the Program Improvement Plan was not receiving appropriate attention and priority from DOE management. The Board questioned DOE on the need for compensatory measures until the program was brought into compliance and on how the management approach would be bolstered to ensure timely completion. In response, DOE initiated an independent team to review progress on the Program Improvement Plan, developed a performance incentive to encourage LANL accomplishment in this area, and assigned a full-time criticality safety engineer at the Los Alamos Site Office.

Transuranic Waste Operations at LANL. The Board urged DOE in a letter dated January 18, 2007, to expeditiously develop a viable disposition pathway for the large inventory of legacy transuranic waste at LANL, particularly for the containers with the highest radiological inventory. In response, DOE has reinvigorated waste disposition work at LANL, including accomplishing facility infrastructure upgrades, developing needed new safety bases, and training and qualifying operators to the associated new procedures.

Safety Improvements at LANL. The Board visited LANL in November 2006, and in a letter dated February 1, 2007, observed five key areas requiring underlying actions that would substantially improve the laboratory's safety posture. These key areas are strengthening federal safety oversight, improving safety bases and ensuring the efficacy of safety systems, eliminating known hazards, and increasing federal management of new projects. DOE subsequently made progress in some of these areas. For example, DOE detailed senior managers to the Los Alamos Site Office to fill critical oversight positions during the search for permanent staff, and completed actions to disposition some of the site's remaining inventory of legacy plutonium-238 residues.

Confinement Ventilation at the LANL Plutonium Facility. The safety basis for the LANL Plutonium Facility credits a passive confinement strategy instead of active confinement ventilation as a safety-class control to protect the public from postulated accidents. Under the Implementation Plan for the Board's Recommendation 2004-2, *Active Confinement Systems*, an evaluation of the facility's confinement strategy was completed this year in parallel with a separate effort to develop a new documented safety analysis for the facility. The Board assessed both efforts and observed that the draft documented safety analysis continued to rely on a safety-class passive confinement approach and did not incorporate the results of the facility analysis. As a result, DOE has developed a path forward that should improve the safety analysis and implementation of controls for the facility.

Nuclear Criticality Safety Program at LLNL. In an October 2006 letter to DOE, the Board noted the weak implementation of criticality safety requirements and the need for additional rigor in conduct of operations and in the verification of compliance of criticality limits at LLNL. The Board also noted a lack of quality assurance procedures for safety-related software systems that are relied upon to verify criticality and other safety limits. In response, LLNL management directed the implementation of improvements to the Nuclear Criticality Safety Program.

Radiography Facility at LLNL. The Board has been closely following operations involving special nuclear materials in the LLNL Radiography Facility and has noted weaknesses in the areas of material packaging, development of work permits, posting of radiological controls, and training. In response, LLNL management increased attention to these operations, which has resulted in observed improvements in work permit development, radiological postings, and discipline of operations.

Resumption of Programmatic Operations at LLNL. Following a standdown to address fundamental safety issues, limited operations in the LLNL Plutonium Facility were authorized to resume in FY 2006 using a formal process for achieving and verifying readiness. In April 2006, the Board observed LLNL's readiness assessment to remove the remaining compensatory measures and return to normal operations, and determined that operations could safely resume. The standup of the Plutonium Facility was completed in early FY 2007.

LLNL Legacy Item Disposition Project. The Board has been closely following efforts to address the unique hazards of a legacy item (referred to as Object 77) at LLNL and the unusual challenges to the facility and personnel associated with its safe disposition. The Board identified deficient safety controls, leading LLNL to develop specific administrative controls to safely disposition the item. In FY 2007, preparations to disposition the item included integrated dry runs as part of LLNL and DOE readiness assessments. In May 2007, the key phases of the project to disposition the item were safely completed, thus eliminating the unique hazards associated with it.

Critique Process at LLNL. In FY 2007, the Board evaluated the informal methods used at LLNL to gather information on safety-related events and identify follow up actions. The Board strongly urged the development of a more rigorous and formal process for critiquing such events. A critique procedure was developed in early FY 2007. In March 2007, a new Nuclear Material Technology Program Event Critiques procedure was employed, with observed weaknesses. Board evaluation of subsequent critiques has indicated that the formal process is improving and will significantly enhance safety at LLNL by providing a clearer understanding of events and the necessary follow up actions.

Configuration Management at LLNL. In a November 2004 letter, the Board identified the apparent lack of configuration management of vital safety systems at LLNL facilities. Subsequently, LLNL established procedures and processes to maintain an interim configuration management system and developed a resource-loaded schedule integrated with the documented safety analysis implementation schedule. A recent subsequent review by the Board identified a lack of quality in the interim system drawings. DOE has drafted a corrective action plan to address this plus numerous additional issues, including configuration management programs and supporting processes.

Safety Basis at Sandia National Laboratories, New Mexico. In late FY 2005, the Board identified fundamental weaknesses in the implementation of nuclear safety requirements and controls at a defense nuclear facility located at SNL. In 2007, SNL completed implementation of a Safety Basis Improvement Project to resolve the underlying safety-related deficiencies and implemented a Safety Basis Operations Schedule. The Board has noted continued progress during its reviews.

Integrated Safety Management at Sandia National Laboratories, New Mexico. In FY 2005, the Board identified multiple failures of the hazard analysis and work control process at SNL. In response, DOE developed a corrective action plan to ensure the associated weaknesses are corrected and that integrated safety management is fully implemented. Near-term corrective actions for defense nuclear facilities are now complete. Sandia corporate-level systems must be implemented to achieve site-wide ISM standards.

Tritium Extraction Facility. The Board identified concerns with the reliability of safety-related equipment for sustained operations at the Tritium Extraction Facility at the Savannah River Site. During readiness reviews for this new facility, the Board observed multiple failures relating to the operability of the tritium air monitors, target rod preparation module, ventilation system, electronic procedures, and fire alarm system. Due to the Board's concerns

as well as the readiness review findings, the site operating contractor commissioned an independent assessment to address the equipment reliability issues.

Tritium Extraction Facility Conduct of Operations. The Board evaluated conduct of operations issues at the Savannah River Site's tritium facilities, and highlighted several issues relating to a wide range of tritium operations. The number and severity of the issues indicated a potential adverse trend in facility operations. In response, DOE included tritium operations in a recent independent assessment that will address causes and corrective actions for the observed issues.

Nuclear Material Packaging. In FY 2006, the Board identified errors in analysis and reasoning used in two principal deliverables of DOE's implementation plan for Recommendation 2005-1, *Nuclear Material Packaging*. The Board worked with DOE to improve the repackaging prioritization methodology and the requirements contained in draft DOE Manual 441.1-1, *Nuclear Material Packaging Manual*. As a result, on March 9, 2007, DOE released the draft Manual for comment into the Review and Comment System and forwarded it, along with the repackaging prioritization methodology, to the sites for development of plans to achieve compliance.

6. PERFORMANCE GOAL 2: SAFE PROCESSING AND STABILIZATION OF NUCLEAR MATERIAL

The processing, stabilization and disposition of DOE'S defense nuclear materials and facilities are performed in a manner that ensures adequate protection of the health and safety of the public, the workers, and the environment.

OUTCOME: DOE will have acknowledged, acted upon, and/or resolved the health and safety issues raised by the Board. Follow-up technical evaluation of DOE's nuclear materials management and facility disposition activities will verify necessary improvements in safety, as DOE meets its commitments to the Board to stabilize and dispose of hazardous nuclear materials.

SUMMARY:

The Department of Energy continues significant stabilization and cleanup work at all of its sites throughout the defense nuclear complex, in some cases in response to Recommendations and other formal correspondence from the Board. The level of effort of this work has remained high as a result of the American Recovery and Reinvestment Act of 2009. Although Recovery Act projects may end in fiscal year 2011, much of the remaining cleanup work will be more hazardous as DOE moves from easy cleanup projects to more difficult activities. The most significant activities are described below:

Nuclear Material Stabilization per Board Recommendation 2000-1—Five milestones remain open under the Implementation Plan for Recommendation 2000-1, *Prioritization for Stabilizing Nuclear Materials*: one at Hanford and four at Los Alamos National Laboratory (LANL). In recent years, DOE intended to complete stabilization of all materials identified under Recommendation 2000-1 by December 2009, but DOE did not meet this schedule. DOE continued to develop new schedules for the disposition of unsheltered containers at LANL, other plutonium-bearing materials at LANL, and highly radioactive sludges at the K West Basin at the Hanford Site. DOE established preliminary plans to process the unsheltered containers at the LANL Chemistry and Metallurgy Research building by 2013. DOE also completed the conceptual design for the retrieval of the Hanford sludges. The Hanford sludge project is discussed in more detail below. The Board plans to monitor closely the development and completion of these material stabilization campaigns.

Nuclear Material Consolidation, Storage, and Disposition—DOE continues to store many metric tons of excess nuclear materials that have been declared surplus to national security needs. These materials, which include plutonium, uranium, neptunium, and spent nuclear fuel, pose significant hazards if not stored, shipped, and disposed of properly. The Board continues to carefully monitor DOE as it attempts to manage these materials and meet its commitments under Board Recommendations 2000-1 and 2005-1, *Nuclear Material Packaging*. The Board also continues to monitor implementation of DOE Order 410.2, *Management of Nuclear Materials*, including the development of a strategic plan for nuclear materials management.

DOE has defined the disposition paths for many of its excess nuclear materials, but some materials have no defined disposition path. Previously planned disposition paths may change. For many materials, DOE's preferred method of disposition is chemical processing through the H-Canyon facility at the Savannah River Site (SRS). This facility, and its now-deactivated sister facility, the F-Canyon, have successfully provided a safe disposition path for large quantities of spent nuclear fuel and other special nuclear materials. However, it is not clear to the Board that operating H-Canyon through the end of its planned lifespan in 2019 will be sufficient to process DOE's entire inventory of surplus nuclear materials that have no other disposition path. DOE will need to provide maintenance resources until H-Canyon is ultimately deactivated and carefully consider how long H-Canyon can operate safely.

High-Level Waste (HLW) Retrieval and Processing—DOE continues to expand HLW retrieval activities, with the attendant hazards of extremely radioactive liquids and sludges, old systems and equipment, and waste conditions that are poorly characterized. Workers at the Hanford Site, SRS, and the Idaho Cleanup Project continue decades-long projects to retrieve and treat wastes from tanks that date as far back as the World War II-era Manhattan Project. Large new facilities needed to treat and dispose of the wastes are in various states of design and construction—most notably the Waste Treatment and Immobilization Plant at the Hanford Site, the Integrated Waste Treatment Unit at the Idaho Cleanup Project, and the Salt Waste Processing Facility at SRS. The Board is performing close oversight of DOE's waste retrieval operations, as well as the development, design, and construction of planned treatment facilities.

Most recently, DOE initiated the Calcine Disposition Project at Idaho to retrieve and treat 4400 cubic meters of HLW calcine (previously treated HLW). DOE plans to convert this waste into a form suitable for disposal. The Board also continues to work closely with DOE's tank expert panels as they plan corrosion and structural testing to understand the factors affecting HLW tank integrity. These activities will require close oversight by the Board for the indefinite future.

Hanford K-Basin Sludge Cleanup—The K West Basin at the Hanford Site contains highly radioactive sludge that requires careful retrieval, stabilization, and disposal. DOE had planned to complete removal of the sludge from the K West Basin by November 2009. DOE's most recent plans identify December 2015 as the new completion date for removing the sludge from the K West Basin. DOE completed the conceptual design for removing the sludge from the basin and transporting it to Hanford's central plateau for interim storage. DOE also examined options to stabilize and package the sludge once it is removed from the basin. The Board plans to follow the resolution of a number of issues it raised with the design for removing the sludge from the basin. The Board plans close oversight of the design, construction and operation of DOE's sludge retrieval and treatment systems.

Transuranic (TRU) Waste Management—Several sites within the DOE defense nuclear complex store large quantities of contact-handled (lower activity) TRU wastes on concrete pads and in soil-covered trenches. DOE has been retrieving these wastes for shipment to the Waste Isolation Pilot Plant (WIPP) for disposal since 1999. DOE has completed shipping most of the lower activity TRU wastes from Oak Ridge National Laboratory (ORNL) and SRS to WIPP. What remains are drums and boxes of waste containing prohibited items and other hazardous materials that pose a greater risk to the workers and considerably slow the retrieval work.

Current shipments to WIPP include TRU wastes from Idaho, Hanford, and LANL. The Board will continue to provide oversight for these hazardous operations.

In addition, DOE stores significant quantities of remote-handled (higher activity) TRU waste in temporary storage at several of these same sites. DOE began shipping the first of this remote-handled TRU waste from the Idaho Cleanup Project to WIPP in early 2007. Subsequently, remote-handled TRU waste shipments have been made from ORNL, LANL, and SRS. Shipments from the Idaho Cleanup Project and ORNL are continuing. DOE has been accumulating remote-handled TRU wastes at the Hanford Site and will have to establish a means to certify and ship these wastes to WIPP. The Board plans close oversight of these activities.

Deactivation and Decommissioning of Facilities—DOE continues significant efforts to clean up radioactive wastes, decommission unneeded facilities, and remediate contaminated soils and groundwater throughout the defense nuclear complex. DOE accelerated much of this work with funding from the American Recovery and Reinvestment Act of 2009. During this acceleration, the Board monitored the training of new cleanup workers, the planning and preparations for cleanup work, and the safety of the work itself.

DOE expects that work funded by the Recovery Act will end in fiscal year 2011. However, DOE plans to continue much of its cleanup work through FY 2012 and beyond. While the rate of DOE's cleanup work may slow, the Board expects the nature of the work to become more hazardous as site workers begin to remediate those facilities and waste sites they deemed too difficult to begin earlier.

Performance Goal 2	**Safe Processing and Stabilization of Nuclear Material.** The processing and disposition of DOE defense nuclear materials and facilities are performed in a manner that ensures adequate protection of the health and safety of the public, the workers, and the environment.

FY 2012 Performance Objectives

The Board and its staff will conduct assessments of DOE's efforts to characterize, stabilize, process, and safely store plutonium, uranium, and other actinides, residues, spent fuel, and wastes from the nuclear weapons program to ensure that these efforts are performed safely and that the risks posed by these materials are addressed in a timely manner. These reviews will be conducted using the principles of Integrated Safety Management and will include assessments of the adequacy of current storage conditions, evaluations of proposed treatment and disposal technologies, evaluations of the design of new facilities and process lines, assessments of facility readiness to safely begin new operations (including implementation of 10 CFR 830, *Nuclear Safety Management*), the safety of ongoing operations, and the suitability of long-term storage and disposal facilities. Representative areas for review include:

- H-Canyon processing campaigns and life extension activities.
- Long-term storage of neptunium oxides at Idaho National Laboratory (INL)
- Complex-wide consolidation and disposition of nuclear materials.
- Stabilization and disposal of plutonium-bearing residues at LANL (Recommendation 2000-1).
- Efforts to consolidate, store, and dispose of spent nuclear fuel at Hanford, INL, and SRS.
- Final design of systems to remove spent nuclear fuel sludge stored near the Columbia River at the Hanford Site (Recommendation 2000-1).
- Removal and processing of salt waste from HLW tanks at SRS, and startup preparations for Salt Waste Processing Facility.
- Closure of HLW Tanks 5, 6, 16, 18, and 19 at SRS.
- Design of the fluidized-bed steam reformer for processing the HLW from SRS Tank 48.
- HLW tank structural integrity at SRS and the Hanford Site and application of the results of DOE's corrosion testing program to corrosion chemistry controls.
- Operation of HLW retrieval and transfer systems at the Hanford and SRS tank farms.
- Conduct of operations and work planning at the Hanford Site and liquid waste operations at SRS.
- Design and testing of waste feed mixing and delivery systems at Hanford tank farms.
- Retrieval, characterization, and packaging of TRU waste at Hanford, LANL, ORNL, SRS, and the Idaho Cleanup Project.
- Operations at the Integrated Waste Treatment Unit at INL.
- Design, acquisition and first use of new remote-handled TRU waste emplacement equipment at WIPP.
- TRU waste disposal operations at WIPP.
- Conduct of operations and work planning at the WIPP Site.
- Operations in support of the Tank W-1A excavation and remediation efforts at ORNL.
- Fire protection at ORNL.
- Deactivation and decommissioning work at defense nuclear facilities.

Performance Goal 2	**Nuclear Material Processing & Stabilization.** The processing and disposition of DOE defense nuclear materials and facilities are performed in a manner that ensures adequate protection of the health and safety of the workers and the public.

FY 2010 Performance Accomplishments

H-Canyon Life Extension. The Board reviewed DOE's application of the Integrated Facilities Aging Management program to evaluate the life extension needs of the H-Canyon facility at SRS. The Board found that while the program successfully identifies aging issues, follow-up to address these issues is often lacking. The Board noted this concern in a letter to DOE dated April 29, 2010. In response, DOE and its contractor reviewed and prioritized needed facility repairs to maintain safe operations at H-Canyon.

Recommendation 2001-1. In letters dated January 7, 2010, and May 27, 2010, the Board accepted DOE's latest implementation plan for Recommendation 2001-1, *High-Level Waste Management at the Savannah River Site*, as an interim plan, but requested a new, more detailed plan. The Board suggested that DOE provide more definitive interim goals to show positive progress in meeting the recommendation. DOE began to revise the implementation plan to include more meaningful interim milestones.

Fire Protection Systems at SRS. The Board reviewed the fire protection program at SRS and identified weaknesses in equipment, management of exemptions and equivalencies, and staffing. In response to the Board's letter dated January 20, 2010, DOE addressed these weaknesses by purchasing new fire trucks and improving its fire protection management practices. Staffing remains an issue.

H-Canyon Safety Basis Upgrade at SRS. The Board reviewed the revised Documented Safety Analysis for the H-Canyon facility. This Documented Safety Analysis incorporates guidance from the latest DOE Standards. During the development of the new Documented Safety Analysis, the Board provided DOE with feedback regarding hydrogen explosions, Technical Safety Requirements, and ammonium nitrate explosions. DOE addressed many of the Board's comments in the approved document.

Transuranic Waste Operations at SRS. The Board reviewed startup of transuranic waste operations in F-Canyon and H-Canyon. In staff-to-staff discussions, the Board noted that the readiness preparations for H-Canyon did not adequately simulate the planned activities. In response, DOE extended the readiness activities to include additional simulations.

Spent Nuclear Fuel Operations at SRS. The Board reviewed spent nuclear fuel storage in L-Area as well as preparations for the movement of fuel from L- to H-Area to support spent fuel processing in the H-Canyon facility. The Board suggested that DOE reconsider the planned level of rigor for readiness activities for spent fuel restart. DOE now plans to use a more-formal contractor Readiness Assessment.

HLW Tank Integrity Program at SRS. The Board observed a DOE independent review of nondestructive examination techniques for HLW tanks. In a letter dated January 6, 2010, the Board suggested that DOE inspect a greater portion of HLW tank walls and explore faster inspection technologies. As a result, DOE revised its in-service inspection program at SRS to expand the scope of its inspections. DOE also plans to implement electromagnetic acoustic testing (a faster technology), after the technology is qualified at Hanford.

Hazard Controls in Safety Basis Documents at SRS. The Board reviewed corrective actions taken by DOE at SRS to address past concerns regarding the formality of hazard controls in facility safety bases. While DOE had corrected the safety basis at the Waste Solidification Building, DOE had not corrected site procedures to prevent recurrence of the problem. In a letter dated July 16, 2010, the Board highlighted this lack of proper guidance at SRS and noted the possibility of missing hazard controls from the safety bases of other facilities. DOE took action to address this issue and to assess the extent of this condition at other sites in the DOE defense nuclear complex.

Work Planning and Conduct of Operations at Hanford Tank Farms. The Board reviewed work planning and conduct of operations at the Hanford Tank Farms. The Board noted several deficiencies in DOE's analysis of hazards, revision of work documents, use of work instructions, and ability to provide feedback and improvement to prevent recurrence of mistakes. In response to a Board letter dated March 12, 2010, DOE made

several improvements to work planning processes and conduct of operations.

Safety Systems at Hanford Tank Farms. The Board identified inadequate pressure-relieving devices in the waste transfer lines associated with double-shell Tank AN-101 at Hanford. Following staff-to-staff discussions, DOE reconfigured the system to include reliable safety features to prevent over-pressurization during waste transfer operations. DOE also revised the safety analysis to address this change.

Safety Basis at Hanford Tank Farms. The Board reviewed the newly revised safety basis at the Hanford Tank Farms. In a letter to DOE dated August 5, 2010, the Board noted a number of analytical and implementation deficiencies in the safety basis. These deficiencies would limit the effectiveness of the prescribed safety controls in the prevention and mitigation of certain postulated accident scenarios. As a result, DOE is working to resolve the weaknesses in the safety basis.

Hanford Sludge Retrieval and Disposition Project. The Board reviewed DOE's conceptual design for systems to remove radioactive sludge from the K West Basin at Hanford. The Board is planning to provide several comments and concerns regarding the conceptual design. DOE is working with the Board to address these issues in a timely manner.

Work Planning at Hanford. The Board reviewed work planning and control for activities performed by the central plateau remediation contractor at Hanford. In a letter dated September 23, 2010, the Board noted weaknesses in the identification of activity-level hazards, tracking of controls in the work packages, and the conduct of pre-job briefings.

Safety Analysis at Hanford Plutonium Finishing Plant (PFP). The Board reviewed the PFP safety analysis and noted deficiencies in factors used to compute radiation dose for postulated accident scenarios. DOE's contractor subsequently identified that some dose conversion factors used to estimate dose consequences were contrary to consensus standards and potentially non-conservative. DOE and its contractor revised and approved the facility's safety analysis. DOE also noted this problem in the safety bases of other facilities and began corrective action.

PFP Decontamination Agents. The Board reviewed the safety of various chemical decontamination agents that DOE used or planned to use at PFP. In staff-to-staff discussions, the Board pointed out hazards associated with the decontamination agents. DOE conducted additional analyses of the agents to better understand the hazards and to develop appropriate hazard controls.

Remote Handled Transuranic Waste Repackaging at Idaho. The Board identified worker safety issues associated with loading high-radiation canisters of transuranic waste in Building CPP-666 at Idaho. After staff-to-staff discussions, DOE modified the crane that moves the canisters and incorporated a shielded transfer device into the process to reduce worker radiation doses.

Radiation Protection Program at WIPP. The Board continued an ongoing review of the radiation protection program at WIPP. In several staff discussions and a telephone conference, the Board noted weaknesses in the requalification process for radiological control technicians and in DOE's triennial audit program. DOE corrected the qualification process for technicians and improved its oversight program.

Transuranic Waste Handling at WIPP. The Board reviewed conduct of operations and work planning and control programs for waste handling at WIPP. The Board identified problems in conduct of operations and site-wide safety culture. DOE acknowledged these issues and agreed to address them.

Electrical Systems at WIPP. The Board reviewed the status of WIPP electrical systems and found several material and programmatic deficiencies. In a letter dated September 22, 2010, the Board noted the contractor's electrical safety program was weak, there was an inadequate training program for electrical workers, and there was no program for identifying parts and components that were not certified by a nationally recognized testing laboratory. DOE has agreed to address these issues.

Performance Goal 2	**Nuclear Material Processing & Stabilization.** The processing and disposition of DOE defense nuclear materials and facilities are performed in a manner that ensures adequate protection of the health and safety of the workers and the public.

FY 2009 Performance Accomplishments

Electrical Systems at the Plutonium Finishing Plant (PFP). In late 2008, the Board reviewed the PFP life extension program for electrical systems and assessed the condition of select safety-related electrical equipment and cables. Several deficiencies were noted. The Board is continuing to evaluate DOE's work to resolve the issues.

Effectiveness of Corrective Actions at Hanford Tank Farms. Following the spill of radioactive waste at Hanford's Tank Farms in July 2007, DOE completed several investigations and issued corresponding corrective action plans. The Board continued its review of the effectiveness of the corrective actions for conduct of operations, emergency management, safety oversight, and equipment maintenance. The Board provided additional feedback to DOE. DOE is working to resolve the Board's issues.

HLW Tank Integrity at Hanford Tank Farms. The Board encouraged DOE to continue laboratory and in-situ testing of corrosion mechanisms related to the HLW tanks. This effort is expected to lead to assurance that DOE's tanks can continue to perform for an anticipated 30 or more years. The Board reviewed the integrity of the double-shell HLW tanks, and evaluated DOE's structural and leak assessment of the older single-shell HLW tanks.

Safety Standards at Hanford Tank Farms. The Board reviewed the standards invoked in DOE's proposed contract for the new tank farm contractor and noted that several important safety standards were missing. In response to Board inquiries, DOE added these standards to the contract.

Hanford Sludge Retrieval and Disposition Project. The Board observed the contractor's alternatives analysis and the subsequent DOE external technical review of the conceptual design for sludge retrieval. The Board closely followed this project to ensure that DOE followed proper project management processes for a high-hazard nuclear operation.

American Recovery and Reinvestment Act. The Board began reviewing the management and work scope of the DOE activities funded by the Recovery Act. In response to the Board's inquires, DOE improved its Recovery Act guidance regarding safety and project management requirements.

HLW Tank Integrity Program at SRS. The Board reviewed the HLW tank integrity program at SRS with a continued focus on ultrasonic testing. In response to a Board letter to DOE regarding tank integrity, DOE issued a revised HLW Tank Inspection Plan and completed a more thorough ultrasonic test inspection of HLW Tank 29. The inspection results showed no obvious active pitting, but revealed many small pits that had not been noted before. These data may prompt further inspections.

Tank 48 Treatment Process at SRS. The Board closely followed DOE's efforts to design a process for treating wastes containing organic materials in HLW Tank 48. In response to a Board letter to DOE noting several project weaknesses, DOE took action to ensure compliance with the DOE Order on project management, and to meet its commitments to perform an evaluation of the confinement ventilation system for the project. In June 2009, DOE confirmed the fluidized bed steam reforming process as the preferred treatment process for Tank 48.

HLW Maintenance Program at SRS. The Board found that the contractor's Maintenance Implementation Plan had not been reviewed by DOE since February 2000, which was contrary to the DOE Order requirement that DOE review and approve the contractor's plan every two years. In response, DOE reviewed and approved the current plan and performed a comparison of the DOE Maintenance Program Guide with site maintenance procedures and began implementing corrective actions.

Tank Closure at SRS. The Board's staff observed readiness reviews for mechanical waste removal in Tanks 18 and 19, as well as waste removal operations. The Board identified weaknesses in the performance of independent verifications, which were corrected.

H-Canyon Electrical Systems. The Board reviewed the safety of electrical systems within the H-Canyon and supporting facilities at SRS. The Board noted several deficiencies and highlighted these in a letter to DOE. DOE took action to immediately correct some of the weaknesses, and put in place plans to correct the remaining deficiencies.

H-Canyon Life Extension. A previous Board review of aging issues at H-Canyon highlighted the need to perform more inspections of aging equipment. The Board's review of the initial approach identified several flaws. The Board suggested a number of improvements to the system, and DOE took action to make improvements. The new Integrated Facility Aging Management Program produced the desired results, and DOE plans to expand the program to review safety systems across SRS.

Fire Protection Systems at SRS. At SRS, the Board noted aging equipment in the site's fire protection program and questioned how the aging equipment was complying with National Fire Protection Association guidance. In response, DOE developed a replacement methodology for aging fire apparatus and submitted a baseline change proposal to purchase new ladder and pump trucks. When the Board questioned the efficacy of Mutual Aid Agreements with nearby fire departments, DOE developed new plans and procedures to reduce response times.

Radiation Protection Program at WIPP. The Board reviewed the radiation protection program and its implementation at WIPP. The Board identified that there was no formal process for performing the triennial audits required by federal regulations. DOE acknowledged and agreed to address the identified concerns.

TRU Waste Handling at WIPP. The Board continued oversight of the safety of TRU waste handling operations at WIPP. After a review of conduct of operations and overall safety culture, the Board communicated several deficiencies to DOE and its contractor. A full-time conduct of operations "champion" was hired and empowered to direct efforts towards correcting the identified deficiencies.

TRU Waste Operations at the Idaho Cleanup Project. The Board observed TRU waste retrieval and repackaging operations at the Idaho Cleanup Project and identified deficiencies in conduct of operations and operational safety. DOE responded by assigning a full time person to address needed improvements through an emphasis on work planning and control.

Performance Goal 2	**Nuclear Material Processing & Stabilization.** The processing and disposition of DOE defense nuclear materials and facilities are performed in a manner that ensures adequate protection of the health and safety of the workers and the public.

FY 2008 Performance Accomplishments

Nuclear Materials Stabilization and Storage at LANL. In response to the Board's Recommendation 2000-1, DOE completed the stabilization of all non-weapons grade plutonium at LANL. DOE plans to complete the four remaining commitments in the Implementation Plan for Recommendation 2000-1 by December 2009.

Uranium-233 Downblending at ORNL. The Board issued a Project Letter to DOE following the Critical Decision (CD)-2/3A approval for the Uranium-233 Downblending and Disposition Project. The letter identified several safety concerns for DOE to consider as the project progresses. DOE accepted these issues and is working to address all of them.

Hanford K-Basin Spent Fuel Disposition. The Board verified the safety of operations at the Hanford K-West Basin by observing the DOE Operational Readiness Review for the restart of fuel cleaning and packaging. This effort will package the small amounts of fuel remaining after the main fuel retrieval effort was completed in 2004.

Hanford Sludge Retrieval and Disposition Project. The Board reviewed the project management processes instituted following the return of the sludge project to the conceptual design phase. The Board noted problems with DOE's planned implementation of the project management requirements such as alternatives analysis and formal project reviews. DOE took corrective actions to implement the requirements.

Interim Salt Disposition Project at SRS. In response to the Board's Recommendation 2001-1, *SRS Waste Management,* DOE began operation of the Actinide Removal Process and Modular Caustic Side Solvent Extraction Unit to remove and process salt waste contained in high-level waste (HLW) storage tanks at SRS. The Board monitored the performance of the DOE and contractor readiness reviews prior to the start of radioactive operations and found them to be satisfactory.

HLW Storage in Tank 11 at SRS. The Board reviewed DOE's plans to store additional HLW in Tank 11 at SRS. This tank is considered a non-compliant tank due to its single-shell design. To ensure safe storage of the waste, DOE and the Board agreed to a set of stringent controls and compensatory measures to be in place prior to the transfer of waste into Tank 11.

Vital Safety Systems at SRS HLW Tank Farms. The Board conducted a review of selected safety systems at the SRS HLW tank farms. The Board found that the contractor's system engineer program did not fully meet the requirements of DOE Order 420.1B, *Facility Safety,* and that DOE had a shortage of safety system oversight engineers in the HLW tank farms. Based on the Board's review, DOE initiated a number of corrective actions to address these deficiencies.

HLW Tank Integrity Program at SRS. The Board reviewed the HLW tank integrity program at SRS, focusing on the ultrasonic testing of the HLW tanks. The Board found that the ultrasonic test plan did not require the re-examination of known pitting to evaluate its extent and growth rates. In addition, the Board found that the potential for pitting at the liquid-air interface in stagnant waste was not adequately addressed. The Board issued a letter to DOE requesting a briefing on actions to be taken to address these shortcomings.

Cleaning of HLW Tanks at SRS. DOE continues to remove waste from various HLW tanks at SRS in preparation for final closure of the tanks. The Board reviewed the chemical cleaning of HLW Tanks 5 and 6, and found that the cleaning was being safely performed. The Board also observed the contractor readiness assessment for the mechanical cleaning of HLW Tanks 18 and 19, and found that the contractor had prematurely declared readiness to operate.

Corrective Actions from Waste Spill at Hanford Tank Farms. Following the spill of radioactive wastes at Hanford's Tank Farms in July 2007, DOE completed several investigations and issued corresponding corrective action plans. The Board conducted reviews of the adequacy of the corrective actions and the implementation of those actions. The Board identified several concerns and made observations regarding conduct of operations,

emergency management, oversight, and the issues management program. DOE is working to resolve the issues. The Board also monitored the spill clean-up efforts that were completed in July 2008.

Complex-Wide HLW Tank Integrity. The Board encouraged DOE to continue laboratory and in-situ testing of corrosion mechanisms related to the HLW tanks. This effort is expected to help ensure that DOE's tanks can continue to perform as designed for an anticipated 30 or more years. The Board continued to evaluate the overall structural and seismic integrity of the double-shell HLW tanks, and DOE continues to examine double-shell tanks for pitting and wall thinning.

Safety Systems at the Hanford Tank Farms. As part of evaluating the infrastructure and life extension of the HLW tanks at Hanford, the Board conducted several reviews that focused on certain vital safety systems. The Board reviewed the maintenance management program, the electrical distribution system, and the digital instrumentation and controls of safety-related systems at the Tank Farms. The Board noted several deficiencies and continued to work with DOE to resolve these issues.

Electrical Cables at the Plutonium Finishing Plant. The Board reviewed electrical safety at the Plutonium Finishing Plant at Hanford and found that DOE had not evaluated electrical cables for extended life. The Board pointed out the requirements for such an evaluation and suggested some example programs for DOE to follow.

Oak Ridge National Laboratory Shielded Transfer Tanks. The Board reviewed the storage conditions of highly radioactive wastes stored in five Shielded Transfer Tanks at Oak Ridge National Laboratory. The Board found the tanks to be sufficiently robust to contain any generated gases and to remain safely in storage for an extended period of time.

Transuranic (TRU) Waste Remediation at SRS. The Board provided oversight of TRU waste operations at SRS's Solid Waste Management Facility and F-Canyon, ensuring that the proper safety controls were in place for both planned operations and during the recovery from anomalous events. The Board also observed the venting of bulged TRU waste drums and provided feedback to the site management for reducing risk to workers during these operations. Site workers have subsequently vented all of the legacy TRU waste drums.

Retrieval, Characterization, and Packaging of TRU Waste. The Board verified the safety of TRU retrieval, characterization, and packaging activities for TRU waste drums and other containers at the Hanford Site and the Idaho Cleanup Project. The Board also assessed the interface between WIPP's Central Characterization Project and Idaho's operating contractors for the Accelerated Retrieval Project and the Advanced Mixed Waste Treatment Project, providing suggested improvements to DOE.

Remote-Handled TRU Waste at Oak Ridge National Laboratory. The Board verified the safety of characterization and packaging of remote-handled TRU waste at Oak Ridge National Laboratory. The verification included a review of the safety basis documents and observation of the DOE operational readiness review.

National TRU Waste Program. The Board assessed the overall progress of DOE efforts to eliminate the long-term safety hazard inherent in TRU waste storage at various sites across the complex. The Board evaluated the progress reported by the DOE TRU Waste Corporate Board and made suggestions where appropriate.

Performance Goal 2	**Nuclear Material Processing & Stabilization.** The processing and disposition of DOE defense nuclear materials and facilities are performed in a manner that ensures adequate protection of the health and safety of the workers and the public.

FY 2007 Performance Accomplishments

Waste Leak at Hanford Tank Farms. In August 2007, operators backflushing a high-level waste transfer pump in the Hanford tank farms caused a leak of high-level waste to the environment. The Board responded quickly by assigning one of the Board's Site Representatives to continuously follow all emergency response actions and recovery actions. The Board noted the potential for a common-cause failure in other areas of the Hanford site, and DOE took appropriate corrective action to prevent a similar event, as well as validate that other sites in the complex were not susceptible to a similar incident. DOE has chartered a formal Type A investigation team to review the incident.

Neptunium-237 at Savannah River Site. As part of its commitment under the Board's Recommendations 94-1 and 2000-1, DOE completed stabilization, packaging, and storage of pre-existing neptunium-237 solutions at SRS.

Nuclear Material Stabilization and Storage at LANL. In response to the Board's Recommendation 2000-1, contractors at LANL reached and exceeded several milestones of their Implementation Plan (IP) for the stabilization and storage of nuclear materials. LANL's contractor stabilized more than 50 percent of the site's weapons grade and non-weapons grade plutonium. Additionally, the contractor stabilized more than of 50 percent of 248 kg of materials designated for the Recovery Evaluation Process.

Uranium-233 Downblending at ORNL. The Board communicated weakness in the development of the Preliminary Documented Safety Analysis for the Uranium-233 Downblending Project. DOE has been receptive to these comments and plans to integrate them into future revisions of the Preliminary Documented Safety Analysis.

Hanford Sludge Retrieval and Disposition Project. At Hanford, DOE completed the retrieval and transfer of K-East basin sludge to K-West Basin holding tanks and the retrieval of K-West Basin sludges into the same holding tanks. The Board reviewed the Sludge Treatment Project at Hanford and noted that portions of the Preliminary Documented Safety Analysis were based on the conceptual and preliminary design instead of the final design. The Board also identified that the final design information for safety systems was not sufficiently mature to meet the required criteria. DOE halted design efforts, re-established the project at the conceptual design stage, and implemented formal project management processes.

Use of Divers at the Hanford K-Basins. At the Hanford K-Basins, DOE's contractor planned to use divers to assist in basin cleanout. The Board thoroughly reviewed these plans and discussed with DOE several concerns regarding work planning, work procedures, and safety controls. In response, DOE conducted additional mockups of the diving effort and determined that the divers would not be ready in time to assist in near-term work at the K-East Basin. The plan was shelved, but may be used in the future during the cleanup of the K-West Basin.

Tank 48 Disposition at SRS. In response to the Board's Recommendation 2001-1, DOE began planning and design for removal of organic wastes from Tank 48 at SRS. This will allow Tank 48 to be returned to high-level waste service, adding 1.3 million gallons of space. DOE conducted three independent reviews of several organic destruction methods and determined that fluidized-bed steam reforming is a leading treatment candidate. DOE plans to select a preferred alternative in the Fall of 2007 and return Tank 48 to service by 2013.

Integrated High-Level Waste Salt Processing at SRS. Also in response to Board Recommendation 2001-1, DOE completed construction and began startup testing of the Actinide Removal Process and the Modular Caustic Side Solvent Extraction Unit. DOE planned to integrate the two projects and initiate radiological operations in early fiscal year 2008. Startup of this project is an important milestone for the High-Level Waste System as it will remove salt waste from the tanks and serve as a pilot plant for the Salt Waste Processing Facility.

Hanford Tank Farms Fill Height Increase. DOE increased the fill height of Tank AP-108 in April 2007. Prior to the increase, the Board reviewed operator readiness, the safety basis, and tank integrity analysis, and expressed concerns about the structural and seismic methodologies used in the analyses. In response, DOE re-engaged outside experts to review the structural calculations, and discovered potential new safety concerns to be resolved prior to increasing the fill height of the next tank.

High Level Waste Tank Corrosion Control. The Board encouraged DOE to continue laboratory testing of corrosion mechanisms related to High Level Waste tanks. This effort will lead to assurances that DOE's High Level Waste tanks can continue to perform as designed for an anticipated 30 more years. DOE continues this testing at CC Technologies in Ohio. Based on the test results for Tank AN-107 at Hanford, DOE imposed a change in sludge chemistry limits for this tank. Tests for corrosion propensity of nitrate and nitrite chemistry in Tank AP-101 and carbonate-based chemistry in Tank AY-102 showed less aggressive corrosion than that in Tank AN-107. Hence, DOE plans to implement less-restrictive chemistry limits for Tanks AP-101 and AY-102.

Waste Storage in Tank 11 at SRS. In the Implementation Plan for Recommendation 2001-1, *High-Level Waste Management at the Savannah River Site*, DOE stated that no waste would be stored in old, non-compliant waste tanks. However, further delays in salt waste processing at SRS have exacerbated the tank space situation there. In response, DOE again proposed the use of an old tank, Tank 11, for waste storage. The Board reviewed this proposal and agreed that waste can be safely stored in Tank 11, given that DOE follows eleven specific safety precautions.

Decommissioning Activities at Hanford's Plutonium Finishing Plant. Due to delays in its ability to consolidate nuclear materials, decommissioning of the Plutonium Finishing Plant has been extended from 2009 to 2016. The Board reviewed the results of contractor life extension evaluations to determine if upgrades or replacements of vital safety systems are required during this extended decommissioning period. The Board agreed with planned upgrades to certain safety systems, but is continuing to evaluate the adequacy of aged cables and electrical equipment necessary to operate the vital safety systems.

Air Filters at Hanford's Plutonium Finishing Plant. In response to a positive Unreviewed Safety Question report on the adequacy of High Efficiency Particulate Air (HEPA) filter, the Board requested information regarding the test method used in conjunction with the HEPA filters. The Board found that the test method did not satisfy the requirements in the American Society of Mechanical Engineer's standards, but that the contractor's compensatory measures and planned facility modifications to meet the standard were adequate.

Retrieval of Buried Radioactive Waste at Hanford. DOE continues to remove radioactive and hazardous wastes from several old burial grounds at Hanford. Dispersal of radioactive materials is possible during remediation of these burial grounds. The Board questioned the adequacy of work planning and the level of controls called for in the safety analyses. In response, DOE is working to develop improved controls to protect the workers and the public.

Idaho Facility Startup Process. DOE's contractor at the Idaho Cleanup Project authorized the startup of remote-handled TRU waste drum venting after completing a contractor management self-assessment (MSA). The Board commented to DOE that an MSA reflects a level of rigor far less than that required for the startup of a Hazard Category 2 nuclear activity. In response, DOE performed an independent review of the Idaho startup processes and found that the site was not in compliance with their own procedures. DOE managers at Idaho committed to making changes to improve the startup readiness process.

TRU Waste Drum Retrieval and Characterization. The Board noted inconsistent, and in some cases unsafe, activities during the retrieval, characterization, and handling of TRU waste drums at several sites. In response, DOE's TRU Waste Corporate Board formed a working group to develop a consistent approach for handling TRU waste drums, and for controlling the hazards associated with the drums. This effort culminated in the issuance of DOE-STD-5506-2007, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*. The Board continued to follow the subsequent effort by TRU waste generator sites to come into conformance with the standard.

TRU Waste Shipment at SRS. DOE planned a "non-routine" shipment of TRU waste between facilities on-site at SRS. These planned shipments included large quantities of radioactive materials and presented a significant risk to workers. The Board reviewed the plans for this effort and found an inadequate safety analysis for the shipments and a lack of DOE oversight. After discussion between the Board and DOE, the DOE site manager directed the contractor to submit appropriate safety documents to DOE for approval prior to commencing shipment.

7. PERFORMANCE GOAL 3: SAFETY IN NUCLEAR FACILITIES DESIGN AND INFRASTRUCRTURE

DOE's new defense nuclear facilities and major modifications to existing facilities are designed and constructed in a manner that ensures adequate protection of the health and safety of the public, the workers, and the environment.

OUTCOME: DOE will have acknowledged, acted upon, and/or resolved the health and safety issues raised by the Board. Follow-up technical evaluation will verify necessary improvements in the design and construction of DOE's new nuclear facilities and major modifications to existing facilities. New nuclear facilities will meet acceptable safety standards.

SUMMARY:

For the next ten years, DOE is undertaking significant development of new capability to process legacy special nuclear materials, and is replacing aging facilities needed to maintain the nuclear weapons complex. Much of this activity is well underway for several major projects with construction of the Waste Treatment and Immobilization Plant, the Salt Waste Processing Facility and the Waste Solidification Building, and the Integrated Waste Treatment Unit; and design of the Chemistry and Metallurgy Research Replacement Project and Uranium Processing Facility. DOE design and construction activity in FY 2012 will continue to require the Board to expend significant resources in exercising its oversight in this area to ensure that new facilities will be adequate to perform their intended functions safely. The key performance objectives for FY 2012 in this strategic area of concentration are:

- Ensure adequate design and construction of the Waste Treatment and Immobilization Plant at the Hanford Site.

- Ensure adequate construction, startup testing, and development of Technical Safety Requirements for the Integrated Waste Treatment Unit to treat sodium-bearing waste at Idaho National Laboratory.

- Ensure adequate design of the new Calcine Disposition Project that will prepare 4400 cubic meters of calcined high-level waste for disposal.

- Ensure adequate design of the Chemistry and Metallurgy Research Replacement Project at Los Alamos National Laboratory.

- Ensure adequate design of the Radioactive Liquid Waste Treatment Facility Upgrade Project to treat liquid waste at Los Alamos National Laboratory.

- Ensure adequate construction, startup testing, and development of Technical Safety Requirements for the Salt Waste Processing Facility for treatment of high-level waste liquids and salts at the Savannah River Site.

- Ensure adequate design of the Pit Disassembly and Conversion Project. This project is a consolidation of two separate efforts, the Pit Disassembly and Conversion Facility and the Plutonium Preparation Project, intended to dispose of plutonium-bearing materials at the Savannah River Site.

- Ensure adequate construction and startup testing of the Waste Solidification Building at the Savannah River Site.

- Ensure adequate design of the Uranium Processing Facility at the Y-12 National Security Complex.

Challenges for the Board's Safety Oversight:

Design and Construction of Nuclear Facilities. One of the Board's statutory responsibilities is the review of design and construction projects for DOE's defense nuclear facilities to ensure that adequate health and safety requirements are identified and implemented. These facilities must be designed and constructed in a way that will support safe and efficient operations for 20 to 50 years. This requires an exacting design process that will ensure appropriate safety controls are identified and properly implemented early in the process. Integrated Safety Management (ISM) provides the framework for this process. The Board's expectation is that the design and construction phases will identify the set of risks for each project and demonstrate clear and deliberate implementation of ISM principles and core functions.

The Board has become more proactive in identifying safety issues early in the design process to avoid significant cost and schedule impacts later in design and construction. The Board's involvement during the later detailed design stages has also increased as pressure to complete projects on cost and schedule has occurred. The Board's involvement is needed to ensure that the safety aspects of the design are not compromised as a means of cost or schedule recovery. The Board has expended considerable resources in evaluating proposed design changes to reduce the need for safety-related systems for the Waste Treatment and Immobilization Plant at Hanford. The Board intends to continue issuing a periodic report to Congress that identifies the Board's issues with new nuclear facilities. This report forms the basis for periodic discussions between the Board and DOE to help ensure DOE senior managers, project personnel, and the Board share a common understanding of the Board's issues and actions needed to resolve the issues.

The Board has noted many problems occurring in the DOE complex with construction practices and procurement of safety equipment that has led the Board to become more involved early in construction, as well as in ensuring adequate quality assurance for procurement and installation of the materials and equipment used in facility construction. Additionally, as facilities near completion, the Board is reviewing the testing of safety systems and the development of Technical Safety Requirements as facilities transition to operation, thereby ensuring the proper operation of safety systems. The Board expects such activities to be required for the foreseeable future.

The Board's reviews of the design and construction of major facilities and projects are resource intensive and time consuming but result in significant safety improvements. The Board's early involvement in the design effort requires multiple reviews of safety systems to assess whether they meet design expectations. The Board has demonstrated the value of rigorous technical oversight to ensure that safety is addressed early in the design process. The Board's reviews of construction and functional testing of safety equipment as it is installed have helped ensure adequate quality and performance of required safety systems.

The following list provides a brief description of major DOE projects currently underway, or planned for the near future, that will require significant Board resources to review. It provides an informal rating of three characteristics: Significance (overall importance of the facility to the mission of the complex); Complexity (relative assessment of the difficulty in successfully implementing the design); and Risk (assessment of programmatic risk and safety risk for the facility):

- **Hanford Site (Office of River Protection)** - Waste Treatment and Immobilization Plant: a project consisting of four major nuclear facilities to pretreat and vitrify waste from the Hanford high-level waste tank farms. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.

- **Hanford Site (Office of River Protection)** - Tank Retrieval and Waste Feed Delivery System: long-term project to provide feed to the proposed Hanford Waste Treatment and Immobilization Plant. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE RISK.

- **Hanford Site (Richland Operations Office)** - Large Package and Remote Handled TRU and Mixed Waste Facility: a new facility or major facility modification to provide the capability to repackage transuranic, mixed transuranic, and low-level wastes for disposal. HIGH SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.

- **Hanford Site (Richland Operations Office)** - K-Basin Closure Sludge Treatment Project: a new facility or major facility modification to provide the capability to retrieve, treat, and package spent fuel sludge for disposal. MODERATE SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.

- **Idaho National Laboratory** - Integrated Waste Treatment Unit: a new facility being planned to treat about one million gallons of sodium-bearing wastes. MODERATE SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.

- **Idaho National Laboratory** – Calcine Disposition Project: a new project that will use structural and process elements of the Integrated Waste Treatment Unit to convert 4400 cubic meters of calcined high-level waste into a form suitable for disposal. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, HIGH RISK.

- **Los Alamos National Laboratory** - Radioactive Liquid Waste Treatment Facility Upgrade Project: to replace the current aging and deteriorating facility with a modern facility. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE RISK.

- **Los Alamos National Laboratory** - Transuranic Waste Facility: a new project that will provide storage, staging, and characterization for transuranic waste generated after 1999 by operations at Los Alamos National Laboratory. MODERATE SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.

- **Los Alamos National Laboratory** - Chemistry and Metallurgy Research Replacement Facility: to replace the current aging and deteriorating facility with a modern facility. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.

- **Oak Ridge National Laboratory** - Building 3019, Uranium-233 Downblending and Disposition Project: the project will give DOE the capability to process the inventory of uranium-233 stored in Building 3019 at Oak Ridge National Laboratory into a disposable form without safeguard requirements. MODERATE SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.

- **Savannah River Site** - Salt Waste Processing Facility: to be used to remove cesium, strontium, and actinides from high-level waste. The high-activity stream would go to the Defense Waste Processing Facility for vitrification in glass logs. The low-activity stream would go to the Saltstone Production Facility for disposal in grout. HIGH SIGNIFICANCE, HIGH COMPLEXITY, MODERATE RISK.

- **Savannah River Site** - Pit Disassembly and Conversion Project: to convert surplus weapons-grade plutonium metal into oxide for subsequent feed to the Mixed Oxide (MOX) Fuel Fabrication Facility. This project represents a combination of the Pit Disassembly and Conversion Facility and the Plutonium Preparation Project as one project in the K-Area Complex. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.

- **Savannah River Site** - Tank 48 Treatment Process Project: a major facility modification to treat organic-bearing waste from high-level waste tank 48 to allow disposal of the waste and reuse of the tank. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE RISK.

- **Savannah River Site** - Waste Solidification Building: to process waste streams generated in the Pit Disassembly and Conversion Project and MOX Fuel Fabrication Facility. MODERATE SIGNIFICANCE, LOW COMPLEXITY, LOW RISK.

- **Y-12 National Security Complex** - Uranium Processing Facility: a new facility to replace aging facilities and consolidate current capability to process uranium materials at the Y-12 Site. HIGH SIGNIFICANCE, HIGH COMPLEXITY, MODERATE RISK.

Performance Goal 3	**Safety in Nuclear Facilities Design and Infrastructure.** DOE's new defense nuclear facilities and major modifications to existing facilities are designed and constructed in a manner that ensures adequate protection of the health and safety of the public, the workers, and the environment.

FY 2012 Performance Objectives

The Board and its staff will continue reviews of DOE's implementation of integrated safety management (ISM) in design and construction activities. At least five reviews will be completed. In general, the reviews will evaluate the adequacy of geotechnical specifications and hazards analyses; the design of safety-related structures, systems, and components (SSCs); and the adequacy of SSC installation, startup, and operational readiness. Candidates for review include:

- Continue design and construction reviews, and initiate review of testing and turnover of safety systems for the Waste Treatment and Immobilization Plant at the Hanford Site.
- Review the final design of the Calcine Disposition Project at Idaho National Laboratory (INL).
- Review the final design of the Chemistry and Metallurgy Research Replacement facility at Los Alamos National Laboratory. If NNSA proceeds with subdividing the project baseline, review construction design packages once finalized.
- Review the construction of the Radioactive Liquid Waste Treatment Facility Upgrade Project at Los Alamos National Laboratory.
- Review final design and safety basis development activities for the Transuranic Waste Facility project at Los Alamos National Laboratory.
- Complete review of the preliminary design of the Pit Disassembly and Conversion Project at Savannah River Site.
- Review construction, development of Technical Safety Requirements, and initial startup plans for the Salt Waste Processing Facility at Savannah River Site.
- Review construction of the Waste Solidification Building at Savannah River Site.
- Review design and construction of the U-233 Downblending and Disposition project at Building 3019 in Oak Ridge National Laboratory.
- Review final design of long-lead procurement equipment for the Uranium Processing Facility. Review final design for the Uranium Processing Facility building and Phase 1 equipment.
- Continue systematic review of the adequacy of electrical safety programs at DOE nuclear sites.
- Review the adequacy of the DOE site probabilistic seismic hazard analysis for the Savannah River Site and Hanford.

As a result of these reviews, DOE will have acknowledged, acted upon, and/or resolved the health and safety issues raised by the Board. Follow-up technical evaluation will verify necessary safety improvement in the design and construction of DOE's new nuclear facilities and major modification to existing facilities. New nuclear facilities will meet acceptable safety standards.

Performance Goal 3	**Nuclear Facilities Design and Infrastructure.** New DOE defense nuclear facilities, and modifications to existing facilities, are designed and constructed in a manner that ensures adequate protection of the health and safety of the workers and the public.

FY 2010 Performance Accomplishments

Waste Treatment and Immobilization Plant at the Hanford Site. The Board has continued its review of the design and construction of important-to-safety structures, systems, and components in the Waste Treatment and Immobilization Plant (WTP) facilities. The Board's activities primarily consisted of the evaluation of emerging issues and the resolution of previously identified issues. Specifically:

- DOE resolved issues identified by the Board in a letter dated December 2, 2009, regarding the adequacy of the structural steel designs for the Pretreatment, High-Level Waste, and Low-Activity Waste facilities.

- The Board identified safety issues in a letter dated January 6, 2010, that could arise as a result of inadequate mixing in process vessels.

- The Board encouraged DOE to complete an independent review of the revised safety design strategy for hydrogen in pipes and ancillary vessels. This review resulted in the identification of 32 findings related to the safety design strategy. DOE is in the process of addressing these issues.

- The Board identified that the methodology for evaluating the consequences of a spray leak from process piping in WTP was not technically correct. DOE agreed with the Board's conclusion and developed a new methodology for WTP. The Board is evaluating the revised approach and its application in WTP.

- The Board identified that DOE had selected a non-conservative value for the deposition velocity, which is a parameter used in the safety analysis to estimate how much radioactive material reaches the public following an accidental release of material.

DOE responded on September 8, 2010, to a set of questions regarding the Board's outstanding concerns. The Board held a public meeting and hearing in early October 2010 to discuss these issues further. The Board is evaluating DOE's responses to the questions and the testimony provided by DOE and its consultants and contractors at the public meeting and hearing. Based on this evaluation, the Board will determine what actions are necessary to ensure that WTP can carry out its important mission in a manner that protects the safety of the public and workers.

Integrated Waste Treatment Unit at Idaho National Laboratory. The Board continued its review of the design and construction of the Integrated Waste Treatment Unit. The Board's activities focused on the project team's selection and design of safety significant instrumentation that protect workers from chemical hazards. The Board reviewed the 90% design of the electrical system in April 2010 and identified issues related to the ampacity derating of long penetration seals and the seismic design and qualification of the emergency lights. Additionally, the Board worked with the project team to address the potential for corrosion of key components. Finally, the Board reviewed the safety basis documents for the facility and is working with DOE to resolve the resulting comments in a timely manner to support a DOE Operational Readiness Review in July of 2011, followed by facility startup in FY 2012.

Chemistry and Metallurgy Research Replacement (CMRR) Project at Los Alamos National Laboratory (LANL). The Board has continued its review of the enhanced preliminary design of the CMRR nuclear facility at LANL. The Board interacted with CMRR project personnel as they advanced the development of a detailed structural model for design. The detailed structural model will be directly used in the seismic analysis of the nuclear facility. The Board encouraged the development of this model so that the building's complex dynamic response can be adequately captured. The Board continued its review of seismic analysis input assumptions and the project approach to soil remediation. The Board provided feedback on seismic analysis issues including time history development and the approach to defining foundation input seismic motions. As a result of the Board's

CMRR certification review, the project developed an approach to validate its design process. CMRR project personnel recently stated their intention to revise their approach to structural and seismic design; the Board is following these changes closely.

The Board initiated its review of the revised CMRR Preliminary Documented Safety Analysis. The Board's review will not be complete until the project finalizes updated System Design Descriptions and a complete Process Hazard Analysis. The Board identified habitability concerns with the Entry Control Facility (ECF), the location where operators will respond to design basis accidents including earthquakes. Currently, the CMRR project does not plan to ventilate the ECF. As a result of Board concerns, the project is completing additional studies to assess the impacts on CMRR of releases from adjacent facilities in the event of the design basis accidents.

Transuranic Waste Facility Project at LANL. NNSA placed the Transuranic (TRU) Waste Facility project on hold in late 2008 to reevaluate mission need and examine alternatives. The delay was in part due to concerns raised by the Board regarding the project's safety strategy. The project resumed in FY 2010 with a reduced scope that eliminated capabilities to process TRU waste and prepare waste shipments for offsite disposal. The project maintains staging, storage, and characterization functions for TRU waste. Though the scope changes resolved the Board's initial concerns, the Board reviewed the revised conceptual design in FY 2010 and identified additional safety issues. The Board identified the absence of controls to mitigate the design basis aircraft crash accident, as well as incorrect application of accident analysis parameters from DOE technical standards to the seismic evaluation. The Los Alamos Site Office subsequently specified resolution of the Board's concerns as conditions of approval in the Conceptual Safety Validation Report. The Board will follow issue resolution during preliminary design.

Radioactive Liquid Waste Treatment Facility Upgrade Project at LANL. The Board confirmed that NNSA has resolved issues previously identified by the Board. Specifically, Federal oversight has improved, and the project team has successfully implemented improvements in its approach to achieving safety in design. The Board reviewed the 80% design the facility. In addition to addressing specific issues related to confinement and system protection during design basis events, the Board helped identify cost-effective strategies to resolve issues regarding the design basis chemical hazard. The project is currently on hold while NNSA reviews alternatives to reduce project cost. Board oversight activities will continue when NNSA decides upon a path forward.

Criticality Experiments Facility at NNSS. NNSA moved the Criticality Experiments Facility from LANL and has been preparing for criticality experiment operations at the Device Assembly Facility. Previously the Board has reviewed and commented on the design for facility modifications and modification of the critical assembly machines, construction activities, and the re-build and testing of the four critical assembly machines. In FY 2010, the Board reviewed startup and acceptance testing, safety basis, instrumentation and control systems, and the readiness review process. The Board found deficiencies in the accident analysis, control set, and safety system design, and also identified the concern that adequate technical expertise had not been applied by NNSA and its contractors to evaluate and ensure safe operations. After resolution of these issues, criticality experiments should be ready to begin.

Fire Protection for Final High-Efficiency Particulate Air (HEPA) Filters for Savannah River Site (SRS) Salt Waste Processing Facility. The Board had previously determined that the design of the confinement ventilation system did not comply with DOE Standard 1066, *Fire Protection Design Criteria*, for protection of the final stage of HEPA filters. In response, the project has implemented a design change to include a manually activated deluge system upstream of the first HEPA filter stage. In addition, the project developed a crosswalk matrix documenting the technical justification for equivalency with the remaining DOE Standard 1066 requirements. The DOE Savannah River Operations Office approved the equivalency determinations. The Board believes the proposed design change with supporting equivalencies provide an adequate degree of fire protection for the confinement ventilation system.

Mixing System Controls and Operational Parameters for SRS Salt Waste Processing Facility. The Board reviewed the design, testing, and controls associated with the methods for mixing the contents of process vessels. The Board concluded that, given appropriate controls and operational parameters, the air pulse agitators should fulfill the functions assumed in the safety basis. However, the Board identified shortcomings with the testing

and modeling that the project team should consider in the selection of controls and operational parameters. The project is taking action to address the Board's concerns.

Waste Solidification Building at SRS. The Board is currently reviewing the quality assurance program, including commercial grade dedication, at the Waste Solidification Building. Specifically, the Board's efforts are focused on the quality assurance aspects of the ongoing construction activities. In addition, the Board is planning to review the facility's instrumentation and control systems in the near future.

Uranium-233 Downblending at Oak Ridge National Laboratory. The Board reviewed the Preliminary Safety Design Report for the project and provided DOE with feedback indicating that the document did not fully address safety basis deficiencies noted in the Board's Periodic Report to Congress on issues concerning the design and construction of DOE's defense nuclear facilities. DOE has informed the Board that the next evolution in safety basis documentation would address the Board's concerns.

Highly Enriched Uranium Materials Facility at Y-12. To support the reviews for startup of operations, and as a follow-up to previous quality assurance reviews of the Highly Enriched Uranium Materials Facility, the Board initiated a review of the adequacy of a sample of Engineering Quality Requirement Document packages and corroborating vendor quality records or applicable quality documentation for completeness. The review determined that the document packages for the Secondary Confinement System and the Rackable Can Storage Boxes were complete. The Fire Suppression System document package was inadequate, lacking sufficient documentation to validate the commercial grade dedication activities and address all critical characteristics of a complete fire suppression system. Subsequent review of vendor records and purchase orders and interviews with quality assurance personnel by the project provided enough evidence that the system can meet safety expectations. The Board is encouraging DOE to share the lessons learned with the Uranium Processing Facility and other projects to help preclude recurrence of similar problems.

After the Y-12 contractor discovered non-safety wiring in a junction box that carries safety related wiring, the Board prompted a detailed technical evaluation of the nonconforming condition and a full extent-of-condition review. This extent-of-condition review is ongoing, and so far has discovered an additional nonconformance. Also during FY 2010, the Y-12 contractor performed a calculation that addresses issues previously raised by the Board regarding ampacity derating of cables passing through penetration seals.

Uranium Processing Facility at Y-12. The Board has continued to conduct reviews of project management, DOE oversight, safety system design, geotechnical and structural design, and technology development. The Board issued a letter on March 15, 2010, transmitting issues with the geotechnical and structural engineering for the project. Project personnel have identified acceptable resolution approaches for the issues and are finalizing design documents to provide verification that the issues are closed. The Board's staff assessed the 35% design of the electrical system in July 2010 and identified issues related to the lightning protection system and emergency lights.

The Board identified that the project strategy for combining critical decisions was not conducive to the verification of safety in the preliminary design. DOE has agreed with this concern and has initiated action to revise the project safety strategy. The Board identified that the long-lead procurement safety basis information was not complete to support a final design. DOE concurred with the findings and identified that the cause was the use of a design-build procurement approach for the long-lead equipment. DOE subsequently revised the strategy for long-lead equipment procurement to address this concern.

Filter Test Facility. Nuclear-grade high-efficiency particulate air (HEPA) filters are used in essentially all new nuclear facilities and are tested in the Filter Test Facility to ensure the filters meet performance requirements. In a letter dated March 17, 2008, the Board expressed concerns with degradation in quality of the nuclear filters as reported by the Filter Test Facility. On April 16, 2010, the Department of Energy (DOE) provided the Board with the final report documenting actions to identify and address quality problems with the manufacture of HEPA filters. While problems with manufacturer quality continue, DOE is more aggressively addressing the deficiencies. This is evidenced by audits of a key filter manufacturer that yielded comprehensive corrective actions and formal corrective action requests being developed in response to defects found by the Filter Test Facility. The Board will continue to monitor DOE corrective actions to address the continuing unacceptably

high filter failure rates.

Safety Classification of Fire Protection Systems. Board Recommendation 2008-1, *Safety Classification of Fire Protection Systems*, identified the need for standards for the design and operation of fire protection systems being relied upon as a primary means of protecting the public and workers from radiological hazards. As part of the Implementation Plan to address the recommendation, DOE and NNSA issued interim guidance on design and operations of safety-related fire protection sprinkler systems in February and March 2010, respectively. Several projects are now using this guidance in preparing their designs. The Board issued a letter to DOE in July 2010 pointing out that, although the interim guidance provides useful information for current and future projects, it does not define the comprehensive set of attributes of safety-related fire protection systems which the Board recommended to be incorporated into the DOE directives. The Board is working with DOE to complete the effort.

Performance Goal 3	**Nuclear Facilities Design and Infrastructure.** New DOE defense nuclear facilities, and modifications to existing facilities, are designed and constructed in a manner that ensures adequate protection of the health and safety of the workers and the public.

FY 2009 Performance Accomplishments

Congressional Mandate: Chemistry and Metallurgy Research Replacement Facility at Los Alamos National Laboratory. Pursuant to the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, the Board has conducted extensive reviews of the preliminary design of the CMRR Nuclear Facility as part of certifying that design concerns reported by the Board have been resolved. During the past year considerable resources have been dedicated to the CMRR certification review. The Board identified seven topical areas for the certification review, which were the five open Board concerns identified in its quarterly reports to Congress plus two additional areas the Board considered important for the CMRR design process. The Board developed a systematic approach to completing the certification review, identifying concerns with NNSA's resolution of the topic area, and formally transmitting these concerns to NNSA for resolution. Based on NNSA responses and commitments each of these concerns were resolved. On September 4, 2009, the board met the Congressional mandate by issuing *Chemistry and Metallurgy Research Replacement Facility Project, Los Alamos National Laboratory, Certification Review, Report to Congressional Defense Committees*. NNSA has committed to implement detailed designs consistent with specific design requirements to which NNSA had agreed as part of the certification process. The Board intends to review additional design material as it becomes available, and to review the final design and Documented Safety Analysis once the CMRR project is given approval to proceed to final design.

Safety-in-Design: With significant Board involvement, DOE developed a change to DOE Order 413.3A, *Program and Project Management for the Acquisition of Capital Assets*, developed sixteen guidance documents to implement this order, and developed a proposed change to DOE Order 420.1B, *Facility Safety*, incorporating changes required to address safety-in-design issues. The Board reviewed and commented on these orders and guides.

Waste Treatment Plant (WTP) at the Hanford Site. The Board has continued its review of the design and construction of important-to-safety structures, systems, and components in the Waste Treatment Plant facilities. The Board's activities primarily consisted of evaluating the resolution of previously identified issues. Specifically:

- Following resolution of Board comments, the final summary structural reports for the Pretreatment and High Level Waste Facilities have been prepared. DOE is continuing to work on the final structural design for these facilities. The Board expects that DOE will satisfactorily complete the structural design for the Pretreatment and High Level Waste Facilities and submit final summary structural reports that fully demonstrate that the WTP facilities meet all structural design requirements.

- The Board resolved issues described in its letter dated June 24, 2008, regarding concerns with the contractor's proposed implementation of DOE Standard 1066, *Fire Protection Design Criteria*. The current WTP design for the confinement ventilation systems ensures they perform as expected and are adequately protected from the effects of a fire.

- In a letter dated January 9, 2009, the Board resolved a long-standing issue with fire protection coating of structural steel in WTP facilities. The Board evaluated the adequacy of fire protection coatings to protect facilities containing radiological and chemical hazards, and reviewed the chemical hazards in each of the WTP facilities. The Board's review revealed that the fire coatings applied in each facility are adequate to prevent structural collapse in a design-basis fire.

- The Board initiated review of proposed changes to the safety strategy in the Pretreatment Facility that would have reduced the safety classification of all the safety systems in the facility. The Board did not find the bases for the proposed changes to be technically defensible. DOE has revised its strategy and is maintaining some safety-class controls but has not yet provided an adequate justification for the entire safety strategy. The Board is continuing its evaluation.

Integrated Waste Treatment Unit at Idaho National Laboratory. The Board continued its review of the design and construction of the Integrated Waste Treatment Unit. The Board's activities focused on evaluating the resolution of previously identified issues. In a safety-in-design project letter dated January 24, 2007, the Board had identified several issues that required resolution during final design. Based upon the root-cause analysis of an over-temperature event in the pilot plant's charcoal bed, DOE modified the design to prevent and mitigate the event. Analysis of the waste characterization was completed which verified the control strategy was adequate for the worst-case inventory. The safety-related instrumentation and control system design was revised to separate its safety-related functions and power supply from the rest of the network, and an appropriate design standard was adopted to ensure its reliability. These actions resolved all outstanding Board issues with the project.

New Solid Transuranic Waste Facility Project at Los Alamos National Laboratory (LANL). Following the Board's review in November 2008, NNSA decided to place construction plans on hold pending completion of an engineering needs assessment. The Board's review identified problems with the facility safety strategy, e.g. the use of personal protective equipment in lieu of engineered safeguards to provide worker protection, and poor integration of safety into the design. This project remains on hold.

Radioactive Liquid Waste Treatment Facility Replacement Project at LANL. The Board had previously raised concerns with the preliminary design of the facility, and concluded there was weak integration of the safety and design processes and weak federal oversight. The Board continued to pursue the resolution of these concerns. NNSA has made some progress in addressing some of the concerns. For example:

- Federal oversight has been enhanced through the addition of more personnel dedicated to the project. It is premature to assess whether this action will be effective in improving federal oversight.

- The design was changed to require stainless steel process equipment in lieu of plastic processing equipment to provide confinement for the liquid radioactive waste.

Criticality Experiments Facility and Device Assembly Facility at the Nevada National Security Site. The criticality testing capability from TA-18 at LANL is being relocated to the Criticality Experiments Facility, which will be housed in the Device Assembly Facility at the Nevada National Security Site. In a letter dated January 18, 2008, the Board highlighted the lack of progress in addressing ongoing operational problems and design deficiencies in the water supply for the safety-related fire suppression systems. DOE subsequently conducted several studies culminating in long-term line item requests to replace the water tank and lead-in pipes. In the interim, short-term projects are being pursued to modify sprinkler systems to correct design deficiencies, replace strainers, refurbish the existing water tank, and investigate using standalone fire suppression systems to supplement the existing deficient fire sprinkler systems. A July 29, 2009, Board letter encouraged NNSA to complete the planned work and not allow administrative compensatory measures (e.g., posting a fire watch) to serve as a long-term substitute for reliable engineered safety systems.

Device Assembly Facility Structure. In a letter dated August 16, 2006, the Board noted concerns with extensive cracking and water leaks in the Device Assembly Facility. After further Board urging, DOE conducted concrete strength testing to determine whether the facility structure can function as designed. The Board reviewed the test results and concluded that the concrete meets strength requirements. This long-standing concern is now considered closed.

Flammable Gas Generation at the Savannah River Site (SRS) Salt Waste Processing Facility. The Board previously identified the need to evaluate the impact of thermolysis on the generation of flammable gases in the process vessels. The flammable gas generation rate assumed in the project analysis was not technically defensible. As a result of the Board's review, DOE initiated testing to validate the assumptions made in the safety basis regarding generation of flammable gases. The Board reviewed the test results and concluded that the flammable gas generation rate assumed in the design analysis adequately bounded the rate determined in the experimental testing. This concern is now considered closed.

Structural Design of the SRS Salt Waste Processing Facility. The Board previously pointed out deficiencies in the analysis of the facility's ability to resist natural phenomena hazards. The Board's review of the structural design focused on the resolution of these deficiencies. The Board completed its review of the finite element analysis, structural design, and summary structural report for the facility, and determined that all concerns were resolved.

Final Design Review of the SRS Salt Waste Processing Facility. The Board reviewed the final design of the Salt Waste Processing Facility. As a result of this review, the Board issued a safety-in-design project letter concurrent with Critical Decision (CD)-3 that stated the safety strategy was sound and identified no significant safety issues that would preclude the start of construction. The Board identified several new issues that require resolution as the design process continues: (1) the structural analysis of the ability of process piping to withstand potential explosions (deflagrations or detonations) did not include several considerations, (2) flammable gas generation rates assumed by the facility did not consider all potential sources of heat input into process vessels, (3) the design of the confinement ventilation system does not implement all features or demonstrate the equivalency of the design to those features specified in Section 14 of DOE Standard 1066, *Fire Protection Design Criteria*, for the protection of the final stage of high-efficiency particulate air filters, (4) the design of the facility does not ensure that all operator actions deemed necessary in the Preliminary Documented Safety Analysis following a seismic event can be readily accomplished, and (5) additional actions beyond those identified in the Preliminary Documented Safety Analysis may be required. The project is in the process of revising its design and performing additional analyses to address these concerns.

Instrumentation and Control System for the SRS Salt Waste Processing Facility. The Board reviewed the design of the safety-related portion of the instrumentation and control system for the Salt Waste Processing Facility. This review identified that (1) the isolation of the safety-related portion of the distributed control system from other portions of the system requires better description and understanding by the project to ensure this functional requirement is met, (2) the safety integrity level specified in the Preliminary Documented Safety Analysis may not be achievable, and (3) the project lacked a clear plan to ensure adequate quality of the software to be used in the system. The project is taking action to address the concerns raised during this review.

Quality Assurance for SRS Salt Waste Processing Facility. The Board initiated reviews of the construction practices being utilized for the placement of concrete for the facility. The Board identified numerous quality problems with the control of the materials used to form the concrete that could have affected the as-placed concrete strength. The project took actions to correct the problems identified. The Board also initiated review of the procurement of safety-related equipment. The project is using a commercial grade dedication process for most procurements. The Board's review concluded that the methodology would not ensure the requisite quality of the safety-related components. The Board reviewed configuration management procedures for the project, and found weaknesses that resulted in discrepancies in design and procurement documentation. The project is in the process of rewriting procedures to correct its configuration management and procurement practices. The Board will continue to review this area.

Waste Solidification Building at SRS. The Board completed a final design review for the Waste Solidification Building, as documented in a letter dated January 12, 2009. The Board closed all final design issues related to structural design, red oil, and hydrogen deflagration/detonation prior to the project receiving CD 2/3 on December 10, 2008. The issues related to red oil and hydrogen deflagration/detonation will continue to be followed by the Board as safety controls are being finalized and implemented.

Uranium-233 Downblending at Oak Ridge National Laboratory. In a September 14, 2007, safety-in-design project letter, the Board identified safety-related concerns with the Uranium-233 Downblending and Disposition Project. The Board and DOE reached agreement on the path forward to address these issues. The Board initiated review of the Preliminary Documented Safety Analysis.

Startup Testing for the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex. The Board reviewed the startup testing of safety-related systems at the Highly Enriched Uranium Materials Facility. The Board concluded that the testing generally ensured that the safety-related systems would meet their functional requirements, although two gaps were noted. The Board also noted problems with the

configuration management of the software used for the safety-related confinement ventilation system. The project is taking action to address the Board's concerns.

Quality Assurance for the Y-12 Highly Enriched Uranium Materials Facility. As the Highly Enriched Uranium Materials Facility was being constructed, the project identified quality assurance concerns with thousands of fasteners used in safety-class storage racks. The Board ensured that corrective actions that included sample testing of fasteners would provide a technically defensible rationale for acceptance of the fasteners. The project's initial plans were inadequate; additional actions identified by the Board were subsequently incorporated into the corrective action plan. The Board reviewed the testing results and concluded that the fasteners could be reasonably accepted as-is. This concern is considered closed. The Board is now encouraging DOE to provide detailed lessons learned to help preclude recurrence of this and other quality problems experienced by the project.

Uranium Processing Facility at the Y-12 National Security Complex. The Uranium Processing Facility project continued with its preliminary design phase in FY 2009. The Board has continued to conduct reviews of the project management, DOE oversight, geotechnical and structural design, development of safety systems design, design criteria development, and technology development. These reviews have served to resolve open items from the Board's August 9, 2007, safety-in-design project letter, have provided timely input to improve the project design inputs, and kept the Board up to date on revision to design strategies to prevent new issues from developing and support future reviews at the completion of preliminary design.

Filter Test Facility. Nuclear-grade high-efficiency particulate air (HEPA) filters used in essentially all new nuclear facilities are tested in the Filter Test Facility to ensure the filters meet performance requirements. In a letter dated March 17, 2008, the Board expressed concerns with degradation in quality of the nuclear filters as reported by the Filter Test Facility. In the past year, DOE has improved the acquisition and transmittal of data from testing to responsible procurement personnel, allowing formal corrective action processes to be initiated for testing failures. DOE is continuing to work with the contractors to address quality improvement and verification testing for HEPA filters purchased by DOE.

Performance Goal 3	**Nuclear Facilities Design and Infrastructure.** New DOE defense nuclear facilities, and modifications to existing facilities, are designed and constructed in a manner that ensures adequate protection of the health and safety of the workers and the public.

FY 2008 Performance Accomplishments

Safety-in-Design: As a result of the Board's three public meetings on safety-in-design, the DOE concluded new guidance was needed. With significant Board involvement, DOE developed and published DOE Standard 1189, *Integration of Safety into the Design Process*, in March 2008. This standard establishes the Department's expectations for identifying and resolving safety issues earlier in the design process and clarifies expectations associated with seismic design criteria, protection of co-located workers, and the significance of developing a safety design strategy early in the project life cycle.

The Board expects that as this standard is fully implemented, consistent with the strategy outlined in the Joint Report to Congress dated July 19, 2007, the important safety aspects of the design will be addressed earlier and if issues arise, they will be addressed and resolved earlier and without the significant cost or schedule impacts that have been historically observed.

Board Recommendation 2008-1, *Classification of Fire Protection Systems*. During reviews of the design of new nuclear facilities, it was apparent that consistent design criteria and operational requirements needed to be developed for safety-related fire protection systems. In this Recommendation, the Board identified the need for standards applicable to the design and operation of fire protection systems relied upon to protect the public and workers in defense nuclear facilities. DOE accepted this Recommendation and is the process of developing the needed criteria. As a compensatory measure, DOE will quickly develop interim design criteria for the type of fire suppression system most commonly in use.

Waste Treatment Plant (WTP) at the Hanford Site. The Board has continued its review of the design and construction of important-to-safety structures, systems, and components in the Waste Treatment Plant facilities. The Board's activities primarily consisted of evaluating the resolution of previously identified issues.

- Following resolution of issues related to seismic design criteria, DOE submitted for Board review technical reports supporting the final summary structural reports for the Pretreatment and High Level Waste Facilities. DOE is incorporating Board comments and continues to prepare final reports. DOE is continuing to work on the final structural design for these facilities. The Board expects that DOE will satisfactorily complete the structural design for the Pretreatment and High Level Waste Facilities and submit summary structural reports that fully demonstrate that the WTP facilities meet all structural design requirements.

- In a letter dated June 24, 2008, the Board noted concerns with the contractor's proposed implementation of DOE Standard 1066, *Fire Protection Design Criteria*, for protection of confinement ventilation systems from the effects of a fire. The exhaust high-efficiency particulate air filters in the ventilation systems provide a safety function and need to be protected from fires to ensure they perform as expected. DOE rejected the contractor's proposal and directed the contractor to resubmit the safety strategy for protecting the filters with adequate technical justification.

- The Board's June 24, 2008, letter noted that the issues with the contractor's implementation of DOE Standard 1066 provided an example of concerns with the project's Decision to Deviate process; specifically, the delay in resolution of safety concerns resulting in cost and schedule risks.

Demonstration Bulk Vitrification Facility at the Hanford Site. The Board had identified concerns with the confinement strategy being developed for the nuclear wastes that would be processed in the Demonstration Bulk Vitrification Facility at the Hanford Site. DOE and project personnel revised the confinement strategy, leading to improvements in the confinement design for the facility. In December 2007, project personnel presented technical analyses and discussions supporting the adequacy of this strategy. The Board is now satisfied that the Project's strategy for confinement is adequate. In 2008, the project was put on hold and placed in a condition to support either restart or termination in FY 2010. The final design was completed and submitted to DOE in May 2008.

Waste Feed Delivery Transfer System at the Hanford Site. The Waste Feed Delivery transfer system will deliver high-level waste slurries from the Tank Farms to the Waste Treatment Plant. DOE performed analyses to determine the minimum design pressure rating of the system. In earlier reviews, the Board found that larger or denser particles could lead to plugging the transfer system. In response to Board concerns, DOE formed an expert panel on slurry transfer that evaluated the uncertainties and noted the need for an improved understanding of process variations, additional testing, and model revisions. DOE completed several reports that addressed the technical issues associated with the waste transfer. The Board believes its concerns have been adequately addressed and has no outstanding issues with this facility.

Integrated Waste Treatment Unit at Idaho National Laboratory. The Board identified issues with the structural design and design basis ground motion used for the facility. The Board reviewed the resolution of concerns with the structural design, particularly the development of the design basis ground motion, inputs into the soil-structure interaction analysis, and the use of mechanically anchored reinforcing bar, and concluded these issues had been satisfactorily addressed by DOE. The Board also reviewed the resolution of several concerns identified by the Board in a project letter issued at the beginning of 2007; progress has been made on several issues. DOE determined the root cause of an over-temperature event in the pilot plant's charcoal bed, and the subsequent design modifications to address the issue were assessed by the Board to be satisfactory. DOE is still addressing concerns with the design of a small portion of a safety system and validation of some assumptions made in the safety basis.

Radioactive Liquid Waste Treatment Facility Replacement Project at Los Alamos National Laboratory. The Board reviewed the preliminary design of the facility, and concluded the weak integration of the safety and design processes and weak federal oversight resulted in problems with safety basis development, material selection, determination of seismic design requirements, and configuration management. The Board continued to pursue the resolution of these concerns.

Chemistry and Metallurgy Research Replacement Facility at Los Alamos National Laboratory. The Board's review of the preliminary design and draft Preliminary Documented Safety Analysis for this facility identified several issues with the safety strategy and selection of safety controls. During the past year, progress has been made towards addressing these concerns. DOE has revised the safety strategy and safety documentation and plans to complete a Technical Independent Project Review before proceeding to the final design stage. The Board intends to review the final preliminary design and Preliminary Documented Safety Analysis and subsequently issue a project letter documenting any remaining issues that would need to be addressed during final design.

Criticality Experiments Facility and Device Assembly Facility at the Nevada National Security Site. The criticality testing capability from TA-18 at Los Alamos National Laboratory is being relocated to the Criticality Experiments Facility, which will be housed in the Device Assembly Facility at the Nevada National Security Site. In a letter dated August 16, 2006, the Board noted concerns with extensive cracking and water leaks in the Device Assembly Facility. After further Board urging, DOE has now conducted concrete strength testing and is evaluating the results to ensure the facility can perform its design function. In a letter dated January 18, 2008, the Board also highlighted the lack of progress in addressing ongoing operational problems and design deficiencies in the water supply to the safety-related fire suppression systems. DOE is now conducting several studies to culminate in a recommendation in FY 2009 for correcting the vulnerabilities with the water supply.

Salt Waste Processing Facility at the Savannah River Site. The Board reviewed the final design, structural calculations, and chemical processes for the facility. The review of the structural design focused on the resolution of previously identified deficiencies in the analysis of the facility's ability to resist natural phenomena hazards; the Board concluded that the structural design was adequate. The review of the chemical processes identified the need to evaluate the impact of thermolysis on the generation of flammable gases in the process vessels. As a result of the Board's review, the DOE initiated testing to validate the assumptions made in the safety basis regarding generation of flammable gases.

Waste Solidification Building at the Savannah River Site. In a letter dated June 25, 2008, the Board identified structural issues related to the roof design and the analytical approach to differential settlement. The Board has worked closely with the project to bring the issues identified in the letter to resolution. Additionally,

the Board identified safety basis issues in a letter dated July 15, 2008, related to the application of DOE Standard 1189 to the design process and the analytical approach to evaluating hydrogen explosions in unvented pipes. The Board will continue to bring open issues to resolution and complete a final design review of the Critical Decision-2/3 design package prior to its approval.

Pit Disassembly and Conversion Facility at the Savannah River Site. Despite the slowdown in the Pit Disassembly and Conversion Facility project, the Board continued to review selected aspects of the safety of the design of the Pit Disassembly and Conversion Facility. As a result of the Board questioning the basis for fire loading assumptions in the Documented Safety Analysis for the facility, DOE performed fire testing of gloveboxes typical of those planned for the facility. The results showed that a potential fire could be much more vigorous than expected. The Board's staff provided a list of concerns to DOE regarding the assumptions on combustible loadings in the facility in the event of a facility fire. Further work must be performed by DOE and its contractor.

Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex. In a letter dated February 6, 2008, the Board identified that the water supply for the safety-significant fire suppression system in the facility was not classified as safety-significant consistent with design basis requirements. This safety classification would help ensure that the water supply system was reliable through more rigorous design, construction, maintenance, and configuration control. Subsequently, DOE developed actions to increase the reliability of the fire protection water supply system for the facility. These actions include: a commitment to connect to the Uranium Processing Facility safety-significant water supply tanks when completed, to provide a safety-significant water supply pressure monitor, and to incorporate safety-related configuration controls to assure availability of a dedicated flow path in the current supply system. The Board believes these actions address the Board's concern with the water supply system and considers this item closed.

Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex. As the Highly Enriched Uranium Materials Facility was being constructed, numerous quality problems with concrete placements became evident. The Board ensured that evaluations of defects were technically appropriate and reviewed the corrective actions proposed by the project. The Board believed additional actions were necessary. These actions were subsequently incorporated into the corrective action plan. These actions helped ensure that the building met its functional design requirements.

Uranium Processing Facility at the Y-12 National Security Complex. The project entered the preliminary design phase in FY 2008. The Board has also conducted reviews of the project management, DOE oversight, geotechnical and structural design, design criteria development, subcontract requirements, and technology development. These reviews have served to address other open items from the Board's August 9, 2007, project letter and have provided timely input to improve the project design inputs. In a letter dated January 17, 2008, the Board identified issues with the radiological dose consequence methodology to be used for the project. Discussions with DOE following this letter resulted in DOE instituting an acceptable methodology, closing a significant issue identified in the Board's project letter and Quarterly Report to Congress.

Filter Test Facility. Nuclear-grade high-efficiency particulate air (HEPA) filters are used in essentially all new nuclear facilities and are tested in the Filter Test Facility to ensure the filters meet performance requirements. In a letter dated March 17, 2008, the Board expressed concerns with degradation in quality of the nuclear filters as reported by the Filter Test Facility. At the time, little DOE action was underway to try to resolve these quality concerns. In response to the Board's letter, DOE developed a plan of action to: (1) investigate and correct the root cause of increased rejection rates of HEPA filters, (2) assess the potential degradation of critical quality manufacturing attributes that are not explicitly tested, and (3) reassess the adequacy of filters considered non-safety-related that are not tested at the facility. The Board considers these actions appropriate.

Performance Goal 3	**Nuclear Facilities Design and Infrastructure.** DOE's new defense nuclear facilities are designed and constructed in a manner that ensures adequate protection of the health and safety of the public, the workers, and the environment.

FY 2007 Performance Accomplishments

The Board and its staff continued providing technical evaluations of numerous design and construction projects throughout the DOE complex. These evaluations have led to DOE improving its design process, enhancing the design of new facilities, correcting construction deficiencies noted, as well as starting actions to correct identified issues. Some of these actions are:

Safety-in-Design Public Meetings. The Board held its third public meeting delving into the DOE design process for new defense nuclear facilities. This public meeting, held on March 22, 2007, was a continuation of previous public meetings concerning the Board's interest in integrating safety earlier into the design process. During the Board's first two public meetings, the Board focused on the adequacy of DOE's existing directives related to the design of new facilities and further explored integration of safety in design and the progress being made in implementing DOE's safety-in-design initiatives. The Board's third public meeting considered early issue identification, communication of the Board's issues to DOE, issue management, and timely closure or resolution of the issues. DOE outlined many of the improvements that have occurred as a result of its safety-in-design initiatives. DOE noted that resolving safety issues early in the design process is central to mitigating cost and schedule risks. DOE also identified the need for strong and persistent federal oversight of new design and construction projects. The results of this meeting assisted the Board and DOE in evaluating potential improvements in the timeliness of issue resolution. The information gained was used by the Board and DOE to develop its Joint Report to Congress, *Improving the Identification and Resolution of Safety Issues During the Design and Construction of DOE Defense Nuclear Facilities*, issued in July 2007.

Overall, the public meetings have led to:

- new expectations for identifying and resolving safety issues earlier in the design process, revision of the existing DOE Order for project management,
- commitments to revise the existing DOE Manual for project management and develop a new standard to implement a more rigorous approach to safety-in-design, and
- action by DOE and the Board that will provide for more timely identification of and resolution of technical issues.

The Board expects that these actions, when fully implemented, should lead to significant improvements in the design of new defense nuclear facilities.

Quarterly Report(s) on the Status of Significant Unresolved Issues with the Department of Energy's Design and Construction Projects. In response to a Congressional reporting requirement, the Board initiated actions to prepare quarterly reports to identify and report the status of significant unresolved issues to the Congressional defense committees. During FY 2007, the Board has issued three of these reports. Per the language in the authorization committees' Conference Report, quarterly reporting was to continue until the Board and DOE issued their joint report on a process for more timely identification and resolution of technical differences between the two agencies. The first quarterly report was widely hailed by Congress as being very beneficial in assisting their understanding of the issues. Congress subsequently requested that these reports continue to be prepared and issued by the Board through FY 2008.

Development of Geotechnical Probabilistic Seismic Hazard Curves for the SRS, LANL and Idaho Sites. The Board continued its review of DOE efforts to update probabilistic seismic hazard curves at several DOE sites. An update of the probabilistic seismic hazard analysis and development of seismic design ground motions was completed for the LANL site. The LANL probabilistic seismic hazard analysis benefited from a rigorous participatory peer review as the work was being accomplished. Results from the LANL probabilistic seismic hazard analysis indicate that the seismic hazard at LANL is greater than previously believed. LANL is in the

process of evaluating the safety impact of this increase in the seismic hazard for each nuclear facility that is operating. Design basis earthquake ground motions have increased by about 50% at LANL. The Board is following DOE efforts to update probabilistic seismic hazard curves at SRS and the Nevada National Security Site.

Waste Treatment Plant at the Hanford Site. The Board has continued its review of the design and construction of important-to-safety structures, systems, and components in the Waste Treatment Plant facilities. The design and construction of these facilities slowed significantly during this past year while DOE addressed technical and project management issues. The Board's activities primarily consisted of considering the resolution of previously identified issues.

- DOE significantly underestimated the impact of hydrogen hazards on pipes and small process vessels and components. At the urging of the Board, DOE has continued to evaluate design solutions to address the issue. DOE has now developed new design criteria that ensure the design remains fully protective of the public's health and safety.

- The Board continued to follow the status of the design and installation of fire-protective coatings on structural steel. DOE has now developed an adequate technical basis to justify not coating some structural steel. The technical basis and criteria developed should ensure that a fire will not adversely impact the structural integrity of the facilities. The Board will evaluate the implementation of the criteria to help ensure protection of the public's health and safety.

Integrated Waste Treatment Unit at the Idaho National Laboratory. The Board reviewed the design of the Integrated Waste Treatment Unit. Engineering disciplines used include: process safety, seismic and structural, electrical, fire protection, mechanical equipment, confinement ventilation, and instrumentation and control. In addition, the Board reviewed the final preliminary documented safety analysis, as well as software quality assurance for both engineering design and safety analysis codes, and software supporting the control of the waste treatment process. DOE is currently resolving several concerns identified. The Board issued a project letter at the beginning of 2007 documenting several items that would need to be addressed during final design to ensure safety. As a result, DOE is taking several actions including additional waste sampling to ensure radionuclide inventories supporting the safety analysis are conservative, and completion and documentation of the investigative effort into the root cause of an over-temperature event in the DOE pilot plant's charcoal bed.

Special Nuclear Material Component Requalification Facility at the Pantex Plant. The Board completed its final reviews and observed the operational readiness review of the Special Nuclear Material Component Requalification Facility. The Board has no outstanding issues with this facility and it is now operational.

Chemistry and Metallurgy Research Replacement Facility at the Los Alamos National Laboratory. The Board's review of the Chemistry and Metallurgy Research Replacement Facility identified weaknesses in the overall approach for selecting safety-related systems, and the establishment of conservative design criteria for these safety-related systems. The draft Preliminary Documented Safety Analysis does not establish an adequate facility safety strategy. The early identification of safety-related structures, systems and components to prevent and mitigate potential accidents is vital to the successful design of the project. The Board continues to review the preliminary design and at the end of preliminary design will undertake a detailed review of the overall safety strategy, as well as, assess the adequacy of design criteria and the design of safety-related systems.

Criticality Experiments Facility at the Nevada National Security Site. The criticality testing capability from TA-18 at Los Alamos National Laboratory is being relocated to the Criticality Experiments Facility, which will be housed in the Device Assembly Facility at the Nevada National Security Site. The Board noted to DOE deficiencies in the seismic analysis and potential structural issues associated with extensive cracking and water leaks in the Device Assembly Facility. The Board informed DOE that further testing of the concrete strength was prudent to fully evaluate the impact of the extensive cracking. As a result, DOE has now agreed to conduct further testing of the concrete strength to adequately evaluate the impact of the extensive cracking and ensure the facility can perform its design function. The Board also reviewed the preliminary documented safety analysis for the Criticality Experiments Facility and developed a significant number of comments and concerns. Many of these concerns were shared by DOE's Safety Basis Review Team, but were not being acted upon. As a result of

Board interaction, the preliminary documented safety analysis was revised and improved.

Salt Waste Processing Facility at the Savannah River Site. The Board's review of the preliminary design of the Salt Waste Processing Facility identified deficiencies in the analysis of the facility's structural design to resist natural phenomena hazards. Further, the supporting geotechnical engineering report had not been issued. Completion of an adequate preliminary design is expected to provide a technically sound basis for establishing the project performance baseline and for initiating the final design. The Board was concerned that a significant redesign of the facility might be warranted. DOE commissioned an independent review team of subject matter experts to validate the Board's issues. This independent review team agreed with the Board and made recommendations to improve the preliminary design of the structure, as well as the analysis for the facility in the geotechnical and structural areas. As a result, DOE has redesigned the facility to ensure it will adequately confine hazardous materials.

Container Surveillance and Storage Capability Project and K-Area Interim Surveillance Project at the Savannah River Site. These two projects provide Savannah River Site additional long-term plutonium storage capacity and the ability to perform surveillance, stabilization, and packaging, capabilities that are required by DOE's long-term plutonium packaging standard. The Board completed its final reviews of the K Area Interim Surveillance Project, focusing on the documented safety analysis, criticality safety evaluation, and vault integrity testing to support a gaseous fire suppression system. No significant issues were identified and the K Area Interim Surveillance Project is now operational. The Board continued reviews of the preliminary design of the Container Surveillance and Storage Capability project, focusing on hazards analysis, criticality safety, fire protection, and an evaluation of the ability of existing and new structures to meet seismic performance requirements. The Board issued a letter in January 2007 communicating several concerns to DOE, including deficiencies in the hazards analysis and an inadequate basis for excluding nuclear incident monitors from the facility. As a result, DOE has revised the hazards analysis to address the Board's concerns and incorporated nuclear incident monitors into the design.

Uranium Processing Facility at the Y-12 National Security Complex. The Board reviewed the conceptual design and safety documentation for the project. The Board concluded that the conceptual design and safety documentation did not meet the expectations of the draft standard for incorporating safety in design. DOE conducted additional design work and elaborated on the project risks to address the Board comments. The Board believes the conceptual design is now adequate to proceed into preliminary design. The project is awaiting formal approval by DOE to proceed with preliminary design.

Plutonium Storage at the Savannah River Site. In 2003, Congress tasked the Board to conduct a study of the adequacy of the K-Area Materials Storage (KAMS) facility and related support facilities, such as Building 235-F (235-F), at the Savannah River Site. A report documenting this study was issued in December 2003. The Board proposed nine actions it considered necessary to enhance safety, reliability, and functionality of the plutonium storage facilities at Savannah River Site. Congress also requested an annual report on the status of the proposals in this report. In June 2007, the Board issued its annual update to Congress. Based in part on extensive proposals, DOE decided against using 235-F and will only store plutonium in the KAMS facility. The Board agreed with this decision. DOE agreed with the Board's proposals to upgrade the KAMS facility. In 2007, DOE completed the last remaining upgrade to the fire protection system in the facility. The addition of a fire detection system permits plutonium to be stored safely in the KAMS facility until dispositioned by DOE.

8. PERFORMANCE GOAL 4: EFFECTIVE NUCLEAR SAFETY PROGRAMS AND ANALYSIS

DOE regulations, requirements, and guidance are developed, implemented, and maintained; and safety programs at defense nuclear facilities are established and implemented as necessary to adequately protect the health and safety of the public, the workers, and the environment.

OUTCOME: DOE will have acknowledged, acted upon, and/or resolved the health and safety issues raised by the Board. In addition, follow-up technical evaluation of DOE's safety programs at defense nuclear facilities will verify necessary improvements in safety, and effective implementation of Integrated Safety Management principles.

SUMMARY:

For FY 2012, the key performance goals and initiatives of the Board in this area are intended to resolve continuing problems and ensure safety is improved at the level of the workers. If addressing nuclear safety hazards at the worker-level at DOE's defense nuclear facilities can be improved, then the safety of the public more distant from the hazards will be substantially improved. Major efforts to achieve this goal in FY 2012 include:

- Ensure that DOE and its contractors apply the principles of integrated safety management at the activity level (i.e., that work scope is properly identified, that workers know the hazards and controls for their work, that work is performed in accordance with those controls, and that feedback and improvement are used to reduce further the risks of future work).

- Ensure that DOE directives that impact safety at defense nuclear facilities are evaluated and strengthened, including the development of new safety directives to provide guidance in areas for which none is currently available.

- Ensure safety programs are appropriately implemented by technically qualified personnel and oversight of these programs is conducted by technically competent federal personnel.

- Strengthen the application of quality assurance principles at defense nuclear facilities to improve the reliability and effectiveness of controls used to prevent or mitigate potential accidents.

- Ensure that verifications of integrated safety management implementation are conducted at sites where new operating contractors are in place and where new integrated safety management systems are invoked, and ensure that such verifications are conducted in a manner that assures public and worker safety and the protection of the environment.

Performance Goal 4	**Effective Nuclear Safety Programs and Analysis.** DOE regulations, requirements, and guidance are developed, implemented, and maintained; and safety programs at defense nuclear facilities are established and implemented as necessary to adequately protect the health and safety of the public, the workers, and the environment.

FY 2012 Performance Objectives

DOE Directives. The Board will continue to assess the adequacy of proposed changes to DOE directives to ensure that any revisions are appropriate and provide for adequate protection of the public, worker, and environment. The results of the directives reviews completed by the Board will be provided to DOE for action. The Board anticipates that approximately 30 DOE directives that may impact public and worker health and safety will require review, of which five to ten are likely to require significant Board and staff interaction to ensure satisfactory resolution of potential issues. The Board also expects to continue its involvement in the efforts of the National Nuclear Security Administration (NNSA) to establish its own supplementary directives system. It is estimated that five NNSA supplementary directives will also require review. As a result of these reviews, new or modified health and safety directives will be issued, resulting in improved safety through standardized requirements and guidance that provide for adequate protection of the workers and the public as well as the protection of the environment.

Integrated Safety Management. The Board will continue its reviews of DOE's implementation of integrated safety management (ISM) and associated nuclear safety programs. In addition, while the Board has noted considerable progress in the implementation of ISM, continued DOE efforts are necessary to maintain ISM systems and ensure continuous improvement across the complex. Specific functional areas will be sampled to a greater depth, with emphasis on implementation of ISM at the activity level of execution.

Safety Management Programs. Safety management programs are designed to ensure defense nuclear facilities are operated in a manner that adequately protects workers, the public, and the environment. At least five reviews will be completed in areas such as training and qualification, quality assurance, nuclear criticality safety, software quality assurance, conduct of operations, configuration management, maintenance management, and readiness preparations. As a result of these reviews, it is anticipated that DOE will provide an acceptable approach and schedule for resolution of any identified issues to support the safe operation of defense nuclear facilities.

Performance Goal 4	**Nuclear Safety Programs and Analysis.** DOE regulations, requirements, and guidance are developed, implemented, and maintained; and safety programs at defense nuclear facilit8ies are established and implemented; as necessary to protect adequately the health and safety the workers and the public.

FY 2010 Performance Accomplishments

DOE Directives. As part of its continuing review of new and revised DOE directives, the Board and its staff evaluated and provided constructive critiques of over 35 directives associated with, but not limited to radiological protection, maintenance management, worker protection, and project management. At year's end, the staff was in the process of resolving issues regarding revisions or drafts of 12 pending directives to improve the content, clarity, and consistency of safety requirements and guidance. Examples of reviews completed in FY 2010 include:

- DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*
- DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*
- DOE Order 458.1, *Radiation Protection of the Public and the Environment*
- DOE Guide 423.1-1A, *Implementation Guide for Use in Developing Technical Safety Requirements*
- DOE Standard 1172-Year, *Safety Software Quality Assurance Functional Area Qualification Standard*
- DOE Standard 1158-2010, *Self-Assessment Standard for DOE Contractor Criticality Safety Programs*

In addition, the Board took actions in response to the *Department of Energy 2010 Safety and Security Reform Plan* issued by the Deputy Secretary of Energy on March 16, 2010, which called for "near term relief from specific low-value burdensome requirements as well as longer-term streamlining of requirements that will lead to measureable productivity improvements." The Deputy Secretary's plan called for a 50 percent reduction in the number of directives managed by DOE's Office of Health, Safety and Security. After reviewing the draft project management plan for this effort, the Board sent a letter to the Secretary of Energy on May 5, 2010, requesting a report and briefing to clarify the criteria DOE was using to analyze individual directives to determine cancelation and consolidation and the steps that DOE was taking to improve and strengthen directives. After the Board's May 12, 2010, public hearing and meeting on nuclear safety oversight, DOE revised its reform plan, satisfactorily addressing the Board's concerns about the need for a rigorous and comprehensive approach for revising safety directives.

Recommendation 2009-1, *Risk Assessment Methodologies at Defense Nuclear Facilities*. In 2009, as a result of several years of review of the use of quantitative risk assessment methodologies, the Board issued Recommendation 2009-1. The Board's recommendation identified the need for adequate policies and associated standards and guidance on the use of quantitative risk assessment methodologies for safety applications at DOE defense nuclear facilities. During 2010, the Board worked closely with DOE to develop an acceptable Implementation Plan, and a final plan was accepted in May 2010. The Board will evaluate DOE's implementation of the plan and continue to work toward improving DOE's safety posture with respect to the use of risk assessment methodologies.

Recommendation 2007-1, *Safety-Related In Situ Nondestructive Assay of Radioactive Materials*. The Board evaluated DOE's progress in implementing Recommendation 2007-1. DOE's Technical Support Group, defined in the recommendation's implementation plan and comprising senior DOE and contractor personnel with significant experience in nondestructive assay, continued to meet the plan's milestones and to provide the results of these efforts to the Board.

Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*. All 22 commitments made in the DOE Implementation Plan responding to Recommendation 2004-1 were due to be complete by 2009. However, several commitments were late or had no discernable response from DOE, and the Board was concerned that some previous improvements had degraded as result of changes in management approach and/or neglect. The Board held two public meeting and hearings on the efficacy of DOE's safety oversight to address these concerns. The first public meeting and hearing held on November 12, 2009, examined DOE's commitment to integrated safety management as its core safety management system. Senior DOE and NNSA leadership confirmed their ongoing support for and commitment to integrated safety management. The second public

hearing and meeting, held on May 12, 2010, focused on the efficacy of DOE and NNSA's safety oversight programs and the potential impact of significant changes to DOE's directives system envisioned under DOE's safety and security reform effort. The public meetings and hearings were effective in heightening the awareness of senior DOE and NNSA leadership to the need for maintaining effective safety management and oversight systems for defense nuclear facilities. The Board will continue to investigate all aspects of DOE's response to Recommendation 2004-1 in future public meetings and hearings and by conducting reviews related to key aspects of this recommendation.

Recommendation 2002-1, *Quality Assurance for Safety-Related Software*. The Board closed Recommendation 2002-1 on April 14, 2010, based on DOE's progress in establishing the necessary processes for software quality assurance. The Board continued to evaluate the efficacy of quality assurance practices germane to safety-related software throughout the complex.

Integrated Safety Management. In addition to oversight activities related to Recommendation 2004-1, the Board continued its reviews of DOE's implementation of integrated safety management (ISM) and associated nuclear safety programs. While the Board noted considerable progress in the implementation of ISM, continued DOE efforts are necessary to maintain ISM systems and ensure continuous improvement across the complex. The Board reviewed the effectiveness of the implementation of ISM in activity-level work planning processes at five sites. The reviews revealed that the ISM programs at the Hanford Tank Farms, Lawrence Livermore National Laboratory, Pantex Plant, Hanford Plateau Remediation, Waste Isolation Pilot Plant, and Idaho National Laboratory have not been fully implemented at the activity level. In all cases, weaknesses were identified in the processes used to analyze activity-level hazards and to provide adequate controls to ensure worker safety. DOE has made efforts to address these weaknesses, but further improvement is needed.

Leading Indicators for Safety Performance. Over the last several years, DOE and its contractors have worked to develop and maintain performance-based contractor assurance systems. These systems are typically large databases of performance metrics selected to monitor contractor performance in satisfying DOE's contractual expectations. With the Board's encouragement, DOE and its contractors are beginning to consider whether data in those systems may provide leading indicators for facility safety programs. The Board has suggested a methodology for identifying and using leading indicators for facility safety programs and will continue to encourage DOE and its contractors in their efforts.

Nuclear Criticality Safety. The Board conducted nuclear criticality safety reviews in 2010 at the Salt Waste Processing Facility and H-Canyon at the Savannah River Site. The Board also followed progress made by DOE contractors on nuclear criticality safety issues identified in previous years, specifically at the Y-12 National Security Complex and Los Alamos National Laboratory. The Board reviewed nuclear criticality safety evaluations from several sites, including the Nevada National Security Site, Los Alamos National Laboratory, Y-12, Savannah River Site, and Hanford. The Board also reviewed the technical basis for the criticality alarm system at the Y-12 Highly Enriched Uranium Materials Facility. The Board continued to evaluate complex-wide activities as described in DOE's annual report on criticality safety. Each of these reviews confirmed that the various criticality safety programs and associated documentation were adequate, but the Board noted several opportunities for improvement and communicated them to DOE and its contractors.

Readiness Reviews. The Board evaluated Startup Notification Reports for defense nuclear facilities under its cognizance and reviewed startup and restart activities accordingly, including the following readiness reviews:

- Highly Enriched Uranium Materials Facility operational readiness review at Y-12.
- Weapons Engineering Tritium Facility operational readiness review at Los Alamos National Laboratory.
- Critical Experiments Facility operational readiness review at Nevada National Security Site.
- Transuranic Waste Processing Center Drum Venting operational readiness review at Y-12.
- Auxiliary Hot Cell Facility operational readiness review at Sandia National Laboratories.
- Barolo subcritical experiments operational readiness review at the Device Assembly Facility at Nevada National Security Site.
- Tritium Processing Station readiness assessment at Lawrence Livermore National Laboratory.

Conduct of Operations. The Board reviewed conduct of operations at Hanford in FY 2010. The Board noted

weaknesses in work planning and control. The Board plans to follow DOE's efforts to improve work planning and control and conduct of operations at Hanford.

Justifications for Continued Operations. The Board continued its review and oversight of DOE's processes and practices associated with the use of justifications for continued operations (JCOs) at defense nuclear facilities. Previously the Board found a number of weaknesses in the JCO process and its implementation at defense nuclear facilities. In response to the Board's concerns, DOE developed and promulgated new and improved guidance in this important safety basis area. The Board will closely follow the implementation and effectiveness of the improved guidance.

Safety System Design, Functionality, and Maintenance. In 2009–2010 the Board continued to conduct reviews of safety system design, functionality, and maintenance at defense nuclear facilities and to follow up on previously identified issues. Throughout FY 2010 the Board interacted with DOE and NNSA to properly disposition the findings from these reviews. As a result of the Board's involvement, all of the heat source plutonium in vulnerable packaging at Los Alamos National Laboratory has been repackaged into robust containers, and significant safety improvements have been implemented at the laboratory's tritium facility. The Board conducted safety reviews of the Tritium Processing Station at Lawrence Livermore National Laboratory, the proposed Savannah River Site Enhanced Chemical Cleaning system, the Hanford Tank Farms, and the Barolo subcritical experiment activity at the Nevada National Security Site. A number of important safety issues were identified during these reviews and communicated to DOE for resolution.

Safety Analysis Requirements for Defining Adequate Protection for the Public and the Workers. Following issuance of Recommendation 2009-2, *Los Alamos National Laboratory Plutonium Facility Seismic Safety*, the Board inquired about the adequacy of the requirements and criteria in the DOE directives system pertaining to the problems that led to the issuance of the Recommendation. The Board reviewed DOE's responses to its inquiries and concluded that DOE's requirements were not sufficiently systematic and comprehensive to ensure that (1) documented safety analyses for defense nuclear facilities are prepared such that they demonstrate adequate protection of the public and the workers, and (2) the DOE approval authority ensures the adequacy of the proposed controls for protection of the public and the workers.

Federal Technical Capability Program (FTCP). The Board participated in FTCP meetings and activities during FY10 to ensure DOE maintained a competent and highly capable workforce at its defense nuclear facilities. The Board reviewed the FTCP's FY 2010 Operational Plan and provided input on the qualification of expert-level technical personnel. The Board also reviewed all newly issued or revised functional area qualification standards and provided comments to improve them. Through its staff's interactions with the FTCP, the Board raised the need for DOE to resolve deficiencies in its human factors program and the necessity of alleviating the shortage of qualified individuals to address human factors issues.

Quality Assurance Management. In addition to the Board's activities related to 2002-1, *Quality Assurance for Safety-Related Software*, the Board encouraged and provided feedback to the DOE efforts to improve Commercial Grade Dedication awareness and training within the department, and monitored the DOE Office of Environmental Management's Corporate Board devoted to continuous improvement of quality assurance program implementation. The Board conducted seven reviews in 2010 involving quality assurance, software quality assurance, and commercial-grade dedication. The Board issued a letter in March 2010 underscoring the issues with the flow down of quality assurance requirements to subcontractors and vendors.

Safety Culture Improvement Project. In FY 2008, DOE and its contractors established a jointly sponsored task team to develop tools for assessing and improving the safety culture of the federal and contractor workforces. In FY 2009 and early FY 2010, the tools developed by the task team were piloted at several DOE sites, and lessons learned were incorporated into the tools. Two recurring observations from the pilot efforts were that safety culture improvement must be a long-term initiative, and that a cadre of personnel knowledgeable on safety culture should be available to advise and support the sites during their efforts. As a result, the safety culture task team has been re-chartered to serve in that capacity. Safety culture improvement activities are expected to begin or continue at several DOE sites over the next few years. The Board has been closely observing the team's efforts and will continue to evaluate and encourage this effort as it continues to mature.

Performance Goal 4	**Nuclear Safety Programs and Analysis.** DOE regulations, requirements, and guidance are developed, implemented, and maintained; and safety programs at defense nuclear facilit8ies are established and implemented; as necessary to protect adequately the health and safety the workers and the public.

FY 2009 Performance Accomplishments

DOE Directives. As part of its continuing review of new and revised DOE directives, the Board and its staff evaluated and provided constructive critiques of over 40 directives associated with, but not limited to nuclear design criteria, radiological protection, maintenance management, worker protection, and project management. At year's end, the staff was in the process of resolving issues regarding revisions or drafts of 10 pending directives to improve the content, clarity, and consistency of safety requirements and guidance. Examples of DOE directive reviews completed in 2009 include:

- DOE Order 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*
- DOE Order 426.X, *Federal Technical Capability*
- DOE Order 410.2, *Management of Nuclear Materials*
- DOE Order 452.2D, *Nuclear Explosive Safety*
- DOE Order 452.1D, *Nuclear Explosive and Weapon Surety Program*
- Title 10, Code of Federal Regulations Part 712, *Human Reliability Program*
- DOE Guide 413.3-4, *U.S. Department of Energy Technology Readiness Assessment Guide*
- DOE Order 414.4.IX, *Quality Assurance*
- DOE Standard 1172, *Safety Software Quality Assurance Functional Area Qualification Standard*
- DOE Standard XXXX, *Application of Safety Instrumented Systems used in Non-Reactor Nuclear Facilities*
- DOE Standard 1173-2009, *Criticality Safety Functional Area Qualification Standard*
- DOE Standard 1083-2009, *Processing Exemptions to Nuclear Safety Rules and Approval of Alternative Methods for Documented Safety Analyses*
- DOE Handbook 1028-2009, *Human Performance Improvement Handbook,* Volume 1: *Concepts and Principles*, and Volume 2: *Human Performance Tools for Individuals, Work Teams, and Management*

Use of Quantitative Risk Assessment Methodologies. The Board identified the timely need for adequate policies and associated standards and guidance on the use of quantitative risk assessment methodologies at DOE defense nuclear facilities and issued Recommendation 2009-1, *Risk Assessment Methodologies at Defense Nuclear Facilities*. The Board recommended that DOE:

1. Establish a policy on the use of quantitative risk assessment for nuclear safety applications.
2. Consistent with this policy, establish requirements and guidance in a DOE directive or directives that prescribe controls over the quality, use, implementation, and applicability of quantitative risk assessment in the design and operation of defense nuclear facilities.
3. Evaluate current ongoing uses of quantitative risk assessment methodologies at defense nuclear facilities to determine if interim guidance or special oversight is warranted pending the development of formal policy and guidance.
4. Establish a requirement to identify deficiencies and gaps in ongoing applications of quantitative risk assessment along with the additional research necessary to fill those gaps in support of the development and implementation of the final policy and guidance.

DOE's Implementation Plan for this Recommendation is expected in late calendar year 2009.

Recommendation 2007-1, Safety-Related In Situ Nondestructive Assay of Radioactive Materials. The Board evaluated DOE's progress in implementing the Recommendation issued in October 2007. The Technical Support Group, defined in the Implementation Plan and comprised of senior DOE and contractor personnel with significant experience in nondestructive assay, developed lines of inquiry to be used during site reviews starting in calendar year 2009. Lines of inquiry included criteria for reviews of training and qualification, design requirements for new facilities and equipment, standards for conducting holdup measurements, implementation of standards, research and development, quality assurance, and oversight. The Board's staff observed the Technical Support Group's benchmarking efforts at key defense nuclear facilities.

Nuclear Criticality Safety. The Board conducted reviews in 2009 related to nuclear criticality safety issues highlighted in Board correspondence with DOE in January 2008 that expressed concerns that DOE reviews of criticality safety may not be of sufficient depth to accurately assess the health of nuclear criticality safety programs at defense nuclear facilities. The Board issued a letter in January 2009 underscoring issues with Nuclear Criticality Safety Evaluations conducted by Y-12. In addition, the Board's staff conducted a review of nuclear criticality safety at Los Alamos National Laboratory to assess progress in resolving previously identified issues. The Board continued to evaluate complex-wide activities as described in DOE's annual report on criticality safety.

Justifications for Continued Operations. The Board continued its review and oversight of DOE's processes and practices associated with the use of justifications for continued operations (JCO) at defense nuclear facilities. Previously the Board found a number of weaknesses in the JCO process and its implementation at defense nuclear facilities. In response to the Board's concerns, DOE is making progress in developing revised guidance for use in the field in the development and implementation of JCOs. Formal review of this guidance is expected to be completed by late calendar year 2009.

Safety System Design, Functionality, and Maintenance Reviews. In 2008 the Board conducted reviews of safety system design, functionality, and maintenance at a number of defense nuclear facilities. These reviews identified a number of deficiencies and weaknesses related to ensuring that credited safety systems can adequately perform their required functions in all operating regimes. Throughout FY 2009 the Board interacted with DOE and NNSA to properly disposition these findings. In particular, the Board has taken definitive action to fully characterize and drive the corrective actions for significant safety issues at Los Alamos National Laboratory at both the plutonium and tritium facilities.

A previous Board review of aging issues at H-Canyon highlighted the need to perform more inspections of aging equipment. The Board's review of the initial proposed approach identified many major flaws, and the Board strongly encouraged DOE to pursue a different approach. The new Integrated Facility Aging Management Program is producing the desired results in a timely manner and is now being expanded to review safety systems across SRS.

Readiness Reviews. The Board reviewed updates to directives related to startup and restart of nuclear facilities, as well as their implementation at defense nuclear facilities. Revisions to these directives are expected to provide much needed clarity. The Board actively monitors Startup Notification Reports for defense nuclear facilities under its cognizance and reviews startup and restart activities accordingly.

Conduct of Operations. The Board conducted conduct of operations reviews at Y-12 and Hanford in 2009. These reviews assessed the adequacy of DOE directives and standards implementation in the flow down to site-specific policies, procedures and instructions. Although the Board noted areas where opportunities for improvement in conduct of operations existed, overall these two sites had properly implemented conduct of operations programs.

Recommendation 2002-1, Quality Assurance for Safety Related Software. On December 22, 2008, the DOE Chief Health, Safety and Security Officer proposed an approach for managing the safety software central registry, a task of the remaining commitment of DOE's Implementation Plan for Recommendation 2002-1. Based on progress throughout this fiscal year, the Board expects DOE to formally request closure of this recommendation late this calendar year, 2009. The Board continues to evaluate quality assurance practices for safety-related software throughout the complex.

DOE Technical Capability. The Board continues to follow the state of technical competency throughout the DOE defense nuclear facilities complex. The Board's staff observed the activities of DOE's Federal Technical Capabilities Panel (FTCP) throughout the fiscal year and reviewed directives governing the FTCP as well as technical qualification standards for several areas of technical specialization.

After the Board identified several deficiencies with qualification cards for Facility Representatives, DOE conducted an assessment, revised the qualification cards and standards, and disqualified a Facility Representative who had been improperly granted interim qualifications. After the Board identified the lack of training

opportunities for Facility Representative candidates, DOE set up a two-week course for Facility Representative candidates and Safety System Oversight candidates.

Activity-Level Work Planning. During 2009, the Board reviewed work planning processes at three sites. The reviews of work planning and control processes at Idaho National Laboratory, Y-12, and Los Alamos National Laboratory indicate that their programs have not been fully implemented and weaknesses still remain. DOE has made efforts to address these weaknesses, but to date these efforts have been inadequate.

Implementation of Safety Basis Controls. Independent validation of implementation of safety basis controls is important to nuclear safety, as discussed in a Board letter to DOE in 2008. Some DOE sites have protocols for performing such validations, but DOE continues to lack complex-wide requirements and guidance for independent reviews of the implementation of nuclear safety basis controls. In a brief to the Board on March 26, 2009, DOE provided the Board with information on a new Guide that has been drafted, *Guide for Performance of Independent Verification Reviews (IVRs) of Safety Basis Controls.* This draft Guide was issued to the field on March 19, 2009, in a 6 month pilot effort. The memo states that, "It is expected that each site will compare the practices outlined in this guide to your current site processes and adjust them, if appropriate." This direction is a positive step in compelling independent verification reviews at defense nuclear facilities.

Safety Culture Improvement Project. Starting in FY 2008 with DOE and its contractors establishing a jointly sponsored task team to develop tools for assessing and improving the safety culture of the federal and contractor workforces, progress continues to be made in refining these tools. As evidenced by the Deputy Secretary of Energy's memorandum dated January 16, 2009, support for strengthening safety culture now has strong leadership support. The Board has been closely observing the team's efforts and will continue to evaluate and encourage this effort as it continues to mature.

Recommendation 2004-1, Oversight of Complex, Hazardous Nuclear Operations. All 22 commitments made in the DOE Implementation Plan responding to Recommendation 2004-1 were due to be complete by 2009. Concerns remain with several commitments that are late or have no discernable response from the DOE. The Board issued a letter to the Secretary of Energy on March 23, 2009, highlighting particular commitments needing attention from senior management and organizational support to meet the intent of the recommendation. The specific troubled commitments highlighted to the Secretary of Energy are:

- Commitment 7, develop process to identify research and development needs across DOE/NNSA and identify the extent that these needs are being met by existing programs; and Commitment 8, develop method to ensure nuclear safety research. These commitments are more than two years late. Efforts made by the office of primary responsibility have fragmented and fall far short of a complex-wide assessment.

- Commitment 2, provide adequate technical support for the Central Technical Authorities (CTAs); and Commitment 3, fully implement the CTA function. The DOE CTA function supporting the Under Secretary of Energy underwent turmoil during the transition of Presidential administrations, and the technical support of the NNSA CTA has been degraded as result of staff reorganization at NNSA. It appears that the DOE CTA issue was resolved following the confirmation of the Under Secretary of Energy.

The Board also remains engaged in two other areas that have been problematic:

- Commitment 5, issue DOE Safety Oversight Guide. This is intended to be a key document to improve the consistency and completeness of implementation of Integrated Safety Management.

- Commitment 10, Deliverable A, develop and implement Quality Assurance Plans required by DOE Order 414.1C, *Quality Assurance*. NNSA's inadequate performance in this area indicates that implementation has not been effective.

Performance Goal 4	**Nuclear Safety Programs and Analysis.** DOE regulations, requirements, and guidance are developed, implemented, and maintained; and safety programs at defense nuclear facilit8ies are established and implemented; as necessary to protect adequately the health and safety the workers and the public.

FY 2008 Performance Accomplishments

DOE Directives. As part of its continuing review of new and revised DOE directives, the Board and its staff evaluated and provided constructive critiques of over 50 directives associated with, but not limited to nuclear design criteria, radiological protection, maintenance management, worker protection, and project management. At year's end, the staff was in the process of resolving issues regarding revisions or drafts of 17 pending directives to improve the content, clarity, and consistency of safety requirements and guidance. Examples of directives completed in 2008 include:

- DOE Order 450.1A, *Environmental Protection Program*
- DOE Manual 460.2-1A, *Radioactive Material Transportation Practices Manual for Use with DOE Order 460.2A*
- DOE Guide 441.1-1C, *Radiation Protection Programs Guide for Use with Title 10, CFR, Part 835, Occupational Radiation Protection*
- DOE-Handbook-1113-2008, *Radiological Safety Training for the Uranium Facilities*
- DOE Manual 441.1-1, *Nuclear Material Packaging Manual*
- DOE-Standard-1189-2008, *Integration of Safety Into the Design Process*
- DOE-Standard-1185-2007, *Nuclear Explosive Safety Study Functional Area Qualification Standard*

Use of Quantitative Risk Assessment Methodologies. The Board continued to follow DOE's activities associated with the use of quantitative risk assessment at defense nuclear facilities. Previously, the Board conducted a comprehensive assessment of DOE's policies, programs, processes, and procedures with respect to the use of quantitative risk assessment and related methodologies and found that additional guidance was warranted. DOE developed a number of draft policies and implementation guides to address the use of risk methodologies in the defense nuclear complex. The Board provided numerous comments on the documents and continues to aid DOE in refining and revising these documents with a goal of issuing a draft Policy and Guide to the complex for formal comment and review.

Recommendation 2007-1, *Safety-Related In Situ Nondestructive Assay of Radioactive Materials.* DOE issued an Implementation Plan addressing the actions from the Recommendation in October 2007. After DOE made several changes including additional DOE commitments, the Board accepted the plan in April 2008. DOE has accomplished the first milestones under the plan, including establishment and funding of the Technical Support Group, which is comprised of senior DOE and contractor personnel with significant experience in nondestructive assay. The Technical Support Group is currently developing lines of inquiry to be used during site reviews, which are planned to start in early calendar year 2009.

Nuclear Criticality Safety (NCS). In a letter to DOE in January 2008, the Board expressed concerns that DOE reviews of criticality safety may not be of sufficient depth to accurately assess the health of NCS programs. NCS problems discovered by the Board at Los Alamos National Laboratory in late FY 2007 underscore the need for an effective review strategy, since these problems had been missed during earlier reviews by DOE. The Board modified the annual reporting requirements from the closure of Recommendation 97-2, *Continuation of Criticality Safety at Defense Nuclear Facilities in the Department of Energy*, to obtain more specific information on the status of criticality safety throughout the DOE complex. This includes line management assessments by DOE on the adequacy of contractor and site office NCS programs, metrics used to monitor contractor NCS performance, and NCS engineer staffing for contractors and site offices. DOE submitted the 2007 annual report on nuclear criticality safety in July 2008, and briefed the Board in September 2008. The Board is currently evaluating the activities described in DOE's report.

Justifications for Continuing Operations. The Board continued its review and oversight of DOE's processes and practices associated with the use of justifications for continuing operations (JCO) at defense nuclear facilities. Previously the Board found a number of weaknesses in the JCO process and its implementation at defense nuclear facilities. In response to the Board's concerns, DOE is developing revised guidance for use in

the field in the development and implementation of JCOs.

Safety System Design, Functionality, and Maintenance Reviews. In 2008 the Board conducted reviews of safety system design, functionality, and maintenance at a number of defense nuclear facilities. These reviews identified a number of deficiencies and weaknesses related to ensuring that credited safety systems can adequately perform their required functions in all operating regimes. DOE will be working throughout FY 2009 to properly disposition these findings.

Readiness Reviews. The Board continues to review directives related to startup and restart of nuclear facilities, as well as their implementation at defense nuclear facilities. DOE formed a readiness review working group to ensure a more rigorous and conservative implementation of DOE Order 425.1C, *Startup and Restart of Nuclear Facilities*, and to address other complex-wide startup and restart issues. The working group evaluated the directives concerning the startup and restart of nuclear facilities and has proposed revisions to the DOE Order 425.1C and DOE Standard 3006, *Planning and Conduct of Operational Readiness Reviews*. The Board observed many of the discussions concerning the proposed revisions to understand the basis for any changes that were proposed. The Board is evaluating the revisions and working with the authors to ensure the specific tenets of Recommendation 92-6, *Operational Readiness Reviews*, are not minimized in the updated directives.

Recommendation 2002-1, *Quality Assurance for Safety Related Software*. On February 7, 2008, the Chief Health, Safety and Security Officer for DOE proposed a path forward for closure of the one remaining open action of DOE's Implementation Plan for the Board's Recommendation 2002-1. This action item required DOE to perform a gap analysis on the six original toolbox codes to determine the actions needed to bring the codes into compliance with Software Quality Assurance criteria. Although the gap analyses were completed, follow-up actions needed to resolve the gaps for each code have yet to be completed. DOE has now developed a plan and schedule along with the approach that will be used to resolve the gaps identified in the toolbox code gap analysis reports to allow closure of Recommendation 2002-1 by the end of 2008.

Recommendation 2004-2, *Active Confinement* Systems. During 2008, all the candidate Environmental Management (EM) facilities were reviewed against the confinement ventilation system evaluation criteria, and many gaps were identified. DOE-EM officials are to review these gaps and the sites' proposed actions for their resolution, and submit to the Board recommended actions for modifications to meet the commitments in the Implementation Plan. Similarly, the National Nuclear Security Administration has performed an assessment of about a dozen facilities and identified gaps that need to be resolved through facility modifications or compensatory measures. The Board has also reviewed the DOE design and construction projects to ensure that the proposed design would meet the intent of the Recommendation and DOE expectations as documented in the Implementation Plan. Resolution of the identified design improvements will significantly enhance the safety posture of these facilities.

DOE Technical Capability. The Board continues to follow the state of technical competency throughout the complex. The Board conducted a review of contractor training and qualification programs at Pantex and provided comments to DOE in a July 8, 2008, letter. The review identified a number of improvements that could enhance the training and qualification program. DOE is currently working to properly disposition these improvement areas.

Activity-Level Work Planning. During 2008, the Board reviewed work planning processes at four sites. The reviews of LANL and LLNL work planning and control processes indicate that their programs have not been fully implemented and weaknesses still remain. DOE efforts to address these weaknesses to date have been inadequate.

Implementation of Safety Basis Controls. Independent validation of implementation of safety basis controls is important to nuclear safety. Some DOE sites have protocols for performing such validations, but DOE lacks complex-wide requirements and guidance for independent reviews of the implementation of nuclear safety basis controls. The Board issued a letter on February 5, 2008, identifying this deficiency and requesting DOE to evaluate the need for such requirements/guidance.

Safety Culture Improvement Project. During FY 2008, DOE and its contractors established a jointly sponsored task team to develop tools for assessing and improving the safety culture of the federal and contractor workforces. The initial effort is intended to focus on improving leadership, workforce engagement, and organizational learning. Improvements in these areas will significantly contribute to improving the implementation of integrated safety management as well as other functional areas related to safety at defense nuclear facilities. The Board has been closely observing the team's efforts and will continue to evaluate and encourage this effort as it continues to mature.

Performance Goal 4	**Nuclear Safety Programs and Analysis.** DOE regulations, requirements, and guidance are developed, implemented, and maintained; and safety programs at defense nuclear facilit8ies are established and implemented; as necessary to protect adequately the health and safety the workers and the public.

FY 2007 Performance Accomplishments

DOE Directives. As part of its ongoing review of new and revised DOE directives, the Board and its staff evaluated and provided constructive critiques of 30 directives associated with, but not limited to nuclear design criteria, maintenance management, worker protection, emergency management, and project management. At year's end, both staffs were in the process of resolving issues on 15 pending directives to improve the content, clarity, and consistency in safety requirements and guidance. Examples of completed directives include:

- DOE-Standard-1183, *Nuclear Safety Specialist Functional Area Qualification Standard*
- DOE-Standard-1185, *Nuclear Explosives Safety Study Functional Area Qualification Standard*
- DOE Manual 460.2-1A, *Radioactive Material Transportation Practices Manual*
- DOE Order 410.1, *Baseline Nuclear Safety Requirements*
- DOE Order 226.1A, *Implementation of Department of Energy Oversight Policy*
- DOE-Standard-SAFT-0113, *Preparation of Safety Basis Documents for Transuranic Waste Facilities*

Administrative Controls. In Recommendation 2002-3, *Requirements for the Design, Implementation, and Maintenance of Administrative Controls*, the Board identified the need for DOE to improve its guidance and expectations with respect to important administrative controls at defense nuclear facilities. As a result of the Board's Recommendation, the Department developed and implemented a plan to improve the reliability and effectiveness of administrative controls that serve safety functions. DOE developed a new standard governing the development and implementation of specific administrative controls in the defense nuclear complex. Further, DOE made significant revisions to the "safe harbor" methodologies used to comply with 10 CFR 830, *Nuclear Safety Management*, to codify and incorporate the provisions of the Recommendation. In early 2007, DOE indicated that all the commitments associated with this issue had been met and requested closure of the Recommendation. However, following a series of effectiveness reviews, the Board identified a number of weaknesses that indicated that the Department's implementation of the Recommendation had not been fully effective. The Board will work to further evaluate the effectiveness and implementation of DOE's efforts to satisfy these commitments in 2008.

Use of Quantitative Risk Assessment Methodologies. The Board continues to follow DOE's activities associated with the use of quantitative risk assessment at defense nuclear facilities. Previously, the Board conducted a comprehensive assessment of DOE's policies, programs, processes, and procedures with respect to the use of quantitative risk assessment and related methodologies. The Board's review suggested that DOE and its contractors have employed quantitative risk assessment in a number of activities, including the development of documented safety analyses and other facility-level decision making activities. The precise use, as well as the level of formality of these assessments, varied over a wide range. As a result of the Board's observations and concerns, DOE has recently developed a new draft policy and implementation guide to address the use of risk methodologies in the defense nuclear complex. The Board will continue to oversee DOE's progress in fully developing an effective policy, along with useful implementing guidance, to govern the use of risk assessment methodologies at DOE facilities.

Justifications for Continuing Operations. The Board reviewed DOE's processes and practices associated with the use of justifications for continuing operations (JCO) at defense nuclear facilities. This review encompassed the guidance and requirements associated with JCO requests, review, and approval, along with a survey of actual JCOs in effect at selected facilities. The Board compared DOE's use of JCOs with approaches used elsewhere in the nuclear industry. The Board found a number of weaknesses in the JCO process and its implementation at defense nuclear facilities. In particular, it was noted that DOE has not established adequate requirements, expectations, and guidance for the use of JCOs. In general, DOE's processes and practices with respect to JCOs are not in conformance with generally accepted nuclear industry processes, and a number of facilities appear to be in violation of even these deficient processes and practices. The Board will continue to work with DOE to develop and implement a satisfactory approach for the use of JCOs in the defense nuclear complex.

DOE Standard 1027*, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23,* Nuclear Safety Analysis Reports, Change Notice 1. In June 2006, the Board issued a letter identifying numerous deficiencies with DOE-Standard-1027-92, and requested that DOE issue a report addressing these and other potential issues associated with the standard. As a result of this letter, DOE closely examined issues associated with DOE-Standard-1027 and its implementation in an effort that involved contractors from across the complex as well as headquarters site personnel. The working group issued supplemental guidance to address the majority of the issues raised in the June 2006 Board letter, including exclusion of sealed sources from facility inventory for hazard categorization purposes. DOE has further committed to the Board to pursue a revision to the standard to catalyze clear and consistent implementation expectations in the document.

Recommendation 2004-2. The Board issued Recommendation 2004-2, *Active Confinement Systems*, in December 2004, to ensure that a reliable and effective control would be available to mitigate the consequences of potential accidents at defense nuclear facilities. During the past year, DOE completed detailed reviews of about a dozen high priority hazard category 2 facilities using the performance criteria provided in the ventilation system evaluation guidance document that was issued in February 2006. These facilities included the Container Surveillance and Storage Capability, Plutonium Disposition Project, Actinide Removal Process, and Pit Disassembly and Conversion Facility at Savannah River Site; New Waste Calcine Facility and Advanced Mixed Waste Treatment Facility at Idaho National Laboratory; Depleted Uranium Hexafluoride Conversion Facilities at Paducah and Portsmouth; Waste Treatment and Immobilization Plant at Hanford; Technical Area-55 Plutonium Facility at Los Alamos National Laboratory; and Uranium Processing Facility and Building 9212 at the Y-12 National Security Complex. These evaluations compared certain functional performance capabilities of the ventilation systems for these facilities against the identified safety related performance criteria of the guidance document. As a result, weaknesses or gaps were identified, and system modifications were proposed to meet the expectations of the Recommendation. Several of these facilities have already committed to making the necessary modifications to improve the reliability and performance of their active confinement ventilation systems. The remainder awaits the Program Secretarial Officer's review and approval of the necessary modifications.

Recommendation 2000-2. Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, was issued to DOE on March 8, 2000, and an Implementation Plan was accepted on December 14, 2000. The plan called for an initial assessment and inventory of the vital safety systems throughout the defense nuclear complex, followed by the development of a process to ensure that those assessments would be repeated periodically. The Implementation Plan also required the establishment (at each site) of qualified federal and contractor employees cognizant of the site's vital safety systems. Because of the great importance of the vital safety systems in achieving and maintaining a high level of safety on the DOE sites, the Board's staff made frequent visits to evaluate DOE's progress in implementing the Recommendation. As a result of the progress made in response to the Recommendation, the Board agreed with DOE, in a letter date August 8, 2007, that the recommendation could be closed. Because of the importance of these systems to safety in the defense nuclear facilities, however, the Board will request, separately and as appropriate, that relevant DOE programs provide periodic reports or briefings on the implementation and maintenance of their supporting configuration management programs.

Readiness Reviews. As a result of concerns expressed by the Board regarding the proper implementation of DOE Order 425.1C, *Startup and Restart of Nuclear Facilities*, DOE conducted a comprehensive review of startup and restart procedures, as well as their implementation at defense nuclear facilities. To ensure a more rigorous and conservative implementation of DOE Order 425.1C, and to address other complex-wide startup and restart issues, DOE formed a readiness review working group. Specific and ongoing working group actions include revising and reinvigorating readiness review training for DOE and contractors; clarifying certain aspects of the Order including definitions, conduct of a readiness review, and the process for readiness review notification; and updating pertinent readiness review examples in associated directives. The Board continues to monitor the working group's efforts to improve the quality of the directives related to startup of new and substantially modified facilities.

Recommendation 2007-1. In April 2007, the Board issued Recommendation 2007-1, *Safety-Related In-Situ Nondestructive Assay of Radioactive Materials*. The Recommendation was developed to ensure that in-situ measurements, when used to determine compliance with safety limits, would be done in accordance with

recognized industry standards and contain appropriate quality assurance elements. The Recommendation also required DOE to establish other requirements via the directives system for proper execution of such measurements within site-level programs, including: personnel training and qualification, standard techniques for addressing measurement uncertainty, and periodic assessments of the need for new technology. DOE accepted the Recommendation in June 2007, and is currently working on an implementation plan to address the concerns identified by the Board.

Criticality Safety. Concerns expressed by the Board regarding the lack of Nuclear Criticality Safety (NCS) site reviews led DOE to establish a formal program to monitor contractor and federal NCS programs across the complex. The baseline reviews, which used senior contractor and federal NCS personnel, are now complete. The results of these reviews have been or will be examined by the Board as the reports are finalized. The Board also provided input to the latest revision of DOE-Standard-3007-2007, *Guidelines for Preparing Criticality Safety Evaluations at Department of Energy Nonreactor Nuclear Facilities*, which was issued in early 2007, and to supplemental guidance issued for DOE-Standard-1027, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Report*. The Board conducted reviews of NCS evaluations, contractor NCS programs, and federal oversight at Hanford, the Savannah River Site, and Los Alamos National Laboratory. The Board continues to monitor DOE's progress in assuring criticality safety at defense nuclear facilities.

Recommendation 2004-1. In response to Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*, DOE completed the following actions in 2007: 1) fully implemented the Central Technical Authorities function, with associated technical support staff managed by the Chief of Defense Nuclear Safety for NNSA and the Chief of Nuclear Safety for the remainder of DOE; 2) issued a new DOE manual on integrated safety management; 3) created an ISM Champions Council, reporting to the Deputy Secretary, and responsible for reinvigorating ISM in the Complex; 4) performed program office self-assessments of safety function assignments at the program office level and defined criteria for the delegation of authority; and 5) issued an integrated safety management system description for each of the program offices. DOE also completed several milestones associated with the corrective action plan for Federal Technical Capabilities, as delineated in the discussion of Technical Competence below. Based on a reevaluation of commitments, DOE revised the 2004-1 Implementation Plan and moved responsibility for the Office of Nuclear Safety Research from the Office of Environment, Safety and Health to NNSA. NNSA also continues to work on a modified line oversight contractor assurance system, which is intended to focus more NNSA oversight on the facilities where a low-probability-high-hazard accident is credible, while relying on the contractor to oversee the remainder of the facilities. The Board will expend significant effort in the oversight of this transformation to ensure that safety of defense nuclear facilities is not jeopardized.

Implementation of ISM: Activity-Level Work Planning. In 2006, NNSA completed work on its expectations for contractors' work planning and control processes, as well as criteria and review approach documents to comprehensively assess these processes. Based upon these documents and similar criteria and review approach documents developed by DOE's Office of Environmental Management, reviews were conducted at each of the sites to determine the baseline state of the work planning and control process. From this baseline, DOE has committed to take actions that will improve work planning and control at the sites as a part of the Recommendation 2004-1 Implementation Plan. During 2007, the Board staff reviewed work planning processes at three DOE sites. The results of these reviews indicate that the oversight actions that were to be taken may not have been fully institutionalized. Oversight of this area will require significant effort during 2008 in order to improve performance.

DOE Technical Capability. In response to the Board's Recommendation 2004-1, DOE is making progress in a number of areas:

- DOE has completed a total of 16 of the 28 actions from the original Corrective Action Plan to improve DOE's federal technical capability, as noted in the implementation plan for Recommendation 2004-1.

- DOE used the lessons learned from a February 2006 Senior Technical Safety Manager (STSM) pilot course to improve the course held in November 2006, and then instituted a Department-wide, formal and rigorous final testing program to validate STSM qualification. DOE also strengthened its qualification criteria with

mandatory performance activities through a significant revision to DOE-STD-1075, *Senior Technical Safety Manager Functional Area Qualification Standard*, re-issued in November 2006.

DOE has incorporated former facility representatives into its integrated project teams, with noticeable success for the Highly Enriched Uranium Materials Facility at Y-12 National Security Complex and the Waste Treatment and Immobilization Plant at Hanford.

9. PERFORMANCE GOAL 5: MANAGEMENT EXCELLENCE

Management excellence in support of the Board's mission. The Board will strive for management excellence throughout its technical, legal and administrative staffs. The Board will be transparent to the public.

OUTCOME: There will be public confidence that the defense nuclear facilities are being operated safely and that the Board's oversight is a positive influence on the safe execution of these activities.

SUMMARY:

The Board executes its oversight responsibilities using a matrix form of organization for its technical staff that is based on the four previous goals. This organizational structure allows the formation of technical teams composed of personnel from each group to share information and address cross-cutting issues more easily and efficiently. Management techniques that keep the support staff small, while maximizing its technical staff, will be continued. The Board relies on management guidance from the Office of Management and Budget (OMB), Office of Personnel Management (OPM), and other Executive Branch agencies, especially guidance that applies to small agencies, in developing and assessing its internal policies and procedures. The Board uses cost-effective external service providers rather than maintaining a large government or on-site contractor staff. A small government staff, augmented by contractors, performs the functions of human resources management, financial management, acquisition management, information technology management, logistics management, security management, travel management, and other administrative matters. A separate General Counsel office provides legal advice to the Board. The Board utilizes organizations such as the Small Agency Council as forums to address common management issues and seek best business practices from other small agencies.

The Board works directly with DOE management at all levels, both at DOE headquarters and in the field, as necessary to accomplish its safety oversight mission. The Board keeps the DOE Office of the Departmental Representative to the Defense Nuclear Facilities Safety Board informed of its activities and coordinates activities between the two agencies with that office when appropriate. The Board uses its legal authorities to establish policies, processes, and procedures for working with DOE.

The Board utilizes the annual Congressional authorization and appropriations process to acquire the resources necessary for the Board's safety oversight activities.

The Board manages three personnel systems: Excepted Service (for the technical staff), Competitive Service, and Senior Executive Service to support its human capital program. The Board's Professional Development Program provides a source for entry-level technical staff. The human resources (HR) staff provides staffing, recruiting, benefits, policy management, and serves as an interface between the HR service provider and the Board's employees. The Board uses a robust training program to maintain and improve the competencies of the staff. The Board

adheres to merit and equal employment opportunity principles. The Board maximizes use of incentives and benefits to attract and retain a quality workforce.

The Board uses its legislative authorities to stay attuned to the planning and execution of DOE's defense nuclear programs by gathering information from a broad range of sources. Once a safety concern is communicated to DOE, the Board uses the same information sources and techniques to ensure that appropriate corrective actions are developed by DOE and its contractors, commitments are made to implement these corrective actions in a timely manner, and the commitments are met. Based on an analysis of available information, the Board chooses from a broad spectrum of action-forcing mechanisms granted by law to communicate identified health and safety concerns and promote appropriate DOE corrective actions. By posting its oversight interactions with DOE and its contractors in the public domain using the Board's public website, the Board seeks to foster the transfer of lessons learned throughout the DOE's defense nuclear complex.

The public has access to the Board's work to the maximum extent possible. This provides visibility into DOE activities to help maintain and restore, as needed, public confidence that the defense nuclear facilities are being operated safely and that the Board's oversight is a positive influence on the safe execution of these activities. The Board documents its activities and makes correspondence available to the Congress and the public in order to ensure there is no ambiguity concerning the Board's position on a particular matter. The Board maintains a public website and conducts public hearings, as appropriate. Reports to congress include annual reports detailing new health and safety issues. The Board provides informal briefings to Congressional committees and testifies before Congress, as required. The Board and DOE provide joint reports on appropriate topics. The Board's official reports are posted on its public website at www.dnfsb.gov.

	FY 2012 Target
Performance Goal 5.1: The Board will keep Congress informed on current health and safety issues at DOE nuclear facilities and the status of progress toward issue resolution.	The Board will publish its annual report to Congress by March 1. This report is to include all recommendations made by the Board during the preceding year, and an assessment of: (1) the improvements in the safety of DOE's defense nuclear facilities during the period covered by the report, (2) the improvements in the safety of DOE's defense nuclear facilities resulting from actions taken by the Board or taken on the basis of the activities of the Board, and (3) the outstanding safety problems, if any, of DOE's defense nuclear facilities. The Board will publish Quarterly Reports on the status of significant unresolved technical differences between the DNFSB

	FY 2012 Target
	and DOE concerning design and construction of DOE's defense nuclear facilities. These reports will serve to provide Congress timely information on significant issues prior to publication of the Board's Annual Report.
Performance Goal 5.2: The Board will inform the public of issues related to health and safety at defense nuclear facilities.	The Board will post public documents, including all recommendations, the Board's Annual Report, Quarterly Reports, and other correspondence with DOE on its public website within 2 work days of publication date. The Board will plan a Public Meeting and Hearing at Los Alamos National Laboratory in the first quarter in order to review public health and safety at the site, provide transparency into DOE activities, and allow interested persons or groups to present comments, technical information, or data to the Board on the announced topics.
Performance Goal 5.3: The Board will adopt and execute processes and procedures with DOE that are compatible with the Board's enabling legislation and further the Board's mission.	The Board will be briefed on issues by senior DOE officials from EM and NNSA on a quarterly basis in order continue a dialogue to further public health and safety at DOE defense nuclear facilities. The Chairman will consult with the DOE Secretary and Deputy Secretary on matters of interest and will meet with the DOE Deputy Secretary three times a year in order to ensure there are no misunderstandings concerning the Board's Recommendations and other concerns at defense nuclear facilities.
Performance Goal 5.4: The Board will implement internal processes and procedures that effectively support the Board's oversight operations and responsibilities as a Federal agency using OMB and OPM management guidance applicable to small agencies to gauge performance.	The Board will improve employee performance by developing a revised GS performance management system to make it more performance oriented in accordance with Office of Personnel Management guidance.

Performance Goal 5.5: Appropriate technical and professional expertise will be recruited and/or trained by the Board to accomplish the mission.	The Board will continue to hire technically competent engineers and scientists who can support the Board's nuclear safety oversight mission. The Board will emphasize improving the diversity of its technical staff workforce. The Board will utilize at least 95% of its authorized FTEs.
Performance Goal 5.6: The Board will effectively manage the appropriated financial resources, and exercise responsible stewardship over its resources to meet its needs and accomplish the mission.	The independent auditor's Report on Internal Control & Compliance with Laws and Regulations does not identify any material weaknesses or non-compliance with laws or regulations. This is to demonstrate the Board is properly managing its resources.
Performance Goal 5.7: The Board will assign staff to be in residence at selected sites.	Ensure the Board has site representatives at appropriate defense nuclear facilities based on changes in DOE priorities and activities. The Board will review the assignment of site representatives semi-annually in order to ensure each manned site has at least one staff member assigned and assess the need for additional site representatives to meet operational needs.

10. FINANCIAL TABLES

OBJECT CLASS SUMMARY

Actual obligations for FY 2010 and the Board's Budget Request for FY 2012 are presented by object class accounts in Exhibit C. The Board proposes to utilize the budget resources requested in the following manner:

Salaries and Benefits (Object Class 10)

The FY 2012 request includes funding of $21,410,309 to support the projected salary and benefit costs for 120 FTEs based on the Board's current statutory authority. The rationale and justification for the additional salaries and benefits costs are explained in detail on pages 7 through 11. The funding for salaries and benefits represents 71 percent of the Board's FY 2012 estimated obligations. In calculating the projected salary and benefits needs of the Board, the following federal pay adjustment and benefits factors for Executive Branch employees are used:

- No pay increase beginning in January 2011.
- No pay increase beginning in January 2012.
- Employee benefits of 26.7 percent of salaries, or $36,136 per FTE in FY 2012.

Note personnel benefit (Object Class 12) costs also include other costs such as change of station, public transit subsidies, etc.

In establishing the Board, Congress sought to bring the best talent available to focus on health and safety oversight questions associated with the design, construction, operation, and decommissioning of DOE defense nuclear facilities. The recruitment and retention of scientific and technical staff with outstanding qualifications are the key components in the Board's human capital strategy if we are to be successful in accomplishing (and expanding) the Board's mission. The Board has assembled a small and highly talented technical staff with extensive backgrounds in science and engineering disciplines such as nuclear-chemical processing, conduct of operations, general nuclear safety analysis, conventional and nuclear explosive technology and safety, nuclear weapon safety, storage of nuclear materials and nuclear criticality safety, and waste management. Virtually all of the technical staff has technical master's degrees, and approximately 24 percent hold doctoral degrees. Almost all technical staff members possess practical nuclear experience gained from duty in the U.S. Navy's nuclear propulsion program, the nuclear weapons field, or the civilian reactor industry. In order to accomplish the Board's highly technical mission, it is of paramount importance that the Board receives sufficient funds to meet the salary and benefit requirements of the staff.

The Board enhances its on–site safety oversight of defense nuclear facilities by assigning experienced technical staff members to fulltime duty at priority DOE sites. Currently eleven full-time site representatives are stationed at six DOE sites: 1) Pantex Plant to oversee nuclear weapons activities, including the weapons stockpile stewardship and weapons disassembly programs; 2) Hanford Site to monitor waste characterization and stabilization and facility deactivation; 3) Savannah River Site to monitor DOE's efforts to deactivate facilities, stabilize

waste materials, and store and process tritium; 4) Oak Ridge's Y-12 National Security Complex to monitor safety and health conditions at Y-12 and other defense nuclear facilities in the area; 5) Los Alamos National Laboratory (LANL) to advise the Board on overall safety and health conditions at LANL, and to participate in Board reviews and evaluations related to the design, construction, operation, and decommissioning of LANL defense nuclear facilities; and 6) Lawrence Livermore National Laboratory (LLNL) to perform similar advisory and review efforts.

The Site Representatives Program provides a cost–effective means for the Board to closely monitor DOE activities, and to identify health and safety concerns promptly by having on-site staff conducting first hand assessments of nuclear safety management at the priority sites to which they have been assigned. Site representatives regularly interact with the public, union members, congressional staff members, and public officials from federal, state, and local agencies.

Travel (Object Class 21)

The FY 2012 request includes funding of $1,250,000 to support the official travel of Board managers and staff based on the Board's current statutory authority. Extensive travel is necessary to the various DOE defense nuclear facilities located throughout the United States in order for Board Members and staff to conduct first-hand assessments of operations and associated health and safety issues. The Board is required to react to incidents at the DOE defense nuclear facilities that may affect public health and safety, requiring unplanned travel expenditures to support its work at these sites. During FY 2010, Board Members, technical staff, and the Board's outside technical experts made 128 team visits to major defense nuclear sites in support of its high priority public health and safety oversight mission.

The Board is also authorized to station staff members at DOE sites or facilities to assist in carrying out its functions. The Board has assigned technical staff teams to round-the-clock monitoring of major startup, testing, or restart activities at various DOE sites. The presence of its technical staff has proved to be invaluable in providing the Board with firsthand information on the demonstrated readiness, capabilities, and performance of DOE and its contractors for ensuring safety in the conduct of such activities. During the coming fiscal years, the Board anticipates a continued need for Board technical staff teams to monitor construction and startup of new DOE defense nuclear facilities, such as the Waste Treatment and Immobilization Plant in Richland, Washington, and Uranium Processing Facility in Oak Ridge, Tennessee.

Travel funds are also used to pay for Board expenses associated with public hearings and meetings at or near DOE sites, where any interested persons or groups may present comments, technical information, or data concerning health and safety issues under Board purview.

Transportation of Things (Object Class 22)

The FY 2012 request includes $255,000 for the shipment of household goods for employees relocating to the Washington, DC area and/or to become site representatives at DOE based on its current statutory activities.

Rental Payments to GSA (Object Class 23.1)

The FY 2012 request includes $2,229,812 to reimburse the General Services Administration (GSA) for projected office rental costs based on its current office space. This overhead expense represents approximately 7 percent of the Board's FY 2012 budget request. GSA negotiated a ten-year lease for the Board effective in March 2006. GSA has estimated that the Board's rental payment to GSA under the lease will be $2.230 million for FY 2012, $59,450 less than their FY 2010 actual obligations.

Communications and Utilities (Object Class 23.3)

The FY 2012 request includes $360,000 for projected communications support costs to support its current statutory activities. Funds in this account will be used for telephone (local, long distance, and cellular) services, Internet access charges, postage and overnight delivery costs, and special messenger services, including $130,000 to implement MTIPS and other cyber security initiatives (see page 11). Contracts for emergency communications services for the Board Headquarters, site representatives, and the Board's alternate Continuity of Operations Facility (COOP) are also included in this account.

Printing and Reproduction (Object Class 24)

The FY 2012 request includes $48,500 based on the proposed statutory authority) for reimbursing the U.S. Government Printing Office for publication of required legal notices in the *Federal Register*. Routine printing and copying charges for Budget Requests, the Board's *Annual Report to Congress, Performance Accountability Report (PAR),* and technical reports, are also included in this account.

Consulting Services (Object Class 25.1)

The Board maintains a highly skilled staff, but it is not economically feasible to maintain multiple permanent staff in very specialized technical disciplines. Therefore, it is necessary to have the funds available to immediately contract for this expertise when needed. For example, extensive use of technical consultants has been necessary to review the complex design and construction of the Waste Treatment and Immobilization Plant at Hanford. This includes the review of seismic analysis, structural loading, and construction plans to ensure the safety of this more than $12 billion project. The Board obtains specialized contractor expertise in a variety of technical disciplines to augment its internal review capability and avoid any unnecessary impact on DOE's construction schedule.

The Board plans to continue contracting for technical expert services in highly specialized disciplines such as geotechnical investigations and seismic/structural engineering. Should an unexpected imminent or severe threat to public health and safety be identified, this expertise may be required for short durations. Each technical expert that the Board employs will continue to be carefully screened for possible conflict of interest.

A list of current major technical support contracts with a brief description of each contractor's area of expertise, and a chart that reflects funding levels for this support are included

on pages 97 through 101. The FY 2012 request includes $850,000 in this account for technical support contracts to assist the Board in its health and safety reviews based on its current statutory authority, $161,583 less than the 2010 actual obligations.

Other Services (Object Class 25.2)

The FY 2012 request includes $2,050,000 to fund a wide range of recurring administrative support needs of the Board (based on its current statutory activities) such as the independent audit of the Board's financial statements, physical and cyber security, employee training, recruitment, information technology support, court reporting, records storage and retrieval, and drug-free workplace testing and support.

Government Services (Object Class 25.3)

The FY 2012 request includes $800,000 for reimbursable support agreements with other federal agencies based on the Board's current statutory activities. The Board utilizes cross-service providers for accounting and payroll processing services consistent with government-wide lines of business objectives, and also utilizes cross-servicing arrangements for services such as physical security, health unit, employee background investigations for security clearances, Employee Assistance Program services, the Library of Congress FedLink for legal and legislative research, and Defense Contract Auditing Agency (DCAA) services to assist in determination of fair and reasonable contracting costs.

Operation and Maintenance of Equipment (Object Class 25.7)

The FY 2012 request includes $65,000 for maintaining and repairing equipment (e.g., copier maintenance agreements, repair of office equipment, etc.) based on the Board's current statutory activities.

Supplies and Materials (Object Class 26)

The FY 2012 request includes $305,000 for continued access to numerous technical standards databases, legal research services, maintenance of the technical reference information for the Board's library, and for general office supplies and materials, based on the Board's current statutory activities.

Acquisition of Assets (Object Class 31)

The FY 2012 request includes $450,000 for recurring software licenses/maintenance agreements supporting the Board's current operations, to replace outdated office equipment such as printers and copiers, and to make minor enhancements to existing software systems. In addition, the Board requests $50,000 in non-recurring obligations for a total of $500,000, $137,791 more than the 2010 actual obligations.

The Board's budget request for assets does not include funding for any new systems. It does include less than $100,000 for potential enhancements to existing systems. The priority for system enhancements will be to ensure that existing security requirements are maintained and/or addressed as part of the enhancement (e.g., no funds will be spent on systems enhancement without first ensuring systems meet existing security requirements or will meet them as a result of the enhancement).

EXHIBIT C: FY 2012 CONGRESSIONAL BUDGET REQUEST

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

FY 2012 CONGRESSIONAL BUDGET REQUEST

BUDGET ACCOUNT -- (OC)	2010 OBLIGATIONS (Actual)	FY 2012 BUDGET REQUEST
PERSONNEL SALARIES -- (11)	$ 14,276,770	$ 16,347,599
PERSONNEL BENEFITS -- (12)	$ 3,888,421	$ 5,062,710
TRAVEL -- (21)	$ 1,033,681	$ 1,250,000
TRANSPORTATION OF THINGS -- (22)	$ 101,269	$ 255,000
RENTAL PAYMENTS TO GSA -- (23.1)	$ 2,289,262	$ 2,229,812
COMMUNICATIONS & UTILITIES (23.3)	$ 216,744	$ 360,000
PRINTING & REPRODUCTION -- (24)	$ 34,353	$ 48,500
ADVISORY & ASSISTANCE SERVICES -- (25.1)	$ 1,011,583	$ 850,000
OTHER SERVICES -- (25.2)	$ 2,211,796	$ 2,050,000
GOVERNMENT SERVICES -- (25.3)	$ 781,307	$ 800,000
OPERATION & MAINT. OF EQUIPMENT -- (25.7)	$ 64,066	$ 65,000
SUPPLIES & MATERIALS -- (26)	$ 302,684	$ 305,000
ACQUISITION OF ASSETS -- (31)	$ 362,209	$ 500,000
*** TOTAL OBLIGATIONS ***	$ 26,574,143	$ 30,123,621
NEW BUDGET AUTHORITY	$ 26,086,000	$ 29,130,000
UNOBLIGATED BALANCE - PREV. FY	$ 3,851,686	$ 1,093,621
RECOVERY OF PRIOR YR OBLIGATIONS	$ 481,181	$ -
TOTAL BUDGETARY RESOURCES	$ 30,418,867	$ 30,223,621
EST. UNOBLIGATED BAL. - CUR. FY	$ 3,844,724	$ 100,000
OUTLAYS	$ 25,471,590	$ 29,521,149

TECHNICAL CONTRACTS SUMMARY

A list of major (> $25,000 in estimated annual expenditures) technical support contracts, with a brief description of each contractor's areas of expertise, follows. The FY 2012 Budget Request includes $850,000 in this account for technical support contracts to assist the Board in its health and safety reviews at DOE defense nuclear facilities.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

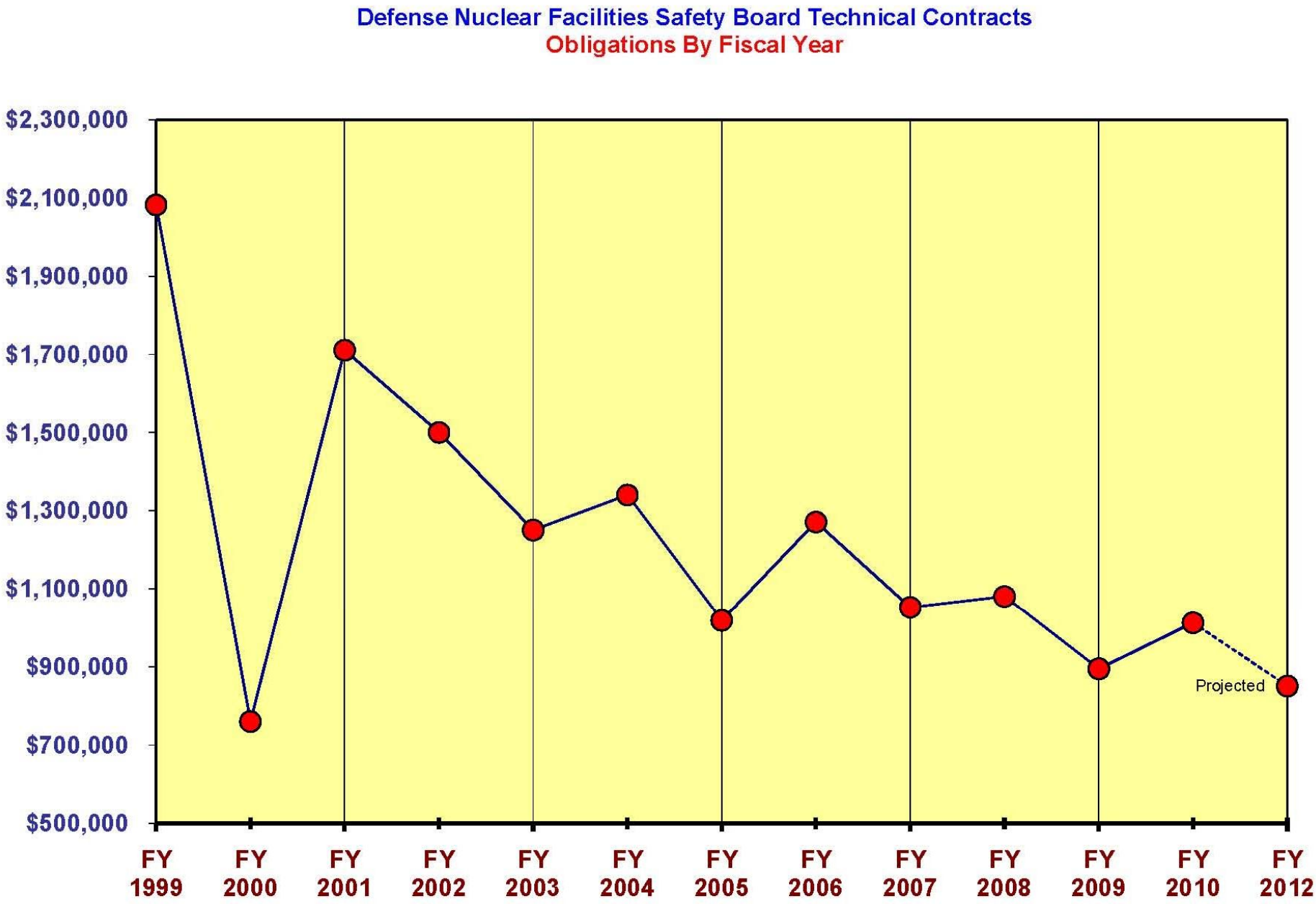
TECHNICAL SUPPORT CONTRACTS

(Status as of January 31, 2011)

Contractor	Contract Expiration Date	Description of Work
Bruce Mathews, LLC	10/31/11	Provide technical support to the Board involving the review, evaluation, and analysis of the safety bases for selected defense nuclear facilities (e.g., the completeness of the identification of hazards, the adequacy of documented analyses, the appropriateness and application of identified controls, the availability of potential alternatives controls), as well as the quality of Federal and contractor assessments and reviews of safety systems, conduct of operations, and readiness for operations at the facilities.
David S. Boyd, Inc.	3/31/11	Provide technical support to the Board, specifically involving the evaluation of directives and procedures governing operation and maintenance of defense nuclear facilities. In addition, provides technical support evaluating the implementation of Integrated Safety Management (ISM) for ongoing operations and maintenance, and also preparations for startup or restart of defense nuclear facilities. Example of work includes supporting review of readiness preparations for restart of at the Pantex Plant.
Mr. Joseph King	3/31/11	Provide technical support to the Board, specifically involving the evaluation of directives and procedures governing operation and maintenance of defense nuclear facilities. In particular, provide technical support evaluating preparations for startup or restart of defense nuclear facilities.
Dr. James L. Liverman	6/30/11	Provide technical support to the Board in the general subject area of ISM, quality assurance and radiation protection, specifically involving review and evaluation of amendments to 10 CFR 835 Rule, radiological protection standards, other radiological and environmental health and safety issues, and review of the development of DOE's quality assurance improvement plan.

Contractor	Contract Expiration Date	Description of Work
Mr. Lew Miller	9/30/11	Provide technical support to the Board in the general subject area of defense nuclear facility design, including design basis accident analysis, safety system classification, application of national consensus codes and standards, application of DOE directives, and the review of technical documents supporting the DOE Critical Decision Process.
Mr. Kenneth Pusateri	10/31/11	Support the review, evaluation, and analysis of various internal processes and control activities used by the Office of the Technical Director and prepare draft directives, procedures, and/or policies relating these processes.
Paul C. Rizzo & Assoc., Inc.	3/31/11	Provide technical support to the Board, specifically in the review and evaluation of systems and seismic engineering of structures, systems and components with particular emphasis on geotechnical investigation and soil mechanics, systems engineering, adequacy of analyses performed by DOE contractors, seismological hazards, safety analysis, hydrology, and environmental related issues.
J.D. Stevenson Consulting	3/31/11	Provide technical support to the Board, specifically in the review and evaluation of systems and seismic engineering of structures, systems and components with particular emphasis on applicability and content of orders and standards developed by DOE and its contractors as well as existing codes and standards used at DOE utilities, applicability of commercial nuclear industry standards as they apply to DOE facilities, quality assurance related matters, adequacy of various types of analysis performed by DOE contractors, and hazard and systems classification.
Stevenson and Associates	12/31/11	Provide support to the Board involving the review, evaluation, and analysis of facility-specific engineering processes as well as products, primarily for natural and man-made extreme loading events such as seismic, high wind, tornadoes, floods, and missile impacts (e.g., the review of structural modal analyses , parameter sensitivities, capacity versus demand calculations, seismic performance of distribution and other systems), and the facility-specific use of DOE orders and standards, as well as relevant national consensus codes and standards.

Contractor	Contract Expiration Date	Description of Work
D. Volgenau Associates, Inc.	3/31/11	Provide technical support to the Board, specifically involving the evaluation of directives and procedures governing operation and maintenance of defense nuclear facilities. In addition, provides technical support evaluating ongoing operations and maintenance and for preparations for startup or restart of defense nuclear facilities. Examples of work include supporting the review of programs and activities at Los Alamos National Laboratory and supporting design review at the Savannah River Site.
Mr. William Yeniscavich	4/30/11	Provide technical support to the Board, specifically involving the area of materials performance (e.g., national safety codes/specifications, stress and temperatures, corrosion and welding fundamentals, inspection and testing techniques.)


Defense Nuclear Facilities Safety Board Technical Contracts
Obligations By Fiscal Year
$2,300,000
$2,100,000
$1,900,000
$1,700,000
$1,500,000
$1,300,000
$1,100,000
$900,000
$700,000
$500,000
FY 1999
FY 2000
FY 2001
FY 2002
FY 2003
FY 2004
FY 2005
FY 2006
FY 2007
FY 2008
FY 2009
FY 2010
FY 2012
Projected