

FY 2009

BUDGET REQUEST

TO THE CONGRESS

Defense Nuclear Facilities Safety Board



February 2008

GOVERNMENT PERFORMANCE & RESULTS ACT

GPRA Strategic Planning Reporting Requirements

The Government Performance and Results Act of 1993 (GPRA) 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 for FY 2003-2009 has been made 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 2008 and FY 2009, as well as representative accomplishments for FY 2004 through FY 2007, 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 the safety of the Department of Energy's defense nuclear facilities see the Board's Reports to Congress, which can be reviewed at the above Web address.

**Defense Nuclear Facilities
Safety Board
FY 2009 Congressional Budget Request**

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1. INTRODUCTION

**Defense Nuclear Facilities
Safety Board
FY 2009 Congressional Budget Request**

APPROPRIATION & EXPENSE SUMMARY

(Tabular dollars in thousands.)

OPERATING EXPENSES

	<u>ACTUAL FOR FY 2007</u>	<u>FINANCIAL PLAN FOR FY 2008</u>	<u>BUDGET REQUEST FOR FY 2009</u>
New Budget Authority	21,914*	21,909 **	25,499
Obligations	22,383	24,359	26,499
Outlays	21,244	23,872	25,969

* P.L. 110-5, “Revised Continuing Appropriations Resolution, 2007.”

** P.L. 110-161, “Consolidated Appropriations Act, 2008”

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).

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PERSONNEL SUMMARY

	<u>FY 2007 ACTUAL</u>	<u>FY 2008 FINANCIAL PLAN</u>	<u>FY 2009 BUDGET REQUEST</u>
Statutory Personnel Ceiling: (FTEs) ^{1/}	150	150	150
FTE Usage ^{2/}	91	98	105
Board Members and Permanent Employees at End of Fiscal Year	92	105	105

^{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.

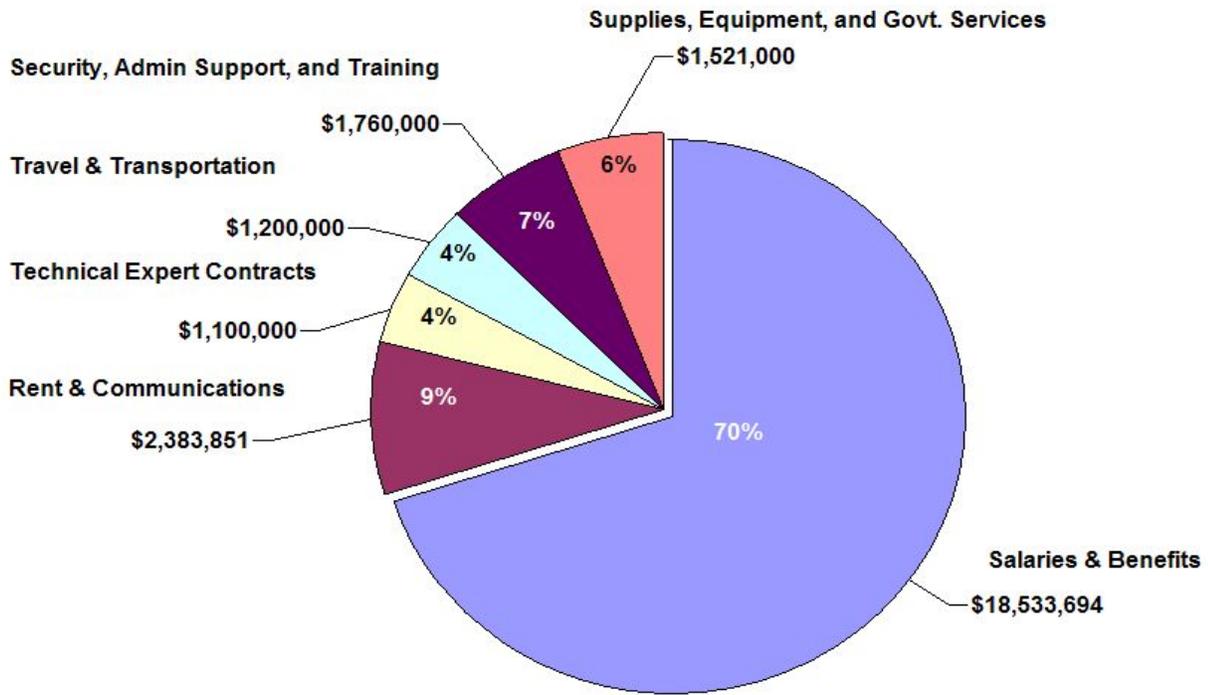
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PROPOSED APPROPRIATION LANGUAGE

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 441. [\$21,909,000] \$25,499,000, to remain available until expended. (*Energy and Water Development and Related Agencies Appropriations Act, 2008*).

FY 2009 Total Projected Obligations = \$26,498,545



Budget Request Summary

The Board's FY 2009 Budget Request for \$25,499,000 and 105 FTEs includes funding for statutory increases in civilian salaries and associated employee benefits such as employer contributions to employee health benefit and retirement accounts, matching Thrift Savings Plan contributions, as well as additional funding for recurring cost increases the Board experienced in FY 2007 that were not reflected in the FY 2008 President's Budget. A brief description of each requirement and associated funding request follows (a full explanation is included on the referenced page number):

	<u>New Budget Authority</u>	<u>FTEs</u>	<u>Page Ref.</u>
Baseline - FY 2008 Congressional Budget Request *	\$22,499,000	98	
Funding for full impact of FY 2008 civilian pay raise in FY 2009. [Note: this amount is the difference between the 3.1 percent pay increase included in the President's FY 2008 Budget and the enacted 3.5 percent pay increase—includes impact on employee benefits.]	\$45,000		15
Funding for two (2) FTE's. [Note: additional funding to offset the impact of only funding 98 FTE vs. 100 FTE due to the FY 2007 Continuing Resolution (Includes salaries, benefits, travel and other expenses.)]	\$400,000	2	14
Funding for a projected 2.9 percent civilian pay raise effective in January, 2009 and other salary adjustments. [Note: budget projection based on paying increased salaries and benefits for nine months in FY 2009 for a 2.9 percent federal pay raise.]	\$565,000		15
Funding for additional FTEs to meet Congressional direction for increased oversight and as a result of new DOE design and construction projects in FY 2009. [Note: in response to Congressional oversight and as a result of recent hearings conducted by the Board to improve the integration of safety early in the design process, the Board is taking steps to increase both its level of oversight and interaction with DOE in the area of design and construction on approximately 25 new defense nuclear facilities and its oversight of all existing DOE defense nuclear facilities.]	\$1,200,000	5	7-11
Funding for increased personnel benefits costs. [Note: budget projection based on increased benefits (i.e., health insurance premiums, retirement contributions, etc.) as a percentage of salaries, excluding the impact of additional FTEs.]	\$25,000		15

Funding for increased relocation costs.	\$200,000	15
[Note: budget projection based on additional site representatives' relocations in FY 2009.]		
Funding for increased technical support contracts.	\$200,000	16
[Note: budget projection based on actual level of FY07 obligations.]		
Funding for increased other services costs.	\$125,000	16
[Note: budget projections for other services (administrative support contracts, etc.) based on increases relating to recruitment advertising, and systems support.]		
Funding for increased Government services costs.	\$100,000	17
[Note: budget projections for Government services (accounting, payroll and human resources, building security, etc. support) based on providers' FY 2009 estimates and/or increases to FY 2008 agreement amounts.]		
Funding for inflation (non-personnel accounts).	\$140,000	17
[Note: budget projection based on 2% increase due to inflation in non-personnel accounts, (e.g., other services, supplies and materials, etc.)]		
Total Cost of Additional Funding Requirements in FY 2009 Budget Request.	\$ 3,000,000	7
FY2009 New Budget Authority.	\$25,499,000	105

* Note the baseline is the amount included in the FY 2008 President's Budget. \$21,909,000 in new budget authority for the Board was enacted in the Consolidated Appropriations Act, 2008. The Board will be able to absorb the difference of \$590,000 in FY 2008 due to a higher a carryover from FY 2007. The impact of the carryover and the FY 2008 reduction are reflected in the \$25,499,000 of new budget authority required for FY 2009.

2. 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 this mission in Fiscal Year 2009, the Board is requesting a total of \$25,499,000 in new budget authority and 105 FTEs. Within this request, the Board seeks additional budget funding of \$1.2 million, which will support the salary and benefits needs for 5 additional engineers (7 FTE) in specialized technical disciplines, and \$1.8 million to help offset the impact of nondiscretionary cost-of-living pay adjustments and other inflation-based cost increases for the Board's existing 100 positions.

In FY 2009, the Board's health and safety oversight plan must be changed to address an unprecedented convergence of workload demands from the Department of Energy and the Board's Congressional oversight and appropriations committees.

First, the Board must be prepared to perform safety oversight on more than 25 DOE design and construction projects with an estimated value of more than \$20 billion. The design and construction reviews conducted by the Board on DOE facilities are resource intensive and time consuming, but these time-sensitive safety reviews are key to preventing safety flaws in design and construction that could render a newly constructed facility unusable. The Board requires additional technical staff to ensure that the Board has the highly specialized skills in areas such as seismic engineering of structures, fire protection, electrical engineering, and geotechnical reviews that are critical to performing the technical oversight reviews of all the new DOE projects.

Second, the Board's Congressional oversight and appropriations committees have demanded that the Board 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 storage facilities are properly and competently maintained. 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 recognize the health and safety expertise that the Board has and the importance of the Board's independent oversight mission. The Senate Armed Services Committee took the lead in directing that new, more aggressive oversight initiatives be implemented by the Board and DOE to improve both the quality and timeliness of project development and completion.

On July 19, 2007, the Board and DOE submitted to Congress a Joint Report entitled, *Improving the Identification and Resolution of Safety Issues During the Design and Construction of DOE Defense Nuclear Facilities*, as required by House Conference Report 109-702 (the John

Warner National Defense Authorization Act for FY 2007). This report included actions to be taken to improve the timeliness of issue resolution, which are summarized in Exhibit B.

To meet the new scope and pace of oversight activities sought by the Congress in highly technical areas such as the DOE nuclear materials processing and stabilization programs and the nuclear weapons programs, and to conduct timely reviews of DOE design/construction projects, the Board included an additional 5 engineering positions (7 FTE) in this budget request.

The cost of re-engineering and making post-construction modifications to complex DOE defense nuclear facilities due to the late discovery and identification of significant design flaws that could impact public and worker health and safety would require significantly more resources than the requested budget increase. If 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. The Board currently oversees approximately \$20 billion in new DOE construction. Each increase in project cost of one percent (1%) equates to an increase of \$200 million. Increases in project cost well in excess of this amount have driven the Congress, as evidenced by the Senate Armed Services Committee language, to insist on identification of safety issues and their resolution early in the design stage.

In line with Congressional actions thus far, the Board believes it is prudent to proactively address DOE safety issues and needs the additional resources addressed in this budget submission to accomplish its expanded workload. The Board's FY 2009 budget request of \$25.499 million in new budget authority and 105 FTEs is necessary to ensure 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.

3. FY 2009 CONGRESSIONAL BUDGET REQUEST

<i>FY 2009 Request Summary</i>	<i>Permanent Positions</i>	<i>FTE</i>	<i>Amount (\$000)</i>
FY 2007 Actual	92	91	\$21,914
FY 2008 Budget Request	100	98	\$22,499
2009 Program Increases	5	7	\$ 1,600
2009 Inflationary Adjustments			\$ 1,400
2009 Request	105	105	\$25,499
Total Change 2008-2009	5	7	\$ 3,000

The DNFSB 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. Under its legislative mandate (Exhibit C), 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 workers at the DOE defense nuclear facilities located throughout the United States are adequately protected, as DOE attempts to maintain the readiness of the nuclear arsenal, dismantles surplus weapons, disposes of excess radioactive materials, cleans up surplus defense facilities, and constructs new defense nuclear facilities;
- Enhancing the safety and security at our Country'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 authority to reduce the nuclear safety risks that exist in the defense nuclear complex to the greatest extent possible. The DOE nuclear weapons program remains a technically challenging and hazardous operation. Many tons of radioactive and toxic materials exist throughout the 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 nuclear facilities at primarily 10 DOE sites. It maintains Site Representatives at six of the sites and maintains a cadre of technical staff at its Headquarters that

is organized to perform oversight roles as required. Over the next several years, the Board's safety focus at these sites will be on the following:

- ***Pantex Plant in Texas.*** Oversight of stewardship of the nuclear weapons stockpile including assembly and disassembly, evaluation, maintenance, and dismantlement of nuclear explosives and the storage of special nuclear material, particularly plutonium pits.
- ***Y-12 National Security Complex in Tennessee.*** Oversight of stewardship of nuclear weapons components 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.*** Oversight of 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.*** Oversight of stockpile management and stewardship of the nation's nuclear weapons, including research and enhanced surveillance of weapons, and the processing of nuclear materials.
- ***Lawrence Livermore National Laboratory (LLNL) in California.*** Oversight of stockpile management and stewardship of the nation's nuclear weapons, including research and enhanced surveillance of weapons, and the processing of nuclear materials.
- ***Nevada Test Site in Nevada.*** Oversight of the stewardship of the nuclear weapons stockpile, including sub-critical experiments and criticality experiments; and the packaging and disposal of radioactive waste.
- ***Sandia National Laboratories (SNL) in New Mexico and California.*** Oversight of stockpile management and stewardship of the nation's nuclear weapons, including research and enhanced surveillance of weapons.
- ***Hanford Site in Washington.*** Oversight of the storage and disposition of high-level waste, stabilization of sludges from corroded spent nuclear fuel, stabilization of other residual nuclear material from previous operation, and the dismantling and disposition of excess defense nuclear facilities.
- ***Idaho National Laboratory (INL) in Idaho.*** Oversight of the storage and stabilization of high level waste, the storage and disposition of spent nuclear fuel, packaging and disposition of radioactive waste, and the dismantling and disposition of excess defense nuclear facilities.
- ***Waste Isolation Pilot Project (WIPP) in New Mexico.*** Oversight of the receipt, handling, and permanent deep geological disposal of transuranic wastes.

The Risks

The potential for release of hazardous materials to the environment by the DOE defense nuclear facilities continues to pose safety and health 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 nuclear waste stockpiles in turn create their own new waste streams, and require extensive planning to mitigate risks of environmental release. Designing new and old facilities or structures to prevent the release of hazardous materials can be threatened 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 defense 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 designing, constructing, operating, and maintaining them. 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 these defense nuclear facilities are not solely a function of the quantities of nuclear material present but more importantly, the material processes involved and the potential for explosive dispersal of radioactive materials or inadvertent nuclear detonation.

Strategic Goals

The Board is developing a revised strategic plan. This plan, to be published in FY 2008, will address achieving the Board's mission from three mutually supporting perspectives:

- **Technical Nuclear Safety Oversight** is the number one priority for the Board and encompasses activities as directed 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 on four interdependent strategic areas of concentration:

Nuclear Weapon Operations
Nuclear Material Processing and Stabilization
Nuclear Facilities Design and Infrastructure
Nuclear Safety Programs and Analysis

- **Communications** focuses on the need for the Board to continually serve and inform the Congress and the public concerning the Board's nuclear safety activities.
- **Management** encompasses establishing procedures and policies to efficiently and responsibly manage the Board's human, financial, and material resources to accomplish its mission.

Human Capital - The Board's Greatest Asset

Seventy 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 the DOE 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 staff requires scientists and engineers with extensive backgrounds in technical disciplines such as nuclear-chemical processing; conduct of operations; general nuclear safety analysis; conventional and nuclear explosive technology and safety; nuclear weapons safety; storage of nuclear materials; nuclear criticality safety; and waste management. Most of the technical personnel have technical master's degrees, and approximately 18 percent have doctoral degrees. 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.

During FY 2007, the Board succeeded in increasing its staff from 86 to 92. Ten engineers were hired and the Board lost four to retirement or attrition. All five Board Member positions are filled. The Board is making hiring a priority so it will reach full strength in 2008. However, in order to accomplish its mission in FY 2009, the Board requires additional resources to meet its nuclear safety oversight responsibilities.

Building on its hiring successes of 2007, the Board will continue its aggressive approach to reach out to mid-career and senior-level scientists and engineers. The combination of an aging workforce and high demand for experienced scientists and engineers by other organizations will impact Board operations if not dealt with in an aggressive manner. Approximately 20 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 to be very stiff due to the expected growth of nuclear power generating capacity in the near future, the consequent need for increased technical expertise by 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 to spend more resources on recruiting highly qualified technical personnel in a highly 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. In FY 2007, the Board set a goal to recruit two to four personnel into the PDP each year. The Board accomplished this annual goal by hiring two PDP personnel in FY 2007.

Health and Safety Oversight Resource Requirements

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.
- (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 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) The Board’s greatest asset is its technically proficient workforce. 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 the DOE defense nuclear complex. The current workforce ceiling of 100 FTE limits both the scope and pace of the Board’s safety oversight effort.

In preparing this budget request, the Board compared its current resources and capabilities against its projected workload, which is derived from three sources: current DOE programs and projects, Congressional direction, and new DOE projects and programs. In FY 2009, the Board will need an additional 5 positions (7 FTE) and a \$3.0 million budget increase in order to meet a significant increase in its safety oversight responsibilities and corresponding workload. A summary follows:

- **Continued operation of the current DOE defense nuclear facilities.** The Board will continue to exercise its current level of nuclear safety oversight over DOE defense nuclear facilities. The Board's current authorization of 100 FTEs is sufficient to maintain selective oversight of current DOE programs and projects included in the FY 2008 budget request. However, this is not sufficient to meet Congressional demands to intensify the scope and pace of the Board's independent oversight of DOE projects and programs.
- **Increased Congressional concerns about facilities and DOE operations.** Congress has continued to express 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 the DOE in meeting mission requirements. In the conference report to accompany the John Warner National Defense Authorization Act of FY 2007 National Defense Authorization Act, H. Conf. Rpt. No. 702, 109th Cong., 2nd Sess. page 976 (2006), the conferees:

...believe that the Board and the Department would benefit from a more structured process for issue resolution that would allow issues to be raised, evaluated, and adjudicated at logical points in the design and construction process.

...urge the Board to evaluate whether more frequent use of the Board's formal recommendation process would drive both parties towards this more structured process.

...encourage the Board to take a constructive role in the problem-solving process by quickly evaluating corrective actions proposed by the Department and its contractors.

...support the pending revision of the Department's Order 413.3 to require critical safety determinations be made prior to Critical Decision 1 in the Department's project management system.

...direct the Board and the Department to continue these discussions and to report jointly to the congressional defense committees on their efforts to improve the timeliness of issue resolution, including recommendations, if any, for legislation that would strengthen and improve technical oversight of the Department's nuclear design and operational activities.

...direct the Board to provide to the congressional defense committees quarterly reports to identify and report the status of significant unresolved issues.

...expect the Board to exercise its existing statutory authority at all Department of Energy defense nuclear facilities. This includes the Waste Treatment and Immobilization Plant [Project 01-D-416] at the Department's Hanford site in the State of Washington.

On July 19, 2007 the Board and DOE submitted to Congress a Joint Report entitled, *Improving the Identification and Resolution of Safety Issues during the Design and Construction of DOE Defense Nuclear Facilities*, as required by the House Conference Report 109-702 on the John Warner National Defense Authorization Act for FY 2007. This report included actions to be taken to improve the timeliness of issue resolution, which are summarized in Exhibit B. The Board's action items are:

- Summarize unresolved safety issues and Board view of safety status of projects at appropriate critical decisions.
- Summarize to the Congress unresolved safety issues on a project by project basis.
- Track the status of safety issues raised as a result of the Board's reviews of projects.
- Review and assess the new DOE Order related to early integration of safety into design.
- Review and assess implementation specific actions during the project design phase to achieve the safety-in-design objectives incorporated into DOE Order 413.3A.
- Demonstrate the safety-in-design requirements of Order 413.3A and Standard 1189 on two major projects (Uranium Processing Facility at ORNL and Integrated Waste Treatment Unit) at INL.
- Review and assess eighteen guides to be developed by DOE to provide additional guidance on implementation of DOE Order 413.3A.

The Board needs to expand its capability to oversee the additional work included in DOE's nuclear program growth.

- **Increased activity at Department of Energy (DOE) defense nuclear facilities.** The risks and challenges facing DOE continue to grow. DOE is pursuing at least 25 major design and construction programs to build nuclear material waste treatment facilities (Exhibit A), and the list has increased by 25 percent during the past year. DOE is planning to modernize the weapons complex. DOE leadership has committed itself to addressing program management shortcomings that contribute to nuclear safety concerns at the facilities. While some DOE sites have improved their ability to implement effective safety and health programs, overall, the Department still has many shortcomings in this area.

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 workers is addressed early in the design process. In FY 2009, the Board will be required to expend considerable resources to review ongoing design efforts, as well as construction activities of DOE defense nuclear facilities currently underway or planned for the near future.

Technical Staffing Requirements

The Board needs to recruit and retain additional technical staff in order to have the capability to perform nuclear safety oversight commensurate with the projected workload in FY 2009. Specifically, the Board plans to recruit additional experienced engineers to perform the following specialty reviews needed in its oversight work in each of four strategic areas of concentration.

- **Nuclear Facilities Design and Infrastructure.** The Board reviews new DOE defense nuclear facilities early in the design process to ensure they are designed and constructed in a manner that will support safe operations. The Board reviews these new projects to ensure a robust design with appropriate safety controls that comply with approved nuclear safety codes and standards. The Board is overseeing safety aspects of new projects at the Savannah River Site (SRS), Hanford, Y-12 at Oak Ridge National Laboratory (ORNL), Idaho National Laboratory (INL), Lawrence Livermore National Laboratory (LLNL), Los Alamos National Laboratory (LANL), and Pantex Sites.
- **Nuclear Material Processing and Stabilization.** Substantial quantities of nuclear materials, nuclear wastes, and irradiated fuel remain in need of safe treatment, processing, and storage. The Board reviews DOE's plans and programs to stabilize the materials and place them in a safe configuration for storage pending future programmatic use or disposition. The Board oversees stabilization of spent nuclear fuel at the Hanford and SRS, the nuclear waste programs being conducted at the SRS and Hanford, as well as at WIPP and INL. The Board also provides safety oversight of DOE programs to deactivate and decommission facilities at the Hanford and SRS, Y-12, LLNL, and LANL.
- **Nuclear Weapon Operations.** Stockpile management describes the industrial aspects of maintaining the U.S. nuclear weapons stockpile and complex. Stockpile stewardship refers to activities carried out by DOE to ensure confidence in the safety, security, and reliability of nuclear weapons in the stockpile, in the absence of underground nuclear weapons testing. Board oversight activities for this strategic area focus on assuring that current and planned stockpile management and stockpile stewardship operations are accomplished safely according to approved standards. This involves oversight of defense nuclear operations at the Pantex Plant, the Y-12 National Security Complex, LANL, LLNL, Nevada Test Site, and Sandia National Laboratories, and tritium operations at the SRS.
- **Nuclear Safety Programs and Analysis.** The Board oversees complex-wide health and safety issues to identify and correct health and safety problems. The Board assesses areas such as the technical competence of DOE's federal workforce, the efficiency of DOE's line management and safety oversight, and the development and implementation of Integrated Safety Management (ISM) systems with particular focus on safety analyses and controls. Key supporting functional areas are also reviewed, such as quality assurance, nuclear criticality safety, and training and qualifications. The Board's reviews in this strategic area often build on data collected at the field level in the other three areas,

integrating and analyzing the results to feed back key information that can be used to direct safety program improvement across multiple management lines.

- **Site Representatives (assigned to full-time duty at a DOE defense nuclear facility)**

An engineer with nuclear/chemical construction expertise to be assigned to DOE site(s) as needed during period of peak construction activity.

Oversight Examples -- DOE Design and Construction Projects

One prominent example of a high risk, new facility undergoing both design and construction is the Waste Treatment Plant (WTP) in Richland, Washington. The WTP project consists of three major nuclear facilities to pretreat and vitrify high-level waste stored in underground tanks at Hanford. This project, now estimated to cost in excess of \$12.0 billion, has evolved from a facility designed to treat only 10 percent of the tank waste at Hanford to one that is proposed to be used to process the entire high-level waste inventory from the underground tanks by 2028. WTP is a complex, high risk program that has evolving design and construction parameters and will require more than 15 years to complete. The design and construction activities for the WTP plant slowed in 2005 and 2006 due to seismic and other concerns, but are expected to ramp up significantly in 2008.

The design and construction reviews conducted by the Board on WTP and other new DOE facilities are resource intensive and time consuming, but are key to preventing safety flaws in design and construction that could render a newly constructed facility unusable. The Board plans to hire additional engineers with highly specialized skills in areas such as seismic engineering of structures and geotechnical reviews that are critical to performing the early technical oversight reviews of new DOE projects.

The Board will require additional structural and mechanical engineering expertise to evaluate the design, selection, and installation of safety-related mechanical systems such as ventilation systems, process piping, pumps and valves, and to evaluate technical issues that continue to evolve. The Board also plans to hire one additional site representative to be assigned full-time at Hanford as the pace of work at WTP increases.

Expertise in safety analysis is a broad area of continuing need for the Board to support the development of adequate safety controls for new defense nuclear facilities, as well as the upgrading of the safety bases for existing facilities.

The Board also requires additional chemical process and nuclear waste vitrification expertise to provide technical oversight of the complex WTP processes, as well as numerous other nuclear facilities, such as the Salt Waste Processing Facility and the Plutonium Disassembly and Conversion Facility at the Savannah River Site, the Plutonium Vitrification Project being planned for the K-Reactor at the Savannah River Site, the Demonstration Bulk Vitrification Facility at the Hanford Site, and the Integrated Waste Treatment Unit at the Idaho National Laboratory.

One of the dominant potential accidents at all defense nuclear facilities, both new and existing, is a major fire. The Board must provide constant oversight and vigilance in the area of fire protection detection and suppression systems to ensure these key safety controls are designed, installed, and maintained correctly.

Oversight Examples -- Safety of Nuclear Weapon Activities

To maintain the Nation's nuclear deterrent without the design of new weapons and the underground testing of existing weapons, DOE is accelerating its programs to extend the life of weapons in the enduring stockpile, requiring more and increasingly complex operations to disassemble, refurbish, reassemble, and re-certify nuclear weapons and components. DOE's nuclear weapons stockpile stewardship and management operations require particular Board oversight attention due to the hazards associated with the nuclear explosive activities and experiments involving co-located high explosives and nuclear material. In addition to the criticality safety concerns, the Board is especially sensitive to the safety risks due to the potential for explosive dispersal of radioactive materials or inadvertent nuclear detonation.

To effectively oversee the health and safety issues and maintain the pace of this expanded weapons program, the Board will need to fill key vacancies in its technical staff with subject matter experts and field site representatives, as well as contract for unique specialized technical expertise (e.g., in-depth knowledge of a particular weapon design). To better oversee nuclear weapon-related activities, the Board currently has established site offices at the Pantex Plant, the Y-12 National Security Complex, the Savannah River Site, and the Los Alamos National Laboratory. As site representative vacancies occur, the Board has reassigned experienced headquarters staff to fill these demanding positions in the field. Thus, the Board must backfill technical vacancies at headquarters to ensure that it has the expertise to conduct oversight operations and to prepare suitable candidates for future field assignments.

A unique and particularly devastating potential accident in the nuclear weapons complex involves an inadvertent nuclear detonation at the Pantex Plant during nuclear explosive operations, or at the Nevada Test Site (NTS) while working on a damaged nuclear weapon or an improvised nuclear device.

Anticipated increased operational tempo of nuclear explosive operations at the Pantex Plant would continue to increase requirements to survey the aging stockpile, particularly in the absence of underground testing. Additionally, dismantling our retired nuclear weapons as we draw down our nuclear weapons stockpile will increase operations. In response to Congressional oversight based on the findings of the Defense Science Board, DOE has begun implementing plans to further increase throughput in the weapons complex. This increased activity will further tax the Board's oversight capability at the nuclear weapons production facilities.

In addition to the increased operational tempo at the Pantex Plant, production operations at the Y-12 National Security Complex will have to continue to provide essential support to the enduring stockpile. The old defense nuclear facilities at Y-12 are particularly in need of replacement, and significant effort on the part of the Board is required to oversee the safety of

the challenging task of operating aging facilities at a high tempo while designing, constructing, and making the transition to modern replacement facilities.

Oversight Examples -- Nuclear Materials Processing and Stabilization

One of the most significant challenges facing DOE in the arena of nuclear materials processing and stabilization is managing the high-level waste (HLW) stored in underground tanks at the SRS. The Board has spent a great deal of effort providing oversight of the SRS HLW system and plans to continue to do so. DOE stores more than 34 million gallons of HLW in 49 HLW tanks at SRS, and the aging systems within the tank farms and the shrinking volume of free space in the tanks pose significant health and safety risks for DOE and its contractor. DOE plans to separate HLW liquids, salts, and sludge, treat each waste stream, and stabilize the waste for packaging and final disposal. This is a complex and hazardous process and requires DOE to work closely with many local and national regulators and stakeholders.

The Board has issued several letters and Recommendations regarding the HLW system at SRS, including Recommendation 2001-1, *High-Level Waste Management at the Savannah River Site*, which is still open and active. On this topic, the Board has interacted closely with DOE, the SRS contractor, the State of South Carolina, and the appropriate committees of the U.S. Senate and House of Representatives.

The Board's oversight is expected to encompass a wide variety of technical safety issues related to the chemical treatment of wastes and to the design, construction, and operation of waste treatment facilities. Examples of these technical safety issues include:

- targeted retrieval of low-curie salt waste from HLW tanks without adding excess dissolution water to the HLW system,
- modifications to and subsequent operation of the Saltstone Disposal Facility for disposal of low-curie salt wastes,
- treatment of unique organic compounds and HLW in Tank 48,
- design, construction and operation of the Salt Waste Processing Facility, which would serve to treat the bulk of the HLW in the SRS Tank Farms,
- coordinated operation of HLW evaporators to avoid introduction of incompatible waste forms to an evaporator,
- coordinated sludge washing and retrieval to maintain a feed stream to the Defense Waste Processing Facility (DWPF),
- assuring adequate tank space to accommodate recycle water from the DWPF, and
- final cleanout and closure of the HLW tanks.

Additional Funding Needs

In addition to the funding needed for the increased 5 positions (7 FTE) required to address the Board's growing workload, the Board's budget request includes funding to pay for the nondiscretionary cost increases resulting from Federal pay raises that exceeded the amount in the President's budget request for FY 2008 and to compensate for the proposed January 2009 pay raise. It also includes funding for inflationary cost increases to non-personnel accounts, as well as for projected cost increases in personnel benefits, technical support contracts, and other services based on FY 2007 actual expenses. With 70 percent of its budget being salaries, benefits, and other personnel related costs, the Board will not be able to absorb these cost increases without the requested increase in new budget authority. Without this additional funding (e.g., if the Board had to operate in FY 2009 at the same level of new budget authority included in the FY 2008 President's Budget), the Board's ability to conduct its safety and health oversight responsibilities would be severely compromised. An explanation of each requirement and associated funding impact and object class (OC) is discussed as follows:

- **Funding Required to Offset the Impacts of the FY 2007 Continuing Resolution**

The Board's requested personnel levels in each of the FY 2005 - FY 2007 President's Budgets were 100 FTEs, the minimum level requested since the early days of the Board. When the President's FY 2008 Budget was prepared, the FY 2007 Energy and Water Development Appropriations Bill had not been enacted, and the Board was operating under a Continuing Resolution (CR). Based on a full year CR, which significantly reduced the projected carryover into FY 2008 (and therefore adversely impacted projected FY 2008 budgetary resources), the Board could only budget for 98 FTEs in its FY 2008 Budget Request. An additional \$400,000 in new budget authority is needed in FY 2009 to fund the historical baseline of 100 FTEs, i.e., to fund two additional FTEs.

- **Fully Fund the Salaries and Benefits Account for FY 2009 (OC 10)**

During the past several years, the enacted civilian pay raises have exceeded the pay raise factors that were included in the President's budget requests. Since an agency's budget request for salary and benefit funds includes an allowance for the President's proposed pay increase, any increase in this pay raise above the President's request must be absorbed by each agency as the funding authorized and appropriated for each agency is not otherwise adjusted to reflect the actual pay raise. With 70 percent of the Board's budget dedicated to paying for staff salaries and benefits, the Board is unable to absorb pay increases without a corresponding staff reduction. The financial impact of these unfunded cost-of-living pay increases is especially severe since the Board does not have the financial flexibility to recover from shortfalls in our salary and benefits account.

The Board needs additional funding to help pay for the 2009 impacts of the enacted 3.5 percent and proposed 2.9 percent increases in January 2008 and January 2009, respectively, as well as other pay adjustments. An additional \$45,000 is needed to fund the full impact of the FY 2008 civilian pay raise at the approved 3.5 percent level for FY

2008, and an additional \$565,000 is needed to fund the President's proposed FY 2009 civilian pay raise of 2.9 percent. Without additional new budget authority to absorb these additional personnel costs, the Board would be forced to operate without the equivalent of 3-5 employees, which would severely jeopardize its ability to carry out its responsibilities.

- **Funding for Increased Employee Benefits Costs (OC 12)**

An analysis of FY 2004 through FY 2007 recurring, non-discretionary employee benefit costs (e.g., contributions to health insurance, FICA, retirement funds, Thrift Savings Plan (both automatic and matching contributions for FERS employees)) at approximately 25.7 percent of salaries. In FY 2007 these costs were almost 26 percent of salaries indicating a definite upward trend in these costs. Employee benefits in the FY 2009 budget request are estimated at 25.9 percent of personnel salaries. This results in an additional \$25,000 in employee benefits costs above the amount included in the President's FY 2008 Budget.

- **Funding for Increased Relocation Costs (OC 12/OC 22)**

The Board annually budgets for projected relocation costs, primarily for the relocation of existing Board employees to or from DOE site offices as a result of site representative changes. The Board is projecting that it will relocate at least two more senior employees in FY 2009 than budgeted for in FY 2008. Based on historical data, the Board estimates change of station (OC 12) expenses (e.g., en route travel, temporary quarters, real estate related costs, etc.) at \$75,000 per employee and transportation of things (OC 22) expenses (e.g., movement of household goods) at \$25,000 per employee. Therefore, the Board requires an additional \$200,000 in new budget authority for additional relocation costs over and above the amount included in the President's FY 2008 Budget.

- **Funding for Increased Technical Support Contracts Costs (OC 25.1)**

The Board maintains a highly skilled staff; however, it is not economically feasible to maintain multiple permanent staff in very specialized technical disciplines. Therefore, it is necessary to contract for this expertise when needed. FY 2007 obligations for these contracts were \$1,050,000 (\$175,000 higher than the amount included in the FY 2008 President's Budget) due to an unexpected need for these services. Contractors can fulfill short-term needs left by vacancies in the government workforce. For example, extensive use of technical consultants has been necessary to review the complex design and construction of the WTP at Hanford. This includes the review of seismic analysis, structural loading, and construction plans to ensure the safety of this \$12 billion project. The Board anticipates a continued need for technical support contractors at the FY 2007 level to monitor construction and start-up of the Hanford facility, as well as other new DOE defense nuclear facilities such as the Highly Enriched Uranium Materials Facility in Oak Ridge, Tennessee. Thus, the FY 2009 budget request includes \$1,100,000 for technical support contracts, a \$200,000 increase over the amount included in the FY 2008 Budget Request, excluding the effects of inflation.

- **Funding for Increased Other Services Costs (OC 25.2)**

Other Services includes a wide range of the Board's recurring administrative support needs such as the independent audit of the Board's financial statements, physical and cyber security, employee training, information technology support, and recruitment advertising. This funding includes \$100,000 for the independent audit of the financial statements. In addition, the staff of the Board's Office of the General Manager (OGM) devotes approximately .5 FTE complying with audit requirements (i.e., gathering data, meeting with auditors, reviewing reports, etc.).

For FY 2009, the Board is requesting an additional \$125,000 in new budget authority for increased contract costs due to increased recruitment advertising (\$35,000), and increased Information Technology (IT) support (\$90,000). The Board experienced significantly higher recruitment obligations in FY 2007 (\$115,000) than it has historically incurred due to its success in filling technical staff vacancies. Experienced scientists and engineers required by the Board are in high demand and an ongoing, extensive recruiting effort is necessary to replace technical employees lost through attrition. Recruitment costs include print and radio advertisements, trade show materials, and conference registration fees. With greater than 20 percent of its current technical employees eligible for retirement in FY 2009, the Board anticipates having to continue this level of recruiting and requires new budget authority in that amount. Finally, the Board will be re-competing its Information Technology support contract and is planning on adding new requirements to meet additional workload emanating from Federal Information Security Management Act (FISMA) and related requirements. The Board estimates these additional requirements will result in \$90,000 in additional costs which were not factored into the FY 2008 President's Budget, requiring new budget authority in that amount.

- **Funding for Increased Government Services Costs (OC 25.3)**

The Board utilizes cross-service providers for a wide variety of support services such as 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 and employee background investigations for security clearances. Based on FY 2009 estimates already received from some providers and FY 2008 agreements in place, the Board will incur approximately \$100,000 in additional costs for these services compared to the amount included in the FY 2008 President's Budget. For example, the Department of Homeland Security's FY 2009 estimate for building security is \$427,000, over \$75,000 higher than the \$350,000 amount included in the FY 2008 President's Budget. The Board paid \$335,000 for building security in FY 2007.

- **Funding for Inflation in Non-Personnel Accounts**

The Board is experiencing increased costs due to inflation in non-personnel accounts such as other services, communications and utilities, supplies and materials, software licenses, etc. The Board requires an additional \$140,000 in new budget authority to fund these increased costs. The estimate was based on 2% of non-personnel costs.

The Bottom Line

The Defense Nuclear Facilities Safety Board's mandate is to provide vital technical health and safety oversight of the Department of Energy's defense nuclear facilities and activities in order to protect the health and safety of the public and workers. To accomplish this mission in Fiscal Year 2009, the Board is requesting a total of \$25,499,000 in new budget authority for 105 FTEs. Specifically, the Board seeks an additional \$3.0 million over the FY 2008 budget request which includes \$1.2 million in funding for 5 new positions (7 FTE) and \$1.8 million for inflationary and other adjustments to fund the Board's existing 100 positions.

The cost of re-engineering and making post-construction modifications to complex DOE defense nuclear facilities due to the late discovery and identification of significant design flaws that could impact public and worker health and safety would require significantly more resources than the requested budget increase. If 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. The Board currently oversees approximately \$20 billion in new DOE construction. Each increase in project cost of one percent equates to an increase of \$200 million. Increases in project cost well in excess of this amount have driven the Congress, as evidenced by the Senate Armed Services Committee language, to insist on identification of safety issues and their resolution early in the design stage.

The Board believes it is prudent to proactively address what has been called a recurring DOE problem and needs the additional resources addressed in this Budget submission to accomplish this. The Board's budget request of \$25.499 million in new budget authority and 105 FTEs is necessary to ensure the scientific and technical resources required to address the nuclear safety issues are available to review the expanding DOE design and construction, and future weapons programs in a timely and efficient manner.

Exhibit A. Planned or Underway DOE Design/Construction Projects

SITE	FACILITY	TOTAL PROJECT COST (\$M)	STATUS - August 2007		
			Critical Decision Approved	Design Completion	Construction Completion
Hanford Site	Waste Treatment Plant	\$12,200			<i>(Operational 2019)</i>
	a. Pretreatment Facility		CD-3	66%	25%
	b. High Level Waste Treatment Facility		CD-3	80%	21%
	c. Low Activity Waste Facility		CD-3	93%	50%
	d. Analytical Laboratory Facility		CD-3	86%	43%
	Demonstration Bulk Vitrification System Project	\$224	CD-1	95%	<i>Some site and foundation work. (Operational 2011)</i>
	K-Basin Closure Project Sludge Treatment	\$100 (Being Evaluated)	Being Evaluated; Re-baselined to CD-0	Being Evaluated	<i>Starting (To be determined)</i>
	<i>Tank Retrieval and Waste Feed Delivery System</i>	<i>\$1,140</i>	<i>One sub-project is not using the formal critical decision process.</i>	<i>Various degrees of completion.</i>	<i>Various degrees of completion and operations</i>
	Immobilized High-Level Waste Interim Storage Facility	\$100	CD-3	90%	Deferred <i>(Operational to be determined)</i>
Idaho National Laboratory	Integrated Waste Treatment Unit project	\$462	CD-2/3B	90%	Some ground work <i>(Operational 2009)</i>
Los Alamos National Laboratory	Chemistry and Metallurgy Research Replacement Project	\$725 - \$975 Being Reevaluated	CD-1	80%	Some ground work <i>(Operational 2014)</i>
	Technical Area 55 Reinvestment Project	\$72	Phase A: CD-2	60%	<i>(Complete 2010)</i>
			Phase B: CD-0		<i>(Complete 2014)</i>
Upgrades to Pit Manufacturing	Annual	Not formally implementing		work ongoing	

	Capability at Tech Area 55	funding	critical decision process		
	Radioactive Liquid Waste Treatment Facility Upgrade Project	\$96	CD-1		<i>(Operational 2011)</i>
	New Solid Transuranic Waste Facility Project	\$40	CD-0	60%	<i>(Operational 2011)</i>
	Nuclear Material Safeguards and Security Upgrades Project Phase 2	\$240	CD-1	30%	<i>(Operational 2013)</i>
	Technical Area 55 Radiography Project	\$38	CD-0	90% on hold	<i>(Operational 2010)</i>
Nevada Test Site	Device Assembly Facility -- Criticality Experiments Facility	\$150	CD-2	90%	<i>(Operational 2011)</i>
Pantex Plant	Component Evaluation Facility	\$112	CD-0	Project is on hold	(Operational on hold)
Oak Ridge National Laboratory	Building 3019 -- Uranium-233 Downblending and Disposition Project	\$371	CD-1	90%	Not Started <i>(Operational 2012)</i>
Savannah River Site	Pit Disassembly and Conversion Facility	\$1,700	CD-1	50%	Not Started <i>(Operational on hold)</i>
	Salt Waste Processing Facility	\$660 being reevaluated	CD-1	30%	Not Started <i>(Operational 2011)</i>
	Container Surveillance and Storage Capability Project	\$130	CD-1	30%	Building Preparations *Started <i>(Operational 2010)</i>
	Plutonium Disposition Project	\$500	CD-0	10%	Not Started <i>(Operational 2013)</i>
	Waste Solidification Building	244	CD-1		Not started (Operational 2012)
Y-12 National Security Complex	Highly Enriched Uranium Materials Facility	\$500	CD-3	100%	40% <i>(Operational 2009)</i>
	Uranium Processing Facility	\$1,500	CD-0	10%	Not Started <i>(Operational 2017)</i>

Exhibit B. Actions Reported in the Joint Report to Congress

Action	Responsibility	Objective <i>(Board Role)</i>
Project Letters	Board	Summarize unresolved safety issues and Board view of safety status of projects at appropriate critical decisions. <i>(Prepare and staff letters, and monitor progress).</i>
Quarterly Reports to Congress	Board	Summarize to the Congress unresolved safety issues on a project by project basis. <i>(Prepare and staff reports.)</i>
Periodic Joint Reviews of Open Safety Issues	Board/DOE	Track and status safety issues raised as a result of the Board's reviews of projects. <i>(Consolidate issues for review. Prepare for and conduct reviews, and document findings.)</i>
Implement Recently Issued Order 413.3A	DOE	Implement changes to the Order related to early integration of safety into design. <i>(Monitor DOE implementation)</i>
Implement Newly Developed Standard 1189	DOE	Implement specific actions during the project design phase to achieve the safety-in-design objectives incorporated into DOE Order 413.3A. <i>(Assess standard, analyze actions, and coordinate responses)</i>
Demonstrate requirements incorporated into Order 413.3A and Standard 1189	Board/DOE	Demonstrate the safety-in-design requirements of Order 413.3A and Standard 1189 on two major projects (Uranium Processing Facility and Integrated Waste Treatment Unit). <i>(Assess demonstrations, analyze results, and prepare response)</i>
Guides to Support Order 413.3A	DOE	Eighteen guides to be developed to provide additional guidance on implementation of DOE Order 413.3A. <i>(Review draft guides and assess impact of guides on activities)</i>

Exhibit C. 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 2009

The Defense Nuclear Facilities Safety Board (Board) is an independent, Executive Branch federal agency charged by statute with a broad mission of providing health and safety oversight of the Department of Energy's (DOE) defense nuclear facilities and activities.

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

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

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

To facilitate strategic management, the Board has organized its technical staff into four groups. The Technical Lead of each group is assigned responsibility for one of the four performance goals in the strategic plan, and for executing the performance objectives associated with that goal. As required by Office of Management and Budget (OMB) guidance governing compliance with the Government Performance and Results Act of 1993, the Board has produced measurable performance goals for FY 2008 and FY 2009 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 budget submission includes the Board's *Annual Performance Plan for FY 2009* 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 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 major 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 2008 and FY 2009. To place this planning information in context, the performance goals are followed by examples of the Board's accomplishments during the years FY 2004 through FY 2007, as required by OMB's instructions on preparing and submitting a performance budget.

A comprehensive assessment of progress during Calendar Year (CY) 2006 appears in the Board's *Seventeenth Annual Report to Congress*. The Board's *Eighteenth Annual Report to Congress*, due for publication in early 2008, will cover accomplishments during CY 2007. 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.

4. 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 the health and safety of the workers and the public.

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 Fiscal Year 2009. 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 Test Site (NTS) will also be a focus area for the Board's safety oversight. Key areas of safety oversight for the Board in Fiscal Year 2009 will include:

- *Nuclear Explosive Operations*—DOE's efforts to increase the operational tempo at Pantex are expected to continue, due to life extension programs for aging weapon systems as well as the need to dismantle retired weapons as we draw down our nuclear weapons stockpile. DOE is expected to implement "safety by design" re-engineering known as Seamless Safety for the 21st Century (SS-21) for proposed B53 dismantlement operations, W84 operations, and W88 cell operations at Pantex. When this effort is complete, all nuclear explosive operations at Pantex will have been re-designed to meet SS-21 technical safety objectives.
- *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 Highly Enriched Uranium Materials Facility, which is presently under construction).
- *Nevada Test Site Nuclear Activities*—There is significant work to be done for DOE to develop a capability at NTS to disposition a damaged nuclear weapon or improvised nuclear device. In addition, further subcritical experiments are expected to be conducted at NTS in support of nuclear weapon programs, and DOE intends to begin nuclear explosive operations at the Device Assembly Facility at NTS in FY 2009. Finally, the Nation's single capability to perform nuclear criticality experiments is being moved from Los Alamos

National Laboratory (LANL) to NTS. The Board will be required to assess the safety of criticality operations at NTS in FY 2009.

- *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 extensive deficiencies in the authorization bases and safety programs for its nuclear facilities. Resolution of the underlying safety-related deficiencies will require years of effort by DOE and the laboratories.

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 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 efforts to develop safety systems (e.g., system and process designs, safety bases, control schemes, and administrative programs) and DOE 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 Test Site (NTS).

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, 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, weapon response evaluation and documentation).
- Cross-cutting functional areas at Pantex, Y-12, NTS, 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, maintenance, configuration management).
- Evaluation of the safety culture of the Pantex Plant and associated design agencies.
- Special studies of unique or significant hazards at DOE nuclear facilities (e.g., classified projects, process technology alternatives, and disposition of special items and by-product materials).
- Startup preparations for the Highly Enriched Uranium Materials Facility.
- Modernization plans for Y-12, including the Beryllium Capability Project, accelerated dismantlement of weapons components, and infrastructure upgrades.
- Plutonium pit manufacturing and certification at LANL.
- Corrective actions to strengthen institutional safety programs and infrastructure at LANL LLNL, and SNL.
- Readiness to dispose of damaged nuclear weapons or improvised nuclear devices at NTS.
- Subcritical experiments at NTS.
- Readiness for nuclear explosive operations at the Device Assembly Facility at NTS.
- Preparations for Criticality Experiments Facility operations at the Device Assembly Facility at NTS.
- Development of plans for relocation of Annular Core Research Reactor at SNL.
- Authorization of SNL Auxiliary Hot Cell Facility and the Radioactive Mixed Waste Management Facility as Category 3 Hazardous Material handling facilities.
- Implementation of Recommendation 2005-1, *Nuclear Material Packaging*.

While performing its reviews, the staff will assess the effectiveness of ISM 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 NTS that start in FY 2009.

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 Objectives	
<p>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).</p>	
<p>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 efforts to develop safety systems (e.g., system and process designs, safety bases, control schemes, and administrative programs) and DOE 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 Test Site (NTS).</p>	
<p>Representative areas for Board and staff review include:</p>	
<ul style="list-style-type: none"> • 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., W76, B53, W80, W83, and W88). • Nuclear explosive operations at Pantex (e.g., conduct of operations, process documentation, and tooling). • Laboratory support of nuclear explosive operations at Pantex (e.g., sensitivity testing of high explosives, electrostatic discharge studies, weapon response evaluation and documentation). • Cross-cutting functional areas at Pantex, Y-12, LANL, LLNL, 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, maintenance, configuration management). • Special studies of unique or significant hazards at DOE nuclear facilities (e.g., classified projects, process technology alternatives, and disposition of special items and by-product materials). • Startup preparations for the Highly Enriched Uranium Materials Facility. • Modernization plans for Y-12, including the Beryllium Capability Project, accelerated dismantlement of weapons components, and infrastructure upgrades. • Corrective actions related to Uranium Holdup Survey Program at Y-12, and development of the next generation program. • Corrective actions to strengthen institutional safety programs and infrastructure at LANL and LLNL. • Readiness to dispose of damaged nuclear weapons or improvised nuclear devices at NTS. • Readiness for nuclear explosive operations at the Device Assembly Facility at NTS. • Preparations for criticality reactor (Criticality Experiments Facility) operations at the Device Assembly Facility at NTS. • Implementation of Recommendation 2005-1, <i>Nuclear Material Packaging</i>. 	
<p>While performing its reviews, the staff will assess the effectiveness of ISM implementation and the safety controls identified for ongoing operations as well as any new weapon system dismantlement projects at Pantex, Y-12, or NTS that start in FY 2008.</p>	

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 NTS (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 NTS. 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.

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 2006 Performance Accomplishments

Nuclear Explosive Safety Top Down Review. DOE has made significant improvements to the Nuclear Explosive Safety process in the past several years; however, because of continuing problems, the Board and DOE agreed in May 2004 that a Top-Down Review of the process was needed to harmonize the directives, eliminate conflicts and redundancy, determine whether the requirements were adequate, and elevate key requirements to a level in the directives system commensurate with their safety significance. The Board participated in this effort, and DOE briefed the Board on the results in January 2006. Forty-three issues had been developed and considered, and action was recommended on almost half of these. Implementation of some of the recommended corrective actions was initiated promptly; however, others have been on hold pending the completion of a DOE review of production throughput at Pantex.

Revised Nuclear Explosive Safety Directives. In response to the Board's observations, DOE has revised and updated 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*. While the new version of DOE-STD-NA-3016 improves over the previous revision in certain areas, the Board does not consider the requirements contained in the standard to be sufficiently detailed and comprehensive, particularly regarding weapon response development, and is holding the associated commitment in the Recommendation 98-2 Implementation Plan open until issues with the standard are resolved.

Pantex Cell Gap Analysis. The Board evaluated calculations of leakage through cell gaps performed to better understand the consequences of potential accidents at the Pantex Plant. Based on these calculations, leakage through cell gaps does not appear to be an issue for single-unit operations. However, there is still a concern that accident consequences for multi-unit operations involving certain systems in certain facilities could challenge the evaluation guidelines. Additional calculations and testing may be needed to provide assurance that the evaluation guidelines will not be challenged for multi-unit operations.

Electrostatic Discharge (ESD). The Board evaluated efforts by the Pantex Plant contractor and the weapon design agencies to characterize ESD insult environments and the responses of sensitive components to them. Progress has been made in defining the environments and the hazards posed by them; however, the Board has identified the need for additional clarification with respect to furniture (e.g., tooling and equipment) ESD, capacitive coupling between the insulting objects and other nearby charged objects, the assumption of electrical isolation of tools within the established standoff boundary, and resonance conditions and effects.

Special Tooling Program at Pantex. In a letter dated December 15, 2004, the Board expressed concern that continuing weaknesses in the Special Tooling Program could have an adverse impact on the safety of nuclear explosive operations. In response, DOE conducted a comprehensive, independent review of tooling program deficiencies and committed to implement corrective actions to improve the tooling program. The Board reviewed the program in March 2006 and determined that it had significantly improved, thereby improving the safety and efficiency of nuclear explosive operations that rely on specially designed tools to eliminate or minimize hazards.

W56 Dismantlement at Pantex. The Board evaluated process development and execution of the W56 dismantlement campaign at Pantex. The Board urged DOE to ensure that laboratory expertise, both active and retired, was applied to resolve technical challenges that arose to help ensure the safe and successful completion of the dismantlement campaign. Dismantlement of all W56 war reserve units was safely completed in June 2006.

B61 and W87 Operations at Pantex. Recommendation 98-2, *Safety Management at the Pantex Plant*, recommended that DOE expedite development and implementation of re-engineered processes for nuclear explosive operations at Pantex so that the attendant safety improvements could be achieved sooner. In FY 2006, the Board evaluated the start-up of the Seamless Safety for the 21st Century (SS-21) processes for the B61 and W87 Disassembly & Inspection and Rebuild Programs. The enhanced processes utilize upgraded procedures, redesigned tooling, and fewer handling and lifting steps. These improvements make the operations significantly safer and more efficient than their predecessors.

Safety of Dismantlement Operations. The Board continued to evaluate DOE's plans to dismantle an older weapon system not protected by modern safety controls. The Board expressed concern to DOE regarding proposed disassembly activities at non-DOE facilities that did not have adequate safety programs and systems. DOE no longer plans to use such facilities; dismantlement operations are now planned for Pantex facilities.

Conduct of Operations at Pantex. In response to a Board letter issued in May 2005 identifying deficiencies in the conduct of nuclear explosive operations at Pantex, DOE initiated efforts to address the cause of the deficiencies and to develop both near- and long-term plans to improve the conduct of operations. After a follow-up review in FY06, the Board issued a letter to DOE in March 2006 re-emphasizing the importance of a consistently high degree of formality in the conduct of nuclear explosive operations, and favorably noting the extensive involvement of senior contractor management in developing and implementing improvements in conduct of operations at Pantex. As proposed improvements are implemented and the process matures, the Board expects to see continued improvements in the formality of nuclear explosive operations. The Board is continuing to evaluate improvements in the formality of work through daily operational oversight provided by its site representatives.

Pantex Multi-Unit Operations. The Board is evaluating the safety implications of the implementation of multi-unit nuclear explosive operations at Pantex, which are being pursued in support of an increasing operational tempo. In response to the Board's observations, Pantex is taking a more comprehensive approach to evaluating the implementation of multi-unit operations, including analyzing human factors considerations. In addition, the Board has urged Pantex to become more closely involved with studies being performed by the design agencies that will aid in evaluating the increase in risk associated with performing multi-unit operations.

Laboratory Support of Pantex Nuclear Explosive Operations. As a result of concerns over the continued erosion of technical competence and a need to re-emphasize the priority of work that directly supports nuclear safety, the Board issued Recommendation 2002-2, *Weapons Laboratory Support of the Defense Nuclear Complex*. In response, DOE established a single point of contact for each weapon system at each national laboratory, and a requirement at each site office to track and ensure closure of nuclear safety support requirements for weapon laboratories. These changes have enhanced the timely resolution of safety concerns in the nuclear weapon complex. The Board has now closed this recommendation.

Readiness to Dispose of a Damaged Nuclear Weapon. The Board has consistently highlighted to DOE the need to develop the programs and infrastructure at NTS necessary to safely dispose of a damaged nuclear weapon or improvised nuclear device. In FY 2006, the Board determined that DOE no longer had a clear plan for meeting this need. The Board requested that DOE explain the required state of facility readiness and its plans for safety improvements, because it did not appear the mission and hazards had changed. As a result of the Board's interactions, DOE has continued to make physical and procedural improvements at the NTS G-tunnel, provided training, and is reconsidering its plans to be prepared to safely dispose of a damaged nuclear weapon if needed.

Subcritical Experiments. The Board reviewed preparations for subcritical experiments at NTS, identifying inadequate nuclear safety management programs, inadequate mechanisms for verification of readiness, and inadequate safety bases. These items would also be relevant to nuclear weapons testing should such testing be resumed. In FY 2006, DOE made improvements that addressed these issues, including improvements in safety basis reviews, implementation of controls, and readiness reviews. As a result, subcritical experiments have a more complete documented safety analysis and thorough verification of readiness.

Lightning Protection at NTS. In 2003 and 2005, the Board noted deficiencies in lightning protection at NTS related to the protection of nuclear operations and personnel. In response, NTS implemented compensatory measures and began a study of the lightning protection needs at NTS. In FY 2006, a site-wide directive for the lightning protection program and lightning protection studies were completed. As a result, NTS now has a technical basis to identify appropriate controls for lightning protection for hazardous operations and has implemented a site-wide lightning protection program and controls.

Device Assembly Facility at NTS. In FY 2006, the Board evaluated the implementation of the safety basis for the Device Assembly Facility and the conduct of readiness reviews. As a result, DOE is developing plans to assess safety management programs and vital safety systems in DAF, has improved work planning and procedures, and has improved the implementation of controls (such as the fire protection system).

LANL Institutional Corrective Actions. The Board spent considerable effort, including a public meeting on March 22, 2006, reviewing LANL's institutional corrective action programs and ensure their continuity through the contract transition. Corrective actions focus on key areas including safety, quality assurance, software quality management, conduct of engineering, safety basis, conduct of operations, environmental risk management, and training. The Board has also sought to encourage DOE to ensure that adequate resources are provided for implementation of these corrective action plans in a timely manner.

Federal Oversight at LANL. In November 2005, the Board learned of DOE's plan to execute a 3-month "strategic pause" in oversight at LANL to re-engineer oversight policies and procedures in preparation for the transition to a new prime contractor. Approximately two-thirds of the site office's workforce were planned to be devoted to the re-engineering effort during the pause, leaving the remaining third to oversee laboratory operations. The Board objected to the concept of the pause and requested information on how DOE would maintain effective safety oversight for the significant defense nuclear activities pursued during that time period. DOE provided the requested information and proceeded with the pause, which evolved into a pilot project for a new concept in oversight that is heavily reliant upon self-oversight by the contractor. The Board is closely evaluating the development of the pilot project.

Confinement Ventilation at the LANL Plutonium Facility. The current safety basis for the LANL Plutonium Facility credits a passive confinement strategy (i.e., no active confinement ventilation) as a safety-class control to protect the public from postulated accidents. In response to issues raised by the Board, LANL analysts performed a comprehensive set of air-flow calculations to estimate potential releases under accident conditions and concluded that this strategy was inadequate. Compensatory measures were developed and implemented while further study on the confinement strategy was performed. Under the Implementation Plan for the Board's Recommendation 2004-2, *Active Confinement Systems*, this facility is now being assessed as a high priority facility with an accelerated schedule. The Board has continued to review and provide feedback on the draft methodology for leak path factor analysis.

Nuclear Criticality Safety Program at LANL. In October 2005, the Board observed DOE's review of the nuclear criticality safety program at LANL. The DOE review revealed several non-compliances with applicable ANSI/ANS standards and DOE Orders. Among the most serious deficiencies were that some operations had changed without revision to the criticality safety analysis, roles and responsibilities were ill-defined and implemented, and some fissile operations did not have documented criticality safety analyses. In response, LANL developed a criticality safety improvement plan, which included a thorough assessment of all on-going fissile material operations. The Board evaluated the execution of this improvement plan in late FY06 and found that adequate progress was not being made. This issue is currently being pursued.

Fire Protection at LANL. On May 15, 2006, the Board received DOE's response to issues previously identified by the Board regarding the need to define a multi-year strategy for timely resolution of all fire protection deficiencies and achievement of site-wide improvements at LANL. Issues that needed to be addressed included incomplete documentation and delays in the completion of inspections, tests, and maintenance; fire hazard analyses recommendations not implemented on a timely basis; no formal plan to address the Baseline Needs Assessment for fire and emergency services; no long-term contract for fire and emergency services with Los Alamos County; and fire alarm systems in several defense nuclear facilities still requiring upgrades. The Board reviewed this plan and determined the contractor's proposed activities adequately addressed the Board's concerns; however, questions remain unresolved regarding the ability of DOE's Los Alamos Site Office to fulfill its role in this area.

Incorporation of Safety into the Design of Research and Development at LANL. In November 2005, the Board reviewed LANL's requirements for designing research and development processes and apparatus. The Board reviewed procedures for performing hazard analyses, developing controls, identifying applicable engineering standards and practices, and applying safety-related project management practices, such as having distinct design phases and independent design reviews. Following the transfer of responsibility for management and operation of LANL to a new prime contractor, the approach of the new LANL management was reviewed. LANL stated that its intention that all significant programmatic and facility work at LANL undergo engineering and safety reviews during design and that each major project will have a designated chief engineer who will act as design authority. These initiatives represent a significant improvement compared to past practices at LANL.

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. At present, SNL is pursuing a Safety Basis Improvement Project to resolve the underlying safety-related deficiencies. Most tasks will be complete by the end of 2006, but some actions stretch out to the end of 2008. The SNL corporate-level safety basis group has hired several additional experienced safety basis staff members and augmented this staff with senior contractors who possess complex-wide experience. This has resulted in significant progress, with upgrades in facilities noted during recent reviews by the Board's staff.

Integrated Safety Management at Sandia National Laboratories, New Mexico. In an October 8, 2004 letter, 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 nearing completion, and longer term actions are in progress.

Safety Basis at Y-12. The Board reviewed a draft version of the Documented Safety Analysis for the Building 9212 Complex and identified weaknesses that resulted in improper downgrading of safety systems, including certain fire protection systems. In response to the Board's observations, key fire protection systems were upgraded to safety-class and design adequacy reviews were performed.

Seismic Deficiencies at Y-12. An evaluation by the Board of the Building 9212 Complex found that previously identified seismic deficiencies were not being adequately addressed and that a proposed replacement facility would not be ready to operate until late in the next decade. Based on these findings, the Board encouraged DOE to take steps to implement practical facility modifications in the near term and continue to reduce the quantity of at-risk nuclear material. As a result, DOE commenced evaluations of near-term upgrades and committed to perform a broad risk prioritization of upgrades needed to support operation of the Building 9212 Complex for the next 15 years.

Uranium Holdup at Y-12. The Board's staff reviewed two criticality safety issues related to uranium holdup in process equipment at Y-12. The first issue involved holdup in an air filter downstream from a uranium chip burner; the second involved holdup in a casting furnace vacuum system filter. Staff input and questions related to nondestructive assay procedures, criticality calculations, and filter cleanout procedures resulted in more rigorous treatment of the issues by DOE and its Y-12 contractor.

Tritium Extraction Facility. The Board continued to perform safety oversight of the Tritium Extraction Facility, which has completed construction and startup testing, and began readiness reviews in late FY06. The facility is now entering the final test phase, in which tritium will be extracted from irradiated tritium producing rods, processed through cleaning operations, and transferred to the another tritium facility at SRS. Safety improvements that were implemented based on Board observations include a seismic alert system, the addition of an oxygen monitor at the lowest elevation in the Remote Handling Building, and improvements to the battery room ventilation system. In addition, reviews of the Worker Protection Safety System suggested by the Board have been completed.

LLNL Plutonium Facility Safety Basis. The Board reviewed the revised Documented Safety Analysis (DSA) for the LLNL Plutonium Facility and determined that it adequately addressed deficiencies identified in the Board's letter of April 12, 2004. The Board was particularly pleased that LLNL has renewed its commitment to a control strategy that includes robust, safety-class active confinement ventilation. The Board identified several isolated weaknesses that warranted consideration in the preparation of future annual updates to the DSA.

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. During FY 2006, LLNL established procedures and processes to maintain an interim configuration management system. The Board reviewed this interim system and found it to be reasonably adequate to support operations while a more durable, institutionalized program is developed and implemented.

Resumption of Programmatic Operations at LLNL. On October 11, 2005, limited operations in the LLNL Plutonium Facility were authorized to resume using a process for achieving and verifying readiness found generally acceptable by the Board. 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. On May 23, 2006, DOE authorized LLNL to resume normal operations.

Request for Proposal for the LLNL Management and Operating Contract. The Board evaluated the draft and final Requests for Proposal (RFP) for the LLNL management and operating contract issued by DOE during FY06. The Board determined that DOE had applied lessons learned from the draft LANL RFP, and that there were no ill-advised limitations on DOE's ability to oversee the safety of operations at LLNL.

Nuclear Material Packaging. The Board reviewed two principal deliverables of DOE's implementation plan for Recommendation 2005-1, *Nuclear Material Packaging*: (1) a repackaging prioritization methodology, and (2) nuclear material packaging requirements based on technically justified criteria. The Board found that, although the basic approaches taken were sound, fundamental errors in analyses had substantially obviated the benefits of the contents of both documents. The Board identified these errors in analysis and reasoning in letters dated April 24, 2006, and May 1, 2006. DOE's responses, provided in letters dated June 8, 2006, and July 21, 2006, were not satisfactory to the Board. The Board is working with DOE to ensure that the commitments DOE has made to improve nuclear material packaging for protection of its workers are implemented.

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 2005 Performance Accomplishments

Safety Basis at Pantex. The Implementation Plan for Board Recommendation 98-2, *Safety Management at the Pantex Plant*, includes commitments to re-engineer nuclear explosive processes and implement site-wide technical safety requirement controls for on site transportation. Satisfactory completion of these important commitments continues to be delayed. At the Board's request, senior DOE management is now providing monthly status briefings to the Board, which has focused management attention on completing these commitments, and improving safety at the Pantex Plant.

Nuclear Material Packaging. On March 10, 2005, the Board issued Recommendation 2005-1, *Nuclear Material Packaging*, following a series of reviews regarding the safety of practices for storage of programmatic nuclear materials at DOE defense nuclear facilities. The Board's reviews had found that, although DOE had made progress in the stabilization and safe storage of its excess nuclear materials, the storage requirements for other categories of nuclear materials were not defined and controlled sufficiently to ensure worker protection. The Board recommended that DOE require technically justified criteria for safe storage and handling of nuclear materials, identify which materials should be subject to this requirement, and implement the packaging criteria in a prioritized manner based on the hazards of the different material types and the risk posed by the existing package configurations and conditions. The Secretary of Energy accepted the Recommendation on May 6, 2005, and provided an implementation plan on August 17, 2005, which was accepted by the Board. Implementation will commence in FY 2006.

Special Tooling Program at Pantex. In a letter dated December 15, 2004, the Board identified a number of deficiencies in the Special Tooling Program, which plays a vital role in the safety of nuclear explosive operations at the Pantex Plant. DOE acknowledged that the tooling program had not demonstrated the necessary level of rigor, developed compensatory measures to address deficiencies, and tasked the site contractor to develop and implement a tooling improvement plan. With numerous organizational and process improvements implemented in the tooling program, DOE plans to conduct a follow-on review of the tooling program by the end of FY 2005, with the results becoming available in early FY 2006.

Conduct of Operations at Pantex. Based on a series of events, which indicated that deficiencies existed in the conduct of nuclear explosive operations at Pantex, the Board issued a letter on May 2, 2005, highlighting the deficiencies and querying DOE regarding development of a plan to improve conduct of operations. In response, DOE initiated efforts to address the cause of the deficiencies and to develop both near- and long-term plans to improve the conduct of operations, including training of technicians, improving the fidelity of training equipment, revising roles and responsibilities for supervisors, establishing performance monitoring metrics, and completing a root cause analysis.

Safe Storage of Pits. In response to the Board's Recommendation 99-1, *Safe Storage of Fissionable Material Called "Pits,"* DOE continued to repackage pits into a robust container suitable for interim storage in FY 2005. DOE has now placed a required second type of container in service. Overall, DOE has repackaged its 12,000th pit. The Board has now closed this recommendation.

Lightning Protection at Pantex. In a letter dated November 3, 2004, the Board noted that a number of significant issues related to lightning protection at Pantex remain unresolved. Among these are an investigation into the potential for spalling of interior concrete surfaces as a result of a lightning strike and an evaluation of the impact of added inductance from facility bond wire. The Board also noted slow progress in addressing the potential for an indirect coupling mechanism from a lightning strike having an impact on nuclear explosive operations. In response, DOE has prepared a project plan, *Investigation of Lightning Initiated Effects at Pantex*, and submitted it to the weapon laboratories for weapon response evaluation.

Laboratory Support of Pantex Nuclear Explosive Operations. The Board reviewed test programs at LLNL and LANL, which involve the response of high explosives to insults, especially with respect to electrostatic discharge and low-velocity mechanical impact. The laboratories have now agreed to a general approach to high explosive material testing, and are approaching agreement on electrostatic discharge testing of weapon components.

These tests will provide vital information for the development of effective safety controls for nuclear explosive operations at Pantex.

Readiness to Dispose of a Damaged Nuclear Weapon. The Board has consistently highlighted to DOE the need to develop the programs and infrastructure at NTS necessary to safely dispose of a damaged nuclear weapon or improvised nuclear device. On March 28, 2005, the Board sent a letter requesting that DOE identify the desired conditions of readiness for G-Tunnel, including facility and equipment improvements, and provide its plan and schedule to establish those conditions. A follow-up review by the Board conducted in May 2005 identified further issues regarding lightning protection. DOE is now addressing the lightning protection issues at G-Tunnel, while continuing to make substantial physical and procedural improvements and to provide training to be prepared to safely dispose of a damaged nuclear weapon or improvised nuclear device at NTS should the need arise.

Subcritical Experiments. The Board reviewed DOE's assessments and readiness for subcritical experiments, identifying inadequate nuclear safety management programs; inadequate mechanisms for verification of readiness of subcritical experiments and test readiness (should nuclear weapons testing be resumed); and inadequate safety bases for subcritical experiments and nuclear weapons testing. In FY 2005, DOE's Nevada Site Office improved safety basis reviews, improved the readiness review process, and committed to improve the implementation of controls and the conduct of readiness reviews. As a result, subcritical experiments have a more complete documented safety analysis and thorough verification of readiness.

Electrical Systems and Lightning Protection at NTS. In a letter dated July 1, 2003, the Board noted several safety issues related to electrical and lightning protection systems at NTS. DOE responded on May 14, 2004, and presented a reasonable approach to address many of the issues raised by the Board. In FY 2005, DOE developed a site-wide directive for the lightning protection program and lightning protection studies were completed, but a follow-up review performed by the Board in January 2005 found that a significant number of the actions to which DOE had committed remained unfinished. By March, 2005, DOE had addressed the electrical and lightning protection issues, significantly improving the safety posture across the site.

Device Assembly Facility at NTS. The Board identified deficiencies in safety management programs, implementation of controls, readiness reviews, seismic analysis, and several potential structural issues at the Device Assembly Facility at NTS. In response, DOE narrowed the scope of near-term operations, increased the resources to support the implementation of controls, committed to a readiness review process, and initiated a seismic analysis and structural assessment.

LANL Resumption Activities. Following the suspension of nuclear operations at LANL on July 16, 2004, the Board assessed conditions at the laboratory and reviewed its restart approach. The Board emphasized the need to closely monitor and appropriately adjust plant conditions to maintain a safe and stable configuration during the stand-down. The Board supplemented its full-time site representatives with additional staff to provide real-time feedback to DOE and LANL personnel responsible for resumption activities. The Board has been encouraging DOE to make certain that adequate resources are provided for full implementation of the corrective action plans emerging from the resumption process.

Confinement Ventilation at the LANL Plutonium Facility. The current safety basis for the LANL Plutonium Facility credits a passive confinement strategy (i.e., no active confinement ventilation) as a safety-class control to protect the public from postulated accidents. In response to issues raised by the Board, LANL analysts performed a comprehensive set of air-flow calculations to estimate potential releases under accident conditions and concluded that a passive confinement strategy was inadequate as a safety-class control. DOE is currently preparing a plan and schedule for implementation of an effective safety-class control to protect the public from the consequences of a potential event at the Plutonium Facility.

Full-Scale Aqueous Processing of Plutonium-238 at LANL. In preparation for near-term startup, the Board continued to evaluate the safety of the LANL full-scale aqueous processing line for plutonium-238. The Board observed that LANL had not adequately resolved previously identified issues, such as the flammability hazards posed by the generation of hydrogen gas in process equipment. LANL subsequently committed to strengthen the technical bases and add necessary safety controls.

Conduct of Engineering at LANL. The Board previously noted continued delays in the full implementation of DOE Order 420.1A, *Facility Safety*, which provides design requirements for nuclear facilities, at LANL. The

Board also observed that some of the more complex and higher-hazard research, development, demonstration, testing and production work would benefit from a structured application of engineering standards and practices, a formal conceptual design phase similar to that for large facility projects, and design reviews following conceptual and final design. LANL has now incorporated corrective actions to address these issues as part of the Operational Efficiency project that emerged from the suspension of operations at LANL.

Fire Protection at LANL. The Board reviewed the fire protection program at LANL and concluded that while LANL and DOE had increased their attention to fire protection and taken some appropriate actions, resolution of issues had been piecemeal. Issues that needed to be addressed included: incomplete documentation and delays in the completion of inspections, tests, and maintenance; fire hazard analyses recommendations not implemented on a timely basis; no formal plan to address the Baseline Needs Assessment for fire and emergency services; no long-term contract for fire and emergency services with Los Alamos County; and fire alarm systems in several defense nuclear facilities still requiring upgrades. The Board has requested that DOE define a multi-year strategy for timely resolution of all fire protection deficiencies and achievement of site-wide improvements.

Request for Proposal for the LANL Management and Operating Contract. On December 1, 2004, DOE issued a draft Request for Proposal (RFP) for the LANL management and operating contract. The Board's review of the draft RFP found that it placed unnecessary and ill-advised limitations on the DOE's right to inspect and oversee the activities of the contractor, undermined DOE's system for identifying and implementing safety requirements, and omitted relevant safety requirements. The Board issued a letter to DOE on December 16, 2004, identifying these problems. The RFP was subsequently amended to address the issues raised by the Board, significantly strengthening DOE's safety posture at the laboratory.

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 Sandia National Laboratories. In response, the Sandia Site Office has reassessed the adequacy of the safety basis for other defense nuclear facilities at Sandia and has rescinded start-up approval for the initial facility in question, where safety basis deficiencies remain, until the documented safety analysis can be revised.

Hazard Analysis Deficiencies at Sandia National Laboratories, New Mexico. In an October 8, 2004 letter, the Board identified multiple failures of the hazard analysis and work control process at Sandia National Laboratories. In response, DOE developed a corrective action plan to ensure the associated weaknesses are corrected and that integrated safety management is fully implemented.

Y-12 Seismic Deficiencies. An evaluation by the Board of the Enriched Uranium Operations building at Y-12 indicated extensive seismic deficiencies. In light of DOE's plan to build a replacement facility by 2013, the Board encouraged DOE to take steps to implement practical facility modifications in the near term and reduce the quantity of at-risk nuclear material. DOE is developing a plan to address this issue.

Y-12 Glovebox Installation. The Board reviewed the new glovebox installation and hazard analysis for the Assembly/Disassembly Building at Y-12. Discussion of the results of the Board's review with DOE and the Y-12 contractor resulted in certain improvements in the equipment design and the procedures.

Y-12 Electrical Safety. As a result of a small electrical fire in the Enriched Uranium Operations Building in 2003, DOE initiated a corrective action plan that included thermal imaging and evaluation of all Y-12 electrical panels. Initial inspections determined that more intrusive inspections were required for some of the panels. The Board noted that these prudent actions were apparently being delayed by other priorities and encouraged DOE to complete them in a timely manner. As a result, DOE applied additional resources and expects to finish by the end of 2005.

Y-12 Authorization Basis Implementation Validation. The Board reviewed Y-12 processes for conducting independent implementation validation reviews for documented safety analysis (DSA) controls developed under 10 CFR 830. The Board noted that Y-12 did not intend to make periodic use of such reviews to ensure controls continued to be properly implemented. In response, Y-12 now intends to require comprehensive independent validation of implementation of DSA controls in each nuclear facility at least every three years.

LLNL Plutonium Facility Safety Basis. In an April 2004 letter, the Board outlined fundamental flaws in DOE's approach to safety basis development at this facility, particularly the downgrading of the safety-class ventilation system based on questionable calculations. Following an independent analysis of these calculations, DOE reported

to the Board in FY 2005 that it had directed the laboratory to maintain the Plutonium Facility's ventilation system as a safety-class system.

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. DOE responded on January 4, 2005, agreeing that prompt action needed to be taken to review the configuration and condition of all vital safety systems in LLNL defense nuclear facilities. During FY 2005, DOE completed evaluations of the application of configuration management for the vital safety systems at LLNL defense nuclear facilities, and developed plans to establish the needed configuration management program.

Resumption of Programmatic Operations at LLNL. In January 2005, DOE's Office of Independent Oversight and Performance Assurance (OA) issued a report identifying serious deficiencies in the administrative control programs mandated by the Technical Safety Requirements for the Plutonium Facility (including the configuration management program), as well as deficiencies in the supporting analyses for safety systems. Because of these findings, LLNL suspended programmatic operations in the Plutonium Facility. The Board issued a letter to DOE on March 8, 2005, cautioning DOE against resuming substantial programmatic activity in the Plutonium Facility prior to adequately addressing the findings of the OA report, and requesting a report detailing DOE's path forward for resuming programmatic operations. In July 2005, DOE and LLNL briefed the Board on a generally acceptable path forward toward achieving and verifying readiness to resume a limited scope of programmatic operations. Execution of this plan will continue into FY 2006.

Nuclear Material Packaging and Storage at LLNL. During a November 2004 review at LLNL, the Board identified weaknesses in the packaging and storage of nuclear materials not covered by either Recommendation 94-1, *Improved Schedule for Remediation in the Defense Nuclear Facilities Complex*, or the inactive materials program. Deficiencies in storage criteria and packaging systems indicated that LLNL was not pursuing a systematic, technically justified approach to packaging. In response, DOE directed the laboratory to evaluate this problem and make improvements to ensure the safe storage of these materials.

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 2004 Performance Accomplishments

Support of the Defense Nuclear Complex. As a result of concerns over the continued erosion of technical competence and a need to reemphasize the priority of work that directly supports nuclear safety, the Board issued Recommendation 2002-2, *Weapons Laboratory Support of the Defense Nuclear Complex*. In FY-04, DOE established at each national laboratory a single point of contact for each weapon system; DOE established at each site office a requirement to track and ensure closure of nuclear safety support requirements for weapon laboratories. These changes have enhanced the timely resolution of safety concerns in the nuclear weapon complex.

Safe Storage of "Pits." In response to the Board's Recommendation 99-1, *Safe Storage of Fissionable Material called "Pits,"* DOE continued to repackage pits into a robust container suitable for interim storage in FY 2004. DOE has repackaged its 10,000th pit. The associated container surveillance program has been rejuvenated and the entire surveillance backlog was worked off during FY 2004.

Improvements in Safety Bases at Pantex. The Implementation Plan for Board Recommendation 98-2 includes a commitment to improve the safety bases at the Pantex Plant. In FY 2004, Pantex completed and approved documented safety analysis for facility and site-wide operations. Pantex has begun implementing a number of new and enhanced controls to improve the safety of nuclear explosive operations.

Readiness to Dispose of a Damaged Nuclear Weapon. The Board has consistently highlighted to DOE, the need to develop the programs and infrastructure at NTS necessary to safely dispose of a damaged nuclear weapon or improvised nuclear device. In FY 2004, DOE made substantial organizational and procedural improvements, and provided training, and developed a safety basis for G-tunnel. As a result, DOE has made substantial physical and procedural improvements and provided training to be prepared to safely dispose of a damaged nuclear weapon should the need arise.

Lightning Protection at LANL. The Board noted that the safety-class lightning protection system at LANL's Weapons Engineering and Tritium Facility (WETF) did not appear to provide adequate lightning protection for the facility. Subsequently, DOE has directed LANL to require that all hazard and accident analysis scenarios be re-evaluated. In addition, LANL is required to upgrade fire barriers and package material-at-risk in approved containers.

Deficiencies in Safety Basis of the Plutonium Facility at LLNL. The Board identified deficiencies in the safety basis for Building 332, the Plutonium Facility, at LLNL. In particular, the Board expressed concern regarding the downgrading of several safety-class systems as part of LLNL's new approach to hazard confinement during accident scenarios. In response, DOE commissioned an independent calculation of the Leak Path Factor and committed to ensuring that system reclassification does not result in downgraded system performance.

Subcritical Experiments. The Board reviewed DOE's assessments and readiness for subcritical experiments, identifying inadequate nuclear safety management programs; inadequate mechanisms for verification of readiness of subcritical experiments and test readiness (should nuclear weapons testing be resumed); and inadequate commitment to improve the readiness review process for subcritical experiments and nuclear weapons testing. In FY 2004, DOE's Nevada Site Office improved the safety basis documents, developed a USQ process, improved the readiness review process, and committed to improve the implementation of controls and the conduct of readiness reviews. As a result, subcritical experiments have a documented safety analysis and there is some verification of readiness.

Lightning Protection at NTS. In 2003, the Board noted that lightning protection at NTS did not appear to provide adequate protection for the nuclear operations and personnel. In response, NTS initiated compensatory measures and a study of the lightning protection needs at NTS. In 2004, lightning protection controls were included in the safety basis of several nuclear facilities. As a result, NTS acknowledged the need to make safety improvements, implemented lightning protection controls, and continues to study lightning protection for NTS.

Hoisting and Rigging at NTS. The Board noted deficiencies in hoisting and rigging, maintenance, and practices for nuclear and nuclear explosive operations at NTS. As a result, DOE has reclassified the critical safety equipment (at G-tunnel) used for the handling of damaged nuclear weapons and improvised nuclear devices as safety-class,

improved controls for handling unvented drums of transuranic waste, and improved maintenance of hoisting and lifting equipment. As a result, controls have improved the safety of nuclear and nuclear explosive operations.

Critical Experiments Facility at LANL. The Board raised concerns that the unmitigated consequences predicted for the worst nuclear accidents at TA-18 are significant, but DOE and LANL are relying on the compliance of operators with a set of administrative controls and interim compensatory measures to prevent such accidents. LANL suspended operations at TA-18 after reviewing information provided by the Board and after an LANL review of a safety requirement violation at TA-18 identified weaknesses that reinforced concerns raised by the Board.

Improvements in Quality Assurance related to the Tooling Program at Pantex. In a June 18, 2004 letter, the Board expressed concern that there continue to be serious weaknesses in the program to design and fabricate tools for nuclear explosive operations at Pantex. Additionally, the Board noted that an effective quality assurance program is essential to the safe design, fabrication, procurement, inspection, and maintenance of special tooling. The Board has requested that DOE conduct a comprehensive review of quality assurance as it affects the tooling program at the Pantex Plant. DOE is developing plans to conduct a comprehensive, independent review of quality assurance at the Pantex Plant.

Hoisting and Rigging Operations. During FY 2003 and FY 2004, the Board's staff reviewed the hoisting and rigging programs at the Savannah River Site, the Pantex Plant, the Nevada Test Site, and Sandia National Laboratory. In letters dated July 10, 2003 and January 21, 2004, the Board expressed concerns regarding the maintenance of hoisting equipment, the safety classification of hoisting, vendor communication, and training for emergency scenarios. The Board also provided DOE substantive comments for the revision of DOE standard 1090, "Hoisting and Rigging." The safety of hoisting and rigging operations across the complex has improved, in particular the hoisting and rigging program at the Pantex Plant.

W78 Operations at Pantex. The Board has been urging DOE to improve the safety of weapons-related work at the Pantex Plant since it issued Recommendation 98-2, *Safety Management at the Pantex Plant*. Principle among the Board's recommendations was that DOE simplify and expedite its process for re-engineering nuclear explosive processes at Pantex such that the attendant safety improvements could be put in place sooner. In FY 2004, DOE completed the start-up of the Seamless Safety for the 21st Century (SS-21) W78 Disassembly and Inspection Program. The W78 Disassembly and Inspection program is now significantly safer and more efficient than it had been previously.

Safety of Dismantlement Operations. In a January 20, 2004 letter, the Board identified a number of deficiencies in various processes at the Pantex Plant that led to the attempted dismantlement of a damaged unit in a manner that was not intended, that was not adequately reviewed, and may not have incorporated adequate safety measures. As a result of this incident, Pantex has made improvements in the training of production technicians, in the conduct of unreviewed safety question evaluations, in the performance of nuclear explosive safety evaluations, and in the requirements for involvement of process engineers in certain types of operations.

Y-12 Building 9212 B-1 Wing Fire Protection. The Board identified concerns to DOE Headquarters regarding the adequacy of fire protection in the B- wing of Building 9212 at Y-12. Following a performance-based review, Y-12 recommended upgrades that include installation of sprinklers on the first floor, a new system shutdown interlock and relocation of certain equipment, and the installation of fire-protective coatings on portions of primary extraction column supports, as well as changes (e.g., new catch basin) to divert primary and secondary extraction combustible liquids to the first floor. Design and planning efforts for the modifications/upgrades have been started by BWXT. The full project is planned (and is to be funded) to be completed by late Fiscal Year 05. When completed, it will improve the degree of fire protection in the facility to a level appropriate for the remaining life of the facility.

Y-12 Oxide Conversion Facility. The Board identified concerns in a December 2003 letter regarding the startup of the Oxide Conversion Facility (formerly referred to as the Hydrogen-Fluoride facility). These concerns included missing weld radiographs, lack of proper designation of certain safety equipment, a credible criticality scenario not addressed, and worker safety concerns. DOE re-radiographed significant welds, upgraded the functional classification of safety system equipment, added seismic reinforcement to address the criticality concern and addressed the worker safety concerns.

Y-12 Conduct of Operations. The Board raised concerns over the formality of operations at Y-12 and the adequacy with which management oversight was exercised. An overall improvement initiative was started by Y-12

that includes a management observation program to provide increased and documented on-the-floor observations of nuclear operations. Y-12 also instituted a “Conduct of Operations Representatives” program to provide ongoing, independent oversight and mentoring during nuclear operations. Six of these representatives have now been deployed.

Y-12 Independent Validation of Safety Basis Controls. The Board inquired on lack of a Y-12 process for independent validation of implementation of new or revised safety basis controls. Y-12 has instituted independent validation protocols for new/revised safety basis controls. Initial implementation validation reviews in certain Y-12 nuclear facilities showed the need for several enhancements to line management implementation efforts and personnel training. Corrective actions are ongoing.

Y-12 Activity Level Work Planning for Infrequent, Potentially Hazardous Operations. The Board identified planning weaknesses that led to inadequate definition of safety controls for infrequent, potentially hazardous operations. DOE prompted a contractor assessment resulting in higher levels of review and approval for such evolutions. A successful trial application is being expanded for use by all major nuclear facilities at Y-12.

Y-12 Conduct of Engineering Improvements. After operations failures related to engineering changes at Y-12, the Board raised concerns regarding the adequacy of engineering analysis used to support the changes. Y-12 evaluated its engineering processes and took steps to strengthen requirements on proper design input and verification for engineering changes and to conduct improved training for Y-12 engineering personnel on these issues.

5. PERFORMANCE GOAL 2: NUCLEAR MATERIAL PROCESSING AND STABILIZATION

The processing, stabilization, 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.

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 to aggressively pursue acceleration of stabilization and cleanup work at facilities at many of its defense nuclear sites, in some cases in response to Recommendations and other formal correspondence from the Board. Examples of the most significant new and ongoing projects are summarized below:

Nuclear Material Stabilization—The Board's Recommendations 94-1, *Improved Schedule for Remediation*, and 2000-1, *Prioritization for Stabilizing Nuclear Materials*, focused on improving the safety of nuclear materials stored across the DOE defense nuclear complex through stabilization and disposal. Operators at the Savannah River Site (SRS) completed stabilization of pre-existing neptunium-237 solutions—the final commitment at SRS. Significant stabilization activities continue at the Hanford Site and Los Alamos National Laboratory (LANL). Hanford personnel continue to vacuum sludge originating from spent nuclear fuel in the KW Basin. Efforts to design a sludge treatment process have been delayed, and DOE will likely request to change the dates of associated commitments in the Implementation Plan for Recommendation 2000-1. Operators at LANL are on schedule to complete stabilization of all materials by December 2009. At the Oak Ridge National Laboratory, engineers are moving forward with the design of a process to downblend Building 3019's inventory of uranium-233 prior to shipment offsite for permanent disposal in accordance with Recommendation 97-1, *Safe Storage of Uranium-233*.

Hanford K-Basin Sludge Cleanup—Retrieval, stabilization, and safe interim storage of the highly radioactive sludge in the K-Basins continues to require substantial safety oversight. DOE met recent commitments in the Implementation Plan for Recommendation 2000-1, but with some delay. Removal of the sludge from the K-Basins is scheduled to be complete by November 2009. DOE then plans to treat the sludge in a nearby facility, but design efforts have slowed. DOE determined that the design developed for this activity was not likely to be successful and re-established the design effort at the conceptual design stage. The Board continues to review the conceptual design for the stabilization and packaging systems.

Nuclear Material Consolidation, Storage, and Disposition—DOE is responsible for consolidating and disposing of 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, can pose significant hazards if not stored, shipped, and disposed of properly. The Board continues to carefully monitor the activities of DOE as it attempts to manage these materials and meet its commitments under Board Recommendations 2000-1 and 2005-1, *Nuclear Material Packaging*. DOE's Nuclear Materials Disposition and Consolidation Coordination Committee acts to coordinate the complex-wide efforts. After years of evaluation and planning, DOE has demonstrated some progress. The National Nuclear Security Administration began construction of the Mixed-Oxide Fuel Fabrication Facility at SRS, meeting a commitment to Congress and to the State of South Carolina that will allow for the consolidation of plutonium-239 materials at SRS.

High-Level Waste (HLW) Retrieval and Processing—The Idaho, Hanford, and Savannah River Sites are continuing decades-long projects to retrieve and treat HLW from tanks that date as far back as the World War II-era Manhattan Project. At each of these sites, retrieval of waste from old storage tanks has begun and progress at Idaho has been good. In coming years, DOE plans to significantly expand waste retrieval activities, with the attendant hazards of extremely radioactive liquids and sludges, old systems and equipment, and conditions that are poorly characterized. Large new facilities needed to treat and dispose of the wastes are in various states of design and construction. Oversight of retrieval operations, as well as the development, design, and operation of planned treatment facilities will require a substantial share of the Board's resources for the indefinite future.

Performance Goal 2

Nuclear Material Processing and Stabilization. The processing, stabilization, 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 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:

- Safe long-term storage of neptunium oxides at the Idaho National Laboratory (INL) (Recommendations 94-1/2000-1).
- Complex-wide consolidation and disposition of special nuclear materials.
- Stabilization and disposal of plutonium-bearing residues at Los Alamos National Laboratory (LANL) (Recommendations 94-1/2000-1).
- Safety of efforts to consolidate, store, and disposition spent nuclear fuel at Hanford, INL, and SRS.
- Conceptual design of systems to treat and store spent nuclear fuel sludge at the Hanford Site (Recommendations 94-1/2000-1)
- Safety of design and construction of modifications to Building 3019 at the Oak Ridge National Laboratory in preparation for the processing of uranium-233 inventory.
- Design of treatment facilities for high level waste (HLW) liquids and salts at SRS, and system improvements to ensure safe management of the SRS HLW (Recommendation 2001-1).
- Final cleanout and closure of selected HLW tanks at SRS (including the annuli around the tanks).
- Maintaining 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.
- Safe operation of HLW retrieval and transfer systems at the Hanford tank farms.
- Conduct of operations and work planning at the Hanford Site.
- Safety of supplemental processing and treatment of waste from Hanford tanks.
- Safety of the retrieval, characterization, and packaging of transuranic (TRU) waste drums and other containers at Hanford, INL, LANL, and SRS.
- Safe operations at the Melton Valley TRU/alpha low level waste processing facility at Oak Ridge National Laboratory.

Performance Goal 2

Nuclear Material Processing and Stabilization. The processing, stabilization, 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 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:

- Safe long-term storage of neptunium oxides at the Idaho National Laboratory (INL) (Recommendations 94-1/2000-1).
- Complex-wide consolidation and disposition of special nuclear materials.
- Stabilization and disposal of plutonium-bearing residues at Los Alamos National Laboratory (LANL) (Recommendations 94-1/2000-1).
- Safety of efforts to consolidate, store, and disposition spent nuclear fuel at Hanford, INL, and SRS.
- Conceptual design of systems to treat and store spent nuclear fuel sludge at the Hanford Site (Recommendations 94-1/2000-1).
- Safety of design of modifications to Building 3019 at the Oak Ridge National Laboratory in preparation for the processing of uranium-233 inventory.
- Design of treatment facilities for high level waste (HLW) liquids and salts at SRS and system improvements to ensure safe management of the SRS HLW (Recommendation 2001-1).
- Waste removal and preparation for closure of selected HLW tanks at SRS.
- Maintaining 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.
- Safe operation of HLW retrieval and transfer systems at the Hanford tank farms.
- Conduct of operations and work planning at the Hanford Site.
- Safety of supplemental processing and treatment of waste from Hanford tanks.
- Safety of the retrieval, characterization, and packaging of transuranic (TRU) waste drums and other containers.
- Safe operations at the Melton Valley TRU/alpha low level waste processing facility at Oak Ridge National Laboratory.

Performance Goal 2

Nuclear Material Processing and Stabilization. The processing, stabilization, 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.

Performance Goal 2

Nuclear Material Processing and Stabilization. The processing, stabilization, 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 2006 Performance Accomplishments

Hanford Sludge Retrieval and Disposition Project. The Board noted that the fabrication of sludge transfer equipment was not in accordance with the documented safety analysis (DSA) assumptions for the equipment and also noted the lack of a systematic engineering approach to verify the DSA assumptions. The project corrected the discrepancy and initiated a tracking mechanism for future design efforts. The Board also identified a problem with the integration of safety into the design for the sludge treatment project. DOE investigated the extent of the condition and suspended the procurement authorization pending DOE approval of the preliminary DSA.

High Level Waste (HLW) Tank Integrity—Vapor Space Corrosion. In response to a Board letter regarding corrosion in the vapor space of HLW tanks, DOE sponsored an expert panel at Hanford July 10-12, 2006, to evaluate the mechanisms of this type of corrosion. The expert panel identified several mechanisms by which corrosive species could concentrate on tank walls and plans to propose a series of laboratory experiments to evaluate these mechanisms. This should allow DOE to identify additional measures to protect the integrity of HLW tanks.

Tank AN-107 Chemistry Control at Hanford. The DSA for Hanford’s HLW tanks requires the liquid waste to have a minimum pH of 13 to prevent corrosion. However, the liquid in the sludge of Tank AN-107 was at pH 11 and decreasing to pH 10. The Board questioned DOE’s approval of a waiver to accept this lower pH without adequate technical justification. DOE responded by establishing a test program to determine optimum waste chemistry limits for maintaining tank integrity. The first phase of this program studied the effect of pH on corrosion. The results showed the pH could as be as low as 10 without significantly increasing the corrosion rate. To confirm the laboratory results, DOE plans to install a corrosion probe in tank AN-107 to continuously monitor corrosion.

Decommissioning Activities at Hanford’s Plutonium Finishing Plant (PFP). Because of delays in DOE’s ability to consolidate nuclear materials, decommissioning activities at PFP have slowed, and the date for completing decommissioning has been extended from 2009 to 2016. The Board continues to evaluate the transition of PFP from a near-term decommissioning mission to an extended lay up period. Through a number of walk downs of the PFP facilities, the Board identified deficient areas (e.g., structure and fire protection piping deterioration) that will require additional attention from DOE if the safety systems and features are to remain operational during the extended lay up period.

Soil Remediation at Hanford. The Board reviewed the safety basis and work planning for the 118-K Burial Ground remediation activity to determine if nuclear criticality concerns had been adequately addressed and if the DSA was compliant with guidance from DOE. The initial version of the DSA contained numerous criticality controls that did not comply with DOE criteria. The Board provided feedback to DOE, resulting in a revision to the DSA such that the DOE criteria were met and unnecessary criticality safety controls were removed.

Hanford Site Conduct of Operations. The Board routinely observed operations at the Hanford Site’s Tank Farms, the K Basin Closure Project, and the Plutonium Finishing Plant and commented on deficiencies in conduct of operations. In response, DOE implemented improvement plans for conduct of operations. The Board has recently noted improvements in the safety of these operations.

Waste Drums Containing Plutonium-238 at Hanford. Since 2002, the Board has noted the potential hazards associated with the retrieval, handling, and disposition of 12 drums containing plutonium oxides with a high plutonium-238 content. The drums were located in a burial ground at the Hanford Site. In October 2005, DOE safely retrieved the 12 drums and placed them in interim safe storage.

Transuranic (TRU) Waste Drum Handling at Hanford. The Board reviewed hydrogen controls for vented TRU waste drums at Hanford and found the controls to be non-conservative. DOE was using a control level of 15% hydrogen, while the safe and commonly accepted control level is 4% (the lower flammability limit for hydrogen). After this concern was communicated, DOE reduced the control level for hydrogen concentration in vented drums. This represented a significant improvement in safety margin for these operations.

Safe storage of neptunium oxides at Idaho National Laboratory (INL). Operators at the Material and Fuels Complex at the INL have received and stored neptunium oxide materials shipped from SRS. The Board reviewed the neptunium storage plans and provided feedback to DOE regarding the adequacy of the storage plans. As a result, DOE is working to develop a new surveillance and maintenance plan for this activity.

Decommissioning at the Fernald Closure Project. The Board reviewed and provided comments to DOE on the safety of final decommissioning and closure work at the site. In response, DOE made changes to improve safety during the demolition of the Silos waste treatment facilities and during placement of contaminated soil and debris in the On-Site Disposal Cells. DOE completed all site closure work in FY 2006.

Tank 48 Disposition at SRS. In response to Board Recommendation 2001-1, DOE submitted a letter report assessing alternatives for treatment of organic compounds and HLW contained in Tank 48. Also, in response to Board concerns, DOE made a new commitment in the Implementation Plan for Recommendation 2001-1 to return Tank 48 to waste processing service by 2010, utilizing organic destruction in a newly designed treatment facility.

Trapped Hydrogen in Process Systems. Based on information from the Waste Treatment Plant at Hanford, the SRS contractor identified all components (e.g., piping) in the Defense Waste Processing Facility (DWPF) that could be capable of trapping hydrogen, which could lead to pressure loads during an explosion. In response to Board observations, additional validation of the hydrogen explosion model was performed to ensure it could generate accurate predictions for DWPF piping configurations. Furthermore, to address Board concerns regarding hydrogen buildup in failed tank cooling coils, the contractor formed a team to incorporate consideration of this hazard into the work planning process, and issued a report listing equipment of concern, along with corresponding recommended controls.

Startup Readiness Reviews at SRS. The Board observed the readiness review performed by the contractor for the retrieval of waste from an older-style HLW tank, using a new mixer pump and equipment, and found that the rigor and scope of the readiness review was inadequate. In response, DOE required the contractor to perform additional reviews to demonstrate readiness to begin waste retrieval operations. Furthermore, the procedure for performing readiness assessments was significantly revised to incorporate lessons learned and good practices. Observations from the Board's extensive oversight of readiness reviews during the year resulted in a number of weaknesses being corrected and subsequently, a noticeable improvement in the planning, conduct, and thoroughness of contractor readiness reviews.

DOE Technical Oversight at SRS. On March 3, 2006, the Board issued a letter informing the DOE Savannah River Operations Office (DOE-SR) that it was not aggressively pursuing the new oversight requirements contained in DOE Order 226.1, *Implementation of Department of Energy Oversight Policy*, and that DOE-SR must fill a substantial gap if it is to fully implement the new oversight directives by the required date. Included in the letter was a 90-day reporting requirement to the Secretary of Energy requesting implementation plans for DOE Order 226.1 across the defense nuclear complex. The Board is continuing to provide extensive oversight of site office corrective actions to ensure they have the desired effect.

Conduct of Operations at SRS. The Board pointed out several deficiencies in the conduct of nuclear operations at SRS. These observations resulted in further DOE and contractor reviews of radiological protection, increased senior management watches, the addition of safety prerequisites to procedures, the performance of mockups, and improved critiques. Formal conduct of operations is now improving, leading to safer nuclear operations.

TRU Waste Drum Retrieval and Characterization. During visits to several DOE sites, the Board noted inconsistent, and in some cases unsafe, approaches from site to site during the retrieval, characterization, and handling of unvented and newly vented TRU waste drums. In response, DOE's TRU Waste Corporate Board is addressing the need for a consistent approach for dealing with unvented TRU drums, the hydrogen gas hazard, and other hazards associated with handling TRU waste. DOE's effort is expected to culminate in the issuance of a new DOE Standard for TRU waste handling activities.

Soil Sampling at Tank W-1A, Oak Ridge National Laboratory. The Board pointed out deficiencies in work planning for the sampling and characterization of soils near Tank W-1A at the Oak Ridge National Laboratory. Areas of weakness included hazard analyses, work instructions, and preparation of radiation work permits. In response, DOE revisited and completed thorough radiological work planning efforts that culminated in a safe and efficient sampling and characterization effort.

Performance Goal 2

Nuclear Material Processing and Stabilization. The processing, stabilization, 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 2005 Accomplishments

Nuclear Material Stabilization and Storage at LANL. The Board increased its oversight of the efforts of DOE and the contractor at LANL to establish adequate systems, safety bases, and procedures for the stabilization of plutonium scrap materials. The efforts at LANL continue to lag far behind the commitments made by the Secretary of Energy. The Board continued to ensure that DOE addressed safety issues communicated to DOE in previous years.

Surveillance and Monitoring Program for Plutonium Storage. The Board continued to monitor activities within DOE to comply with DOE-STD-3013, *Stabilization, Packaging, and Storage of Plutonium-Bearing Materials*, which establishes requirements for the long-term storage of plutonium metal and oxides and requires a surveillance and monitoring program to verify safe storage parameters. Through the Materials Identification and Surveillance Program, the Board provided feedback on the scientific and statistical methodology being employed for surveillance of plutonium in storage.

High-Level Waste Tank Integrity. The Board closely followed the HLW tank integrity program for double-shell tanks at Hanford. The Board issued a letter to DOE questioning DOE's approval of a plan to exempt a tank from waste chemistry limits established in the technical safety requirements (TSR), and requested a report on the long term management of tank space while maintaining waste chemistry within TSR limits. DOE responded to the Board's request and sponsored laboratory corrosion studies to establish optimum waste chemistry limits for maintaining tank integrity. In a letter to DOE, the Board noted that laboratory studies for vapor space corrosion within the tanks were not included. DOE is assessing the feasibility of including vapor space corrosion studies in the program.

Hanford Tank Farms Integrated Safety Management. The Board reviewed a series of occurrences, incidents, near misses, and other operational events indicating serious weaknesses in work planning, conduct of operations, and responses to unexpected conditions. The Board issued a letter requesting that DOE provide a report on the weaknesses in integrated safety management at the tank farms and on corrective actions to improve worker safety. Hanford's tank farms contractor identified and implemented corrective actions, and DOE conducted a two-part improvement validation review at the tank farms in November 2004 and March 2005.

Tank 48 Disposition. The Board reviewed the safety of DOE's proposed disposition of HLW from Tank 48 at SRS, which poses a potential explosion hazard due to the generation of flammable vapors. The Board found that DOE did not have enough validated experimental data to show that an explosion would not occur during processing or disposal. DOE committed to perform additional analyses and experiments with better analytical techniques and equipment to ensure the safety of this operation.

Hydrogen Release from HLW. The contractor at SRS developed a hydrogen retention model for HLW tanks that led to a program for periodic agitation of the waste in certain HLW tanks to prevent a large hydrogen release. The Board questioned the conservatism of the model; subsequently, an actual hydrogen release event showed that the model was non-conservative. As a result, the contractor developed and implemented a conservative hydrogen retention model and agitation program that reduces the possibility of a fire or explosion due to the release of hydrogen.

Safety System Upgrades at SRS. As a result of safety issues raised by the Board, the contractor at SRS made safety equipment upgrades on HLW Tanks 3, 11, and 41 at SRS. The upgrades included the installation of ventilation interlocks, lower flammability limit interlocks, and devices to prevent inadvertent addition of liquid to the tanks.

Transfer Control Program at SRS. In the last year, several inadvertent transfers of HLW occurred at the tank farms at SRS. The Board reviewed the transfer control program and suggested improvements to reduce the possibility of transfer errors. The contractor revised the transfer control program and incorporated the Board's suggested improvements.

Hanford Spent Nuclear Fuel Project. The Board's review of ongoing spent nuclear fuel project operations at Hanford identified that changing conditions were not being appropriately reviewed by the contractor for safety implications. Reevaluation of these activities led the implementation of new controls to provide adequate safety for fuel removal operations. The contractor completed spent nuclear fuel removal with the exception of a limited number of fuel pieces that will be removed during sludge retrieval efforts. The removal of spent nuclear fuel from the K Basins represents a significant reduction in risk at the Hanford Site.

Hanford Sludge Retrieval and Disposition Project. The Board continued to provide oversight of the contractor's efforts to retrieve of sludge from the K-East Basin at Hanford and to design the sludge transfer system. Safety issues identified by the Board led the contractor to make design changes and DOE to commission a Sludge Review Board to provide additional oversight. The Board urged DOE and the contractor to reevaluate the effectiveness of corrective actions identified in response to past deficiencies. After delays and difficulties with sludge retrieval operations, the project began to make some progress toward the goals of completing sludge retrieval and preparing for sludge treatment.

Decommissioning of Building 371 at the Rocky Flats Environmental and Technology Site (RFETS). The Board completed its safety oversight responsibilities with the dismantlement of Building 371, which was the last plutonium building at RFETS. The RFETS closure project is near completion with only industrial hazards remaining. The Board conducted several meetings with both DOE and the contractor and visited the site, reinforcing the importance of worker safety. The Colorado Department of Public Health and Environment now has responsibility for oversight of DOE's program for monitoring and surveillance of legacy materials.

Hanford Site Decommissioning Activities. The Board reviewed decommissioning activities at the Plutonium Finishing Plant (PFP) and identified safety issues regarding the criticality safety and fire protection programs. The Board sent letters to DOE on these subjects, and the contractor developed corrective actions to resolve the issues. Although the contractor made some improvements, PFP managers noted additional difficulties. Subsequently, the Board met with representatives of DOE and contractor to discuss ongoing corrective actions to improve worker safety.

Deactivation Activities at the Savannah River Site (SRS). The Board reviewed deactivation and decommissioning activities at SRS and concluded that the program is reasonably well run. The program is ahead of the target schedule to demolish 239 buildings before the end of the current contract, September 30, 2006. The Board has emphasized criticality safety and fire protection, and has sent a letter to DOE requesting increased effort on hazard analysis and worker protection.

Decommissioning at the Miamisburg Closure Project. The Board closely followed the decommissioning work at Miamisburg, stressing worker safety, which has been good at the site. Site closure work is expected to be complete by December 2005—this includes demolition of 66 buildings and transfer of 9 buildings to the Miamisburg Mound Community Improvement Corporation for commercial use.

Decommissioning at the Fernald Closure Project. The Board reviewed safety documentation and readiness preparations for the Silo 1, 2, and 3 projects at Fernald, which are designed to retrieve and package uranium-bearing wastes for shipment and disposal offsite. The Board and the site readiness review teams found several deficiencies in the Silos 1 and 2 project and determined that corrective actions were needed before radioactive operations could begin. The Board sent a letter to DOE stating that improvements were needed in the management self-assessment process used by the contractor to verify that the project was ready to begin operations. As a result, project managers corrected the self-assessment process, successfully completed a startup readiness review, and safely began waste processing operations.

Deactivation of the Heavy Element Facility at the Lawrence Livermore National Laboratory. Laboratory operators removed sufficient inventory of radioactive material from the Heavy Element Facility to allow it to be downgraded to a Radiological Facility. Facility operators then began decontamination and disposal of gloveboxes. The Board provided oversight of these activities and ensured that lessons learned from decommissioning activities at other DOE sites were incorporated into the deactivation and decommissioning work.

Melton Valley TRU/Alpha Low-Level Waste Treatment Facility. Prior to startup of this new facility, the Board pointed out deficiencies in the conduct of operations for radiological work. In response, the contractor upgraded the safety of non-routine radiological work by requiring verbatim compliance with procedures.

Retrieval of TRU Waste Drums at Hanford. The Board reviewed DOE plans to retrieve TRU waste drums from soil-covered trenches and noted a lack of adequate controls to protect the workers. In response to a letter from the Board, DOE and its contractor implemented more robust controls for handling unvented drums and began planning for the safe retrieval and handling of high-source term drums containing plutonium-238.

Performance Goal 2

Nuclear Material Processing and Stabilization. The processing, stabilization, 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 2004 Accomplishments

Nuclear Material Stabilization and Storage at LANL. As part of the implementation of the Board's Recommendations 94-1 and 2000-1, the Board has continued to evaluate NNSA's plans for repackaging high-risk materials at LANL into robust containers, and to urge NNSA to pursue alternative approaches that could accelerate this work. As a result, LANL and NNSA have developed a comprehensive nuclear materials packaging and storage plan that will result in a substantial reduction in risk by accelerating the schedule for stabilization, packaging, and improved storage of nuclear materials.

Inactive Actinide Materials. The Board evaluated NNSA's plans for managing non-programmatic actinide materials stored at LANL, LLNL, SNL, Pantex Plant, and Y-12. The Board found that NNSA has begun to define and execute adequately its strategy to characterize materials for storage or disposition, to identify which materials fall under this effort, and to analyze and upgrade, where appropriate, material packaging and storage facility conditions. The Board continues to evaluate the approaches taken by each NNSA site, as well as NNSA's programmatic direction.

Surveillance and Monitoring Program for Plutonium Storage. DOE-STD-3013, *Stabilization, Packaging, and Storage of Plutonium-Bearing Materials*, which establishes requirements governing the long-term storage of plutonium metal and oxides, requires a surveillance and monitoring program to verify safe storage parameters. The Surveillance and Monitoring Program managed by the DOE Savannah River Operations Office was established for this purpose, but despite assurances provided last year, DOE again under funded the LANL portion of this effort, thereby jeopardizing verification of safe storage parameters as required by the standard. At the urging of the Board, the Assistant Secretary for Environmental Management restored the funding for this program for FY 2004. The Board also reviewed the scientific and statistical methodology for surveillance of plutonium in storage and provided input that corrected overly optimistic assumptions regarding the validity of extrapolations.

Hanford Tank Farms Fill Height. The Board questioned the safety of DOE's plan to fill certain high-level waste tanks beyond the height which was tested for leaks during construction. In response to these questions, DOE limited the proposal to only those tanks which had been leak tested to the proposed fill height.

Safety Basis for Hanford Tank Farms. The Board identified that the revised Technical Safety Requirements for flammable gas and waste transfers had eliminated key safety controls and that the site's independent validation of the implementation of the Documented Safety Analysis was inadequate. Continued questions by the Board led to the further discovery that the contractor had inadvertently put a tank at risk of retaining and releasing significant quantities of flammable gas. As a result, DOE rewrote the Technical Safety Requirements to reinstate necessary controls, convened a second independent review to ensure all controls had been implemented, and increased the frequency of key tank waste measurements to better ensure that current waste conditions remained safe.

Salt Waste Processing Facility at SRS. The Board evaluated the safety risks associated with delays in the design and construction of the Salt Waste Processing Facility and urged DOE not to eliminate funding for this important work. DOE has since restored funding for this project and is currently pursuing a program plan that will accelerate waste stabilization and risk reduction. The Board reviewed the Critical Decision (CD)-1 facility design documentation and identified weaknesses in the performance categorization and potential seismic interactions of various portions of the facility. DOE plans to perform further analysis and upgrades to the facility's structural components to address the Board's concerns.

Mercury Hazards at the SRS High-Level Waste System. In 2002, the site identified the potential for workers to be exposed to mercury vapors and compounds in the high level waste tank farms. Since the initial discovery, the Board has had held discussions with DOE and the contractor regarding actions to protect site workers and verified the adequacy of the engineered and administrative controls implemented to protect workers from mercury exposure.

Hanford High-Level Waste Tank Integrity. The Board reviewed the tank inspection program at Hanford and proposals to relax requirements for corrosion inhibitors in the tank waste. The Board provided input during meetings of a Corrosion Expert Panel held at Hanford to evaluate the proposed changes. The panel recommended maintaining the existing corrosion inhibitor controls until a solid technical basis can be developed.

Hanford Spent Nuclear Fuel Project. The Board's review of ongoing spent nuclear fuel project operations at Hanford identified that changing conditions were not being appropriately reviewed by the contractor for safety implications. Reevaluation of these activities led to multiple positive unreviewed safety questions and the implementation of new controls to provide adequate safety for fuel removal operations.

Hanford Sludge Retrieval and Disposition Project. The Board continued to provide close oversight of the contractor's efforts to start the retrieval of sludge from the K-East Basin at Hanford. The Board urged DOE to require a formal Operational Readiness Review (ORR) for sludge retrieval and to identify new milestones for completing sludge retrieval. DOE and its contractor both completed ORRs that were rigorous and the contractor began limited sludge retrieval. Additionally, DOE committed to new milestones for sludge retrieval and treatment.

Melton Valley Transuranic/Alpha Low-Level Waste Treatment Facility. Prior to startup of this new facility, the Board pointed out deficiencies in the conduct of operations for radiological work. In response, the contractor upgraded the safety of non-routine radiological work by requiring verbatim compliance with procedures.

Safety Basis for Mobile Transuranic Waste Characterization Units. The Board reviewed the DOE-authored Basis for Interim Operation for the operation of mobile transuranic waste characterization units. The Board discovered inadequacies concerning quantities of material at risk, analysis of deflagrations, and in the controls specified in the Technical Safety Requirements. Following several discussions and a Board letter, DOE agreed to add several new controls including a formal container inspection program and lid restraints for unvented drums, and will require an Operational Readiness Review for new deployments to ensure sites receiving the units are ready to operate them safely.

Retrieval of Transuranic Waste Drums at Hanford. The Board reviewed DOE plans to retrieve transuranic waste drums from soil-covered trenches and noted a lack of adequate controls to protect the workers. In response to a letter from the Board, DOE and its contractor implemented more robust controls for handling unvented drums and began planning for the safe retrieval and handling of high-source term drums containing plutonium-238.

Rocky Flats Environmental Technology Site Building 371 Fire. The Board completed its evaluation of the significant fire that occurred on May 6, 2003, during decommissioning of a glovebox. In a letter of December 2, 2003, the Board identified broad weaknesses in the planning and execution of decommissioning work at RFETS, as well as the site's failure to properly investigate the fire or address the problems which led to the fire. In response, DOE and the contractor conducted extensive reviews and implemented corrective actions such as restricting the use of generic work packages to only simple tasks, instituting more comprehensive review of work packages, improving chemical decontamination and combustible control procedures with associated improvements in conduct of operations, retraining workers on the proper response to fires, and improving daily pre-evolution briefings to better communicate hazards and controls to the workers. Lessons learned have been shared with other DOE sites performing decommissioning work.

Fernald Silo 3 Waste Disposition Project. The Board reviewed the safety analysis for the Silo 3 waste disposition project and raised questions regarding the proper classification of the project, the new form of safety documentation (a nuclear health and safety plan), and various assumptions used in the safety analysis. The contractor subsequently made changes in the safety documentation to improve worker safety. The Board also provided comments on ways to improve the readiness review plans for the startup of the Silo 3 project that were accepted by the contractor and DOE.

Decommissioning at SRS. The Board evaluated the safety of decommissioning activities at SRS and expressed concern to DOE regarding several potentially serious events, including a release of tritium from contaminated piping, exposure of workers to an unshielded cesium-137 source, falling pipes and duct work, cutting into active electric lines, a grass fire, and several other events. Although the contractor implemented corrective actions after each event, the Board is evaluating the broader issues regarding the adequacy of training, procedures, and supervision for decommissioning work at SRS.

Sodium Fluoride Traps at ORNL. In a September 2002 Board letter regarding storage of sodium fluoride traps containing uranium-233 hexafluoride in Building 3019, the Board noted the safety issues due to increasing pressure in the traps from radiolytic gas production. ORNL now has completed the depressurization of all sodium fluoride traps susceptible to high pressures.

6. PERFORMANCE GOAL 3: NUCLEAR FACILITIES DESIGN AND INFRASTRUCTURE

New DOE 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 workers and the public.

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 facility designs 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 some major projects with construction of the Waste Treatment Plant and Highly Enriched Uranium Materials Facility, and with design of the Salt Waste Processing Facility and the Chemistry and Metallurgy Research Replacement Project. DOE design and construction activity in FY 2009 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 2009 in this strategic area of concentration are:

- Ensure adequate design and construction of the Waste Treatment Plant at the Hanford Site.
- Ensure adequate conceptual design of the Large Package and Remote Handled Transuranic (TRU) and Mixed Waste Facility at Hanford.
- Ensure adequate construction of the Integrated Waste Treatment Unit to treat sodium-bearing waste at the Idaho National Laboratory.
- Ensure adequate design of the Chemistry and Metallurgy Research Replacement Project at the Los Alamos National Laboratory.
- Ensure adequate construction of the Salt Waste Processing Facility for treatment of high-level waste liquids and salts at the Savannah River Site.
- Review final design of the Pit Disassembly and Conversion Facility at Savannah River Site.

- Ensure adequate design of the Plutonium Disposition Projects for vitrification of plutonium-bearing materials at the Savannah River Site.
- Continue construction reviews and review preparations for the start of operations of the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex.
- Ensure adequate design of 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 recognized during the past several years that DOE has not been conservatively designing safety into new defense nuclear facilities early in project life. Subsequent changes to the facility design to enhance the safety to a level expected for these facilities is often expensive and causes schedule slippage. The Board has held three public meetings intended to allow the Board to consider how DOE incorporates safety into the design and construction of defense nuclear facilities. 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.

At the request of Congress, the Board and DOE developed a Joint Report to Congress, *Improving the Identification and Resolution of Safety Issues during the Design and Construction of DOE Defense Nuclear Facilities*, published in July 2007.

The commitments and results of the Board's public meetings will cause the Board to become more proactive in assisting DOE to develop potential corrective actions for the issues identified. The Board's interactions with DOE on its defense nuclear projects must occur earlier in the projects design stages, contributing to the Board's need for additional resources. The Board must continue to evaluate changes to DOE directives to ensure it agrees that changes are appropriate and will help integrate safety into the design of new defense nuclear facilities early in the process. Additionally, the Board will need to assess the effectiveness of changes initiated by DOE.

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 has demonstrated the value of rigorous technical oversight to ensure that safety is addressed early in the design process. 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.

The list below describes each project and 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 Plant: a project consisting of three 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 Plant. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE RISK.
- **Hanford Site (Office of River Protection)** - Immobilized High-Level Waste Interim Storage Facility: to provide storage for glass waste canisters produced at the Waste Treatment Facility. HIGH SIGNIFICANCE, LOW COMPLEXITY, LOW 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 (Office of River Protection)** - Supplemental processing capabilities are being developed to reduce the burden on the Waste Treatment Plant and improve the rate of retrieval of waste from tanks. Demonstration Bulk Vitrification Facility: a new facility to demonstrate the capability to vitrify low-activity Tank Farm waste is being designed. HIGH SIGNIFICANCE, MODERATE 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.
- **Los Alamos National Laboratory** - TA-54 Waste Management Mitigation: to mitigate fire-related vulnerabilities in TA-50 (radioactive liquid waste operations) and TA-54 (solid waste) operations. MODERATE SIGNIFICANCE, LOW COMPLEXITY, LOW 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.
- **Nevada Test Site - Criticality Experiments Facility** - A facility within the Device Assembly Facility to which the criticality experiment and complex-wide criticality training capability from TA-18 at Los Alamos National Laboratory are being transferred. HIGH SIGNIFICANCE, HIGH 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 Facility: to convert surplus weapons-grade plutonium metal into oxide for subsequent feed to the mixed oxide (MOX) Fuel Fabrication Facility. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.
- **Savannah River Site** - Container Surveillance and Storage Capability: to provide a capability to store, conduct surveillance of containers, stabilize, and package plutonium consolidated at the Site from the DOE complex. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.
- **Savannah River Site** - Plutonium Vitrification Project: to process excess plutonium to allow disposal. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.
- **Savannah River Site** - Waste Solidification Building: to process waste streams generated in the Pit Disassembly and Conversion Facility and MOX Plant. MODERATE SIGNIFICANCE, LOW COMPLEXITY, LOW RISK.
- **Savannah River Site** - Actinide Removal Process and Modular Caustic-side Solvent Extraction Unit: to remove actinides and cesium from high-level waste prior to treatment in the Defense Waste Processing Facility or disposal in Saltstone. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE RISK.
- **Y-12 National Security Complex** - Highly Enriched Uranium Materials Facility: to provide long term consolidated storage for all highly enriched uranium material forms at the Y-12 Site. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE 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

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 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 (SSC); and the adequacy of SSC installation, startup and operational readiness. Candidates for review include:

- Continue design and construction reviews of the Waste Treatment Plant at the Hanford Site.
- Review construction of the Demonstration Bulk Vitrification Facility at the Hanford Site.
- Review the conceptual design for the Large Package and Remote Handled Transuranic and Mixed Waste Facility at Hanford.
- Complete review of the design and continue construction reviews of the Integrated Waste Treatment Unit for treatment of sodium-bearing waste at the Idaho National Laboratory.
- Review the final design of the Chemistry and Metallurgical Research Replacement facility at the Los Alamos National Laboratory.
- Review design and construction of the Criticality Experiments Facility at the Device Assembly Facility at Nevada Test Site.
- Review the final design of the Pit Disassembly and Conversion Facility at SRS.
- Review the final design and construction of the Salt Waste Processing Facility at SRS.
- Continue construction reviews and review preparations for start of operations for the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex.
- Review the preliminary design of the Uranium Processing Facility at the Y-12 National Security Complex.

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 facility designs 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 2008 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 (SSC); and the adequacy of SSC installation, startup and operational readiness. Candidates for review include:

- Continue design and construction reviews of the waste Treatment Plant at the Hanford Site.
- Review the final design and review construction of the Demonstration Bulk Vitrification Facility at the Hanford Site.
- Complete review of the design and continue construction reviews of the Integrated Waste Treatment Unit for treatment of sodium-bearing waste at the Idaho National Laboratory.
- Review the final design and start of construction of the Chemistry and Metallurgical Research Replacement Facility at the Los Alamos National Laboratory.
- Review design and construction of the Criticality Experiments Facility at the Device Assembly Facility at the Nevada Test Site.
- Review the final design of the Pit Disassembly and Conversion Facility at SRS.
- Review the final design and construction of the Salt Waste Processing Facility at SRS.
- Continue construction reviews and review preparations for start of operations for the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex.
- Review the preliminary design of the Uranium Processing Facility at the Y-12 National Security Complex.

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 facility designs 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 2007 Performance Accomplishments

The Board and its staff continued providing technical evaluations of numerous design and construction projects through out 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 Test 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 Test 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 Test 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 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.

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 2006 Performance Accomplishments

The Board and its staff continued providing technical evaluations of numerous design and construction projects through out 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. As a result of reviews conducted by the Board during the past several years, it became apparent to the Board that safety was not being integrated into the design of new facilities early in the design process. The Board held two public meetings to delve into how safety could be better integrated into the DOE design process. As a result, DOE acknowledged that improvements were needed to better incorporate safety into the design of nuclear facilities and reported undertaking a number of initiatives to address the identified shortcomings. DOE has now established new expectations for identifying and resolving safety issues earlier in the design process, revised the existing DOE Order for project management and is working to revise the existing DOE Manual for project management. Further, DOE is developing a new standard to implement a more rigorous approach to safety-in-design. The Board expects that these actions, when fully implemented, should lead to significant improvements in the design of new defense nuclear facilities.

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 budget issues. The Board's activities primarily consisted of considering the resolution of previously identified issues. Subsequent deficiencies and concerns have been identified during these reviews, for example:

- The Board had earlier identified that the DOE-specified seismic requirements may not have been sufficiently conservative. DOE evaluation of this concern identified that the seismic requirements were underestimated by about 40 percent. DOE is now evaluating the impact this increase will have on the design of the structure and equipment and using state-of-the-art techniques to develop new data to resolve some uncertainty in the modeling used to predict the seismic hazard. The Board is evaluating the techniques being used to collect these data.
- 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 and re-evaluated and issued new design criteria to ensure the design remains fully protective of the public's health and safety.
- The Board continues to follow the status of the design and installation of fire-protective coating on structural steel subsequent to DOE directing the contractor to comply with code requirements. Questions on the basis for not coating some steel have resulted in DOE developing criteria and a methodology to justify the decisions. The Board has questioned the basis for much of the criteria in an attempt to improve its technical adequacy.

Demonstration Bulk Vitrification Facility at the Hanford Site. In September 2005, the Board identified potential weaknesses in areas such as the design, safety analysis, and the safety of workers that needed to be considered in finalizing the design of the Demonstration Bulk Vitrification Facility. Design of the facility continued in FY 2006 including an independent expert review arranged by DOE. Additionally, a more formal approach to project management was implemented. As a result, the design has continued to evolve and improvements in radioactive material confinement and worker safety features have been developed.

Integrated Waste Treatment Unit at the Idaho National Laboratory. The Board reviewed major aspects of the project organization, preliminary design, and safety basis development for the Integrated Waste Treatment Unit (IWTU). Primary areas of focus included: process design and confinement strategy, safety strategy as detailed in the preliminary documented safety analysis, and pilot plant testing. In response to Board concerns, the DOE directed the project to use a more conservative and commonly used computer code for estimating radiological consequences for co-located workers and the public from postulated accidents. Further, the project directed a review of key safety analysis inputs and subsequently changed its inputs for many of the postulated accidents. The

Board is continuing to review concerns including: control strategy for hydrogen deflagration prevention in process equipment, rapid shutdown system design, and waste characterization/radionuclide inventory controls.

Los Alamos National Laboratory Chemistry and Metallurgy Research Replacement Facility. The Board performed a series of reviews on the conceptual design and initial portions of the preliminary design. A number of significant concerns were identified, including an inadequate suite of safety controls that would not provide confinement under all accident scenarios. NNSA is currently working to address the concerns raised by the Board.

Device Assembly Facility at the Nevada Test 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 (DAF) at the Nevada Test 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 DAF. The Board had previously reviewed the plans for the Criticality Experiments Facility (including design reviews and preliminary documented safety analysis) and took issue with the lack of design criteria and an inadequate safety analysis. In FY 2006, the Board provided additional feedback to DOE regarding the progress on the safety analysis, ongoing seismic analysis, and evaluation of the cracking concerns. As a result, DOE now plans to perform a new structural and seismic analysis, has plans to address water leaks, and is preparing a new safety analysis. The Board informed DOE that further testing of the concrete strength was prudent to fully evaluate the impact of the extensive cracking in DAF.

Pit Disassembly and Conversion Facility at the Savannah River Site. The Board continued to review the safety of the design of the Pit Disassembly and Conversion Facility (PDCF). The Board reviewed the surface settlement profiles at the building foundation as a result of soft zones unique to the Savannah River Site (SRS). Based on this review, the Board found that although the final predicted surface settlement is deemed adequate, the methods used need to be improved. The Board will address this concern with SRS separately. The Board also suggested several improvements in the electrical design of PDCF. The Board observed that the design rating of the diesel generator may not be adequate to handle the necessary loads during startup following a loss of offsite power.

Salt Waste Processing Facility at the Savannah River Site. The Board's review of the conceptual design of the Salt Waste Processing Facility at SRS identified weaknesses in the facility's design criteria for natural phenomena hazards. As a result, DOE has now directed its contractor to pursue a more robust structure, which will provide the confinement required by the DOE safety basis. The Board continues to review the new enhanced design as well as site geotechnical investigations.

Highly Enriched Uranium Manufacturing Facility. The Board initiated its review of construction activities for the Highly Enriched Uranium Materials Facility (HEUMF) at the Y-12 National Security Complex. The initial assessment focused on implementation of the construction quality program for reinforced concrete installation. Several fundamental concerns were noted and discussed with DOE. However, shortly after DOE initiated corrective actions, a significant number of quality related deficiencies became evident. Short term compensatory actions were initiated on the project while long-term corrective actions are being developed and implemented.

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 2005 Performance Accomplishments

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

Hanford Waste Treatment Plant. The Board has continued its extensive review of the design and construction of important-to-safety structures, systems, and components in the Waste Treatment Plant facilities. Numerous deficiencies and concerns have been identified during these reviews. For example:

- The Board had earlier identified that the DOE-specified seismic requirements may not have been sufficiently conservative. DOE evaluation of this concern identified that the seismic requirements were underestimated by about 40 percent. DOE and its contractor are now evaluating the impact this increase will have on the design of the structure and equipment.
- DOE significantly underestimated the impact of hydrogen hazards on pipes and small process vessels and components. At the urging of the Board, DOE is now evaluating design solutions to address the issue.
- At the Board's suggestion, DOE completed a detailed review of the blackcell concept. Components in the blackcells will not be readily accessible for the life of the plant. This review revealed problems associated with erosion of components. DOE has now enhanced understanding of erosion and is developing a surveillance and testing program to better ensure components in the blackcells will last for the life of the plant.
- The Board has identified deficiencies in the structural evaluation methodology. An independent Peer Review Team brought on at the Board's suggestion by DOE to help with the structural evaluation agreed with the Board. DOE has now required the contractor to change its analysis methodology to correct the deficiencies.
- The Board continues to follow the status of the design and installation of fire protective coating to structural steel subsequent to DOE directing the contractor to comply with code requirements. Questions on the basis for deleting coatings on some steel have resulted in the contractor committing to develop criteria and a methodology to justify the decisions. DOE now monitors the work and recently questioned the contractor's basis for reducing the approved thickness of the applied coatings, which is still under review.
- The Board identified deficiencies with plans for protection of operators who must remain in the control room during accidents to safely shutdown the plant. WTP has now redesigned the habitability system for the emergency shutdown facility. The new design provides for a dramatic improvement in protection of the operators.

Salt Waste Processing Facility at SRS. The Board's review of the conceptual design of the Salt Waste Processing Facility identified weaknesses in the facility's design criteria for natural phenomena hazards and with DOE directives. DOE commissioned an independent review team of subject matter experts to review this issue. This independent review team agreed with the Board and made recommendations to improve the design criteria for the facility. As a result, DOE is developing new criteria to ensure that the facility design will adequately confine hazardous materials. The Board has also informed DOE of the concerns with the DOE directives associated with developing facility design criteria.

Pit Disassembly and Conversion Facility. The Board continued to review the safety of the design of the Pit Disassembly and Conversion Facility (PDCF). The Board found the Preliminary Documented Safety Analysis comprehensive and acceptable. However, the Board questioned the impact of geologic soft zones at the site and their possible impact on the PDCF plutonium processing building during a Design Basis Earthquake. Because the PDCF plutonium processing building is a bermed structure, it has much larger vertical soil stresses than other SRS buildings. Hence, surface settlement profiles at the building foundation become a critical design parameter and the details of the soft zone characteristics take on an added significance. DOE has initiated a review of this issue.

Tritium Extraction Facility. The Board continues to provide oversight of the Tritium Extraction Facility, which has completed construction and is now in the testing and startup phase. The facility has an advanced computerized process control and worker protection system. At the Board's urging, a special one week software review was conducted by experts from the NNSA Service Center, and reviews of the computerized systems have been added to the DOE Operational Readiness Review (ORR). Also, there are certain maintenance and operations evolutions that cannot be demonstrated during the ORR. At the Board's urging, DOE ORR team members are observing selected items of maintenance and operations being conducted prior to the ORR.

Los Alamos National Laboratory Chemistry and Metallurgy Research Replacement Project. The Board reviewed the major safety aspects of the Critical Decision 1 package submittal. In a letter dated February 24, 2005, the Board raised concerns with the project's acquisition strategy and compressed federal oversight schedule. In response to the letter, NNSA developed a detailed review plan that outlines direct federal involvement to monitor the integration of safety throughout the design process. The Board also identified weaknesses with the project's confinement strategy, which will be addressed during the preliminary design.

Pantex Building 12-64 Upgrade Project. The project team established an administrative limit on the quantity of high explosives to preclude failure of the roof slabs. However, the Board questioned whether the initial analysis work justified the new explosive limits. DOE thereafter modified the methodology to include a quantification of the hazard so that a rational and justifiable limit could be selected. The final explosive limits were reviewed by the Board and found to provide an adequate level of safety.

Hanford Demonstration Bulk Vitrification Facility. During review of the preliminary design of the Demonstration Bulk Vitrification Facility, the Board identified deficiencies with the safety controls specified for protection of the workers. In particular, confinement of the hazardous material involved was not sufficient. DOE commissioned an independent review of the project safety basis and confinement strategy. This independent review agreed with the Board. DOE is now taking action to revise the design to provide better safety controls and confinement strategy.

Plutonium Storage at SRS. In Public Law 107-314, Section 3183, *Study of Facilities for Storage of Plutonium and Plutonium Materials at Savannah River Site*, Congress tasked the Board to conduct a study of the adequacy of K-Area Materials Storage facility (KAMS) and related support facilities such as Building 235-F (235-F), at SRS. In 2005, the Board issued its annual update to Congress. The Board proposed nine actions it considered necessary to enhance safety, reliability, and functionality of the plutonium storage facilities at SRS. Based in part on these extensive proposals, DOE has now decided against using 235-F and is now consolidating its plutonium in KAMS. DOE has agreed with the proposals to upgrade KAMS and is evaluating implementation of the needed actions.

Highly Enriched Uranium Manufacturing Facility at Y-12 National Security Complex. The Board has completed its design reviews of the High Enriched Uranium Materials Facility (HEUMF) and believes the design will adequately protect the public and workers. Some design enhancements remain to be implemented. For example, the contractor has agreed to correct emergency lighting deficiencies—system components are not seismically qualified, subjecting the building to a total blackout during an earthquake. The contractor will analyze the ability of the safety controls to protect against large fires involving canned subassemblies. The project configuration management system is being upgraded.

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 2004 Accomplishments

Plutonium Storage at SRS. In Public Law 107-314, Section 3183, *Study of Facilities for Storage of Plutonium and Plutonium Materials at Savannah River Site*, Congress tasked the Board to conduct a study of the adequacy of K-Area Materials Storage facility (KAMS) and related support facilities such as Building 235-F (235-F), at the Savannah River Site (SRS) in South Carolina. In FY 2004, the Board issued its initial report as well as a follow up report to Congress. The Board proposed nine actions it considered necessary to enhance safety, reliability, and functionality of the plutonium storage facilities at SRS. DOE has agreed with the proposals and is currently evaluating implementation of appropriate actions during the next year.

Hanford Waste Treatment Plant Design and Construction. The Board has continued its extensive review of the design and construction of important to safety structures, systems and components in the Waste Treatment Plant facilities. Numerous deficiencies and concerns have been identified during these reviews, for example:

- The contractor had planned to eliminate much of the fire-resistive coatings on the structural steel used in the facilities. Eliminating the coatings is inconsistent with DOE's own requirements as well as industry standards. This decision is now being reversed.
- The cesium ion exchange system could accumulate explosive concentrations of hydrogen gas. Furthermore, the hydrogen generation rates, hydrogen gas retention and release in waste tanks, and the ability of the mixing systems to prevent gas accumulation in the stored high-level waste tanks was not understood. DOE has now added an inerting system to the cesium ion exchange system to manage hydrogen flammability.
- One of the facilities in the WTP contains areas that by design will not be accessible after construction. The Board was concerned that the design of equipment in these areas were not sufficiently robust to operate normally for 40 years without maintenance. The Board encouraged DOE to further evaluate the performance criteria and validate that this equipment could in fact be expected to perform for this extended period of time. DOE conducted the study and is now correcting noted deficiencies and is also considering providing limit access to the areas for maintenance.
- In response to Board concerns with the large number of weld defects and missing leak tests for a high-level waste vessel, DOE performed root cause analyses which identified significant weaknesses in vessel technical specifications, fabrication oversight, and engineers understanding of safety requirements. DOE is now implementing corrective actions for these weaknesses.
- DOE proposed delegating its approval of safety-related expectations (codes, major design changes, and safety control modifications) to the contractor. As a result of the Board's objections, DOE significantly modified their process and maintained their control of the standards and design of the Waste Treatment Plant.
- The criteria proposed by the contractor to be used to accept a new, experimental concrete mixture was inadequate. As a result, additional acceptance criteria were developed to ensure the concrete's quality would be suitable.
- In response to Board concerns with the large number of weld defects and missing leak tests for a high-level waste vessel, DOE performed root cause analyses which identified significant weaknesses in vessel technical specifications, fabrication oversight, and engineers' understanding of safety requirements. DOE is now implementing corrective actions for these weaknesses.

High Enriched Uranium Materials Facility at Y-12 National Security Complex. The Board has continued its design reviews of the High Enriched Uranium Materials Facility (HEUMF). Based on detailed reviews, the Board identified concerns with important safety systems such as the structure, electrical, ventilation, and instrument and control (I&C) systems. Based on these Board concerns, the contractor has made the electrical design more reliable, added concrete details to the structure to better resist an earthquake, and is actively working to resolve additional safety concerns raised by the Board.

Pit Disassembly and Conversion Facility. The Board has been reviewing the structural design for the Pit Disassembly and Conversion Facility (PDCF) to be located at the Savannah River Site. The Board has ensured the structural design criteria were adequate, the geotechnical evaluations were appropriate, and the soil-structure interaction (SSI) analysis was adequate for the PDCF structures. In response to a Board letter dated May 13, 2003, the contractor conducted a fire risk analysis to assess a seismically induced full-facility fire. The Board is reviewing the final design to ensure that it is adequate and incorporates appropriate defense-in-depth.

Pantex Building 12-64 Upgrade. In a letter dated October 10, 2003, the Board noted that DOE was not addressing the structural weaknesses of the bays in Building 12-64 during conceptual design of upgrades. The Board emphasized the need to improve the structure's ability to withstand a potential earthquake and to establish a limit on explosive loading that appropriately accounts for known design deficiencies in the facility structure. As a result, the project was modified to include a structural repair to the building that should significantly reduce the likelihood of facility failure during an earthquake. In addition, the project has worked toward establishing an appropriate explosives limit to preclude impacting nearby facilities should there be an explosion.

High Efficiency Particulate Air Filter Testing at the Savannah River Site. High Efficiency Particulate Air (HEPA) filters provide an important confinement safety function in many DOE nuclear facilities. The Secretary of Energy committed to the Board to maintain the Filter Test Facility (FTF) in Oak Ridge, Tennessee, and to independently test important-to-safety HEPA filters to ensure they will perform as expected. In July 2003, the Board noted that the Savannah River Site (SRS) had been installing HEPA filters in safety class and safety significant applications in nuclear facilities without testing the filters at the FTF. In response to the Board SRS replaced the vast majority of the incorrectly installed filters, and will replace the remaining few filters in the near future.

Nuclear Air Cleaning Handbook. The Board has urged DOE to issue an update to the *Nuclear Air Cleaning Handbook*, DOE-HDBK-1169, which forms the technical basis for the ventilation systems in most DOE nuclear facilities. The previous version was published in 1976. After much involvement by the Board, DOE issued an update to this important handbook in December 2003. The Board will continue to ensure that the handbook is appropriately implemented.

Salt Waste Processing Facility at the Savannah River Site. The Salt Waste Processing Facility will be used to remove cesium, strontium and actinides from high-level waste before it is vitrified. In a June 18, 2004 letter the Board outlined safety risks associated with delays to the salt processing program and urged DOE not to eliminate funding for this important work. DOE has restored funding and is now pursuing a sound program plan that will accelerate waste stabilization and risk reduction.

Hanford Plutonium Finishing Plant. Previously the Board identified electrical deficiencies at the Plutonium Finishing Plant. Specifically, baseline short circuit calculations, which are used to confirm the adequacy of installed electrical equipment, were not consistent with the electrical configuration drawings. During this fiscal year, the contractor evaluated this situation and in June 2004 concluded that many of the electrical system protective devices in the facility have been applied above their rated capability resulting in an unsafe condition and a violation of the National Electrical Code. Actions to correct this situation are underway.

Electrical Safety Handbook. In a letter to DOE dated August 7, 2003, the Board identified weaknesses with the proposed revision to the Electrical Safety Handbook, DOE-HDBK-1092-98. The Board requested that DOE provide effective, detailed guidance to contractors on electrical safety programs. In July 2004, DOE revised the handbook to include the details of electrical safety and guidance for an effective electrical safety program. This version is under review.

7. PERFORMANCE GOAL 4: 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 protect adequately the health and safety of the workers and the public.

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 2009, 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 safety of the workers at DOE 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 2009 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 directives that inform DOE personnel and contractors how to fulfill their responsibilities safely are evaluated and strengthened where necessary, including the development of new safety directives to provide guidance in areas for which none is currently available.
- 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 radiological 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 the public and worker safety and the protection of the environment.

Performance Goal 4

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 protect adequately the health and safety of the workers and the public.

FY 2009 Performance Objectives

The Board will continue to assess the adequacy of proposed changes to DOE directives to ensure that any revisions are appropriate. The results of the directives reviews completed by the Board will be provided to DOE for action. The Board anticipates that approximately 20 DOE directives that may impact public and worker health and safety will require review, of which two or three are likely to require significant Board and staff interaction to ensure satisfactory resolution of potential issues. In those rare cases in which new directives are determined to be required, the Board will work with DOE to ensure that the applicable documents are appropriately developed. The Board also expects to continue its involvement in the efforts of the National Nuclear Security Administration (NNSA) to establish its own directives system. It is estimated that 15 NNSA 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.

The Board will continue its reviews of DOE's implementation of integrated safety management and associated nuclear safety programs. In addition, while the Board has noted that considerable progress has been made 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. 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 facilities are established and implemented; as necessary to protect adequately the health and safety of the workers and the public.

FY 2008 Performance Objectives

The Board will continue to assess the adequacy of proposed changes to DOE directives to ensure that any revisions are appropriate and adequate. The results of reviews completed by the Board will be provided to DOE for action. The Board anticipates that approximately 20 DOE directives that may impact public and worker health and safety require review, of which two or three are likely to require significant Board and staff interaction to ensure satisfactory resolution of potential issues. In those rare cases in which new directives are determined to be required, the Board will work with DOE to ensure that the applicable documents are developed adequately. The Board also expects to continue its involvement in the efforts of the National Nuclear Security Administration (NNSA) to establish its own directive system. It is estimated that 15 NNSA directives will also require review. As a result of these reviews, new or modified health and safety directives will be issued in an enhanced form, resulting in improved safety through standardized requirements and guidance that provide for adequate protection of the workers and the public.

The Board will continue its reviews of DOE's implementation of Integrated Safety Management (ISM), as well as ongoing efforts to make ISM more effective. At least five reviews will be completed. Candidates for review include:

- Activity-level ISM implementation at sites with performance indicators judged to have higher than expected rates of abnormal occurrences related to worker protection.
- Validation of at least one site office review of activity-level ISM.
- Validation of at least one ISM review by the DOE Office of Independent Oversight
- Implementation and effectiveness of ISM at defense nuclear facilities.

The Board has noted that considerable progress has been made in the implementation of ISM, but that 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, 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, DOE will be expected to provide an adequate approach and schedule for resolution of identified issues that supports 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 facilities are established and implemented; as necessary to protect adequately the health and safety of 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 await 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.

Performance Goal 4

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 protect adequately the health and safety of the workers and the public.

FY 2006 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 32 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 12 pending directives to improve the content, clarity, and consistency in safety requirements and guidance. Examples of completed directives include:

- DOE Order 151.1X, *Comprehensive Emergency Management System*
- DOE Order 251.1X, *Directives Program*
- DOE Order 420.1B, *Facility Safety*
- DOE Guide 424.1-1A, *Implementation Guide for use in Addressing Unreviewed Safety Question Requirements*
- DOE Order 452.1C, *Nuclear Explosive and Weapon Surety Program*
- DOE Order 452.2C, *Safety of Nuclear Explosive Operations*
- DOE Standard 1104, *Review and Approval of Nuclear Facility Safety Basis Documents*

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. DOE has now screened all hazard category 2 and 3 defense nuclear facilities against criteria designed to identify those with the potential for benefiting from the intent of the Recommendation. DOE also completed another major milestone in February 2006, developing and issuing its Ventilation System Evaluation Guidance document. This document identifies a set of design and performance attributes that ventilation systems can be evaluated against for identification of potential upgrades. Several pilot facilities have been identified by DOE to which these attributes will be applied, in order to identify potential improvements, before the guidance document is applied to the rest of hazard category 2 and 3 facilities that were screened and identified earlier in the year. The evaluation process will be completed over the next two years, resulting in significant improvement in the safety posture of defense nuclear facilities across the complex

DOE Technical Capability. In response to the Board's Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*, DOE is making progress in a number of areas:

- In May 2006, DOE conducted the initial accreditation review of the Technical Qualification Program (TQP) at the site office for the Y-12 National Security Complex. The Y-12 Site Office had a solid program and served as a good benchmark for this accreditation process.
- DOE budgeted \$2M for FY08 to re-establish the Corporate Technical Intern Program, which would fund ten interns.
- DOE developed and executed a Senior Technical Safety Manager (STSM) overview course in Albuquerque in February 2006 for qualified STSMs in the process of requalification and for new STSM candidates to assess gaps in their knowledge level. DOE will use lessons learned from this course to improve its next scheduled course. Additionally, DOE is strengthening its STSM qualification criteria with mandatory performance activities through a significant revision to DOE-STD-1075, *Senior Technical Safety Manager Functional Area Qualification Standard*. DOE expects to issue this standard later this year.

Recommendation 2004-1. In 2006, the Board issued technical report, DNFSB/TECH-36, *Integrated Safety Management: The Foundation for an Effective Safety Culture*. The report examines the current status of the effectiveness of integrated safety management (ISM) systems at the seven NNSA weapons sites, summarizes failures and good practices, and proposes changes to enhance the effectiveness of ISM. In response to Recommendation 2004-1, DOE completed the following actions in 2006: DOE designated an ISM Champion to chair an ISM Champions Council, which will assist in developing and sustaining vital, mature ISM systems throughout the Department; established two Central Technical Authorities (CTAs) with associated technical

support staff; issued a new DOE policy and order on DOE oversight; implemented a nuclear safety research function; strengthened the technical qualification program for Federal safety assurance personnel; implemented a formal safety delegation and assignment process; and took steps to improve the implementation of the ISM “feedback and improvement” function, including issuance of a new DOE Order describing the Operating Experience Program. However, DOE has recently begun to take actions to withdraw from several of these commitments and is in the process of revising the implementation plan for the recommendation, which will require significant Board oversight in 2007.

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 in safety functions. DOE developed a new standard governing the development and implementation of specific administrative controls in the defense nuclear complex. Additionally, DOE has developed a set of training materials to introduce the new and revised requirements to its field elements and has taken actions to verify the adequacy and implementation of the revised guidance and expectations throughout the complex. Further, DOE has 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. With the exception of the completion of several annual updates, DOE has indicated that it believes that all of the commitments associated with the Recommendation have been met. The Board will work to evaluate the effectiveness and implementation of DOE’s efforts in satisfying these commitments in 2007.

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 chartered a working group comprised of representatives from the major program offices, field elements, national laboratories, and major contractors to guide the efforts in this area. This group has worked to develop a draft policy, along with draft implementation guidance, which is scheduled to be released for general comment later this year. The Board will continue to oversee DOE’s progress in developing an effective policy, along with useful implementing guidance, to govern the use of risk assessment methodologies at DOE facilities.

Nuclear Criticality Safety. Concerns expressed by the Board regarding the lack of Nuclear Criticality Safety (NCS) site reviews led to the establishment of a formal program to monitor contractor and federal NCS programs across the complex. The reviews are performed using senior contractor and federal NCS personnel; results of these reviews will be a component of subsequent DOE NCS Annual Reports. In response to the DOE FY 2005 NCS Annual Report, the Board requested additional information from DOE for three items: an updated schedule for relocation of critical experimental capability from Los Alamos National Laboratory (LANL) to the Nevada Test Site; an analysis of DOE site office staffing needs for effective federal NCS oversight and plans to fill those positions; and the latest status and schedule for conducting NCS engineer training classes, which had been discontinued at LANL in 2004. DOE is preparing its response.

Implementation of ISM: Activity-Level Work Planning. In 2006, the National Nuclear Security Administration completed work on its expectations of the contractors’ work planning and control processes, as well as criteria and review approach documents to comprehensively assess these processes for the first time. These documents will assist the sites in their goal of continuously improving worker safety. 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. Since that time, DOE has identified that the specific commitments will not be met as identified in the recommendation 2004-1 Implementation Plan, but that other actions will be taken as a part of the normal oversight of the sites. The Board will continue to work with them throughout FY 2006 to improve performance in this key area.

Recommendation 2002-1, *Quality Assurance for Safety-Related Software.* This recommendation was issued to correct problems caused by inadequate design, implementation, testing, and configuration management of safety-significant computer software. During the past year, DOE has completed identification, selection, and assessments of safety system software and firmware at its defense nuclear facilities. In addition, DOE has made some progress in properly training and qualifying personnel assigned to software quality assurance (SQA) positions to the requirements of DOE-STD-1172-2003, *Safety SQA Functional Area Qualification Standard*. Finally, DOE has issued three SQA-related directives and has revised DOE Manual 411.1C, *Safety Management Functions, Responsibilities and Authorities Manual* to reflect software-related organizational changes and responsibilities. Overall, DOE's ability to assure the validity of safety information developed by use of software is improving.

Performance Goal 4

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 protect adequately the health and safety of the workers and the public.

FY 2005 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 32 directives associated with, but not limited to, worker protection management, electrical safety, quality assurance, internal and external dosimetry, and natural phenomena hazard mitigation. At year's end, both staffs were in the process of resolving issues on 17 pending directives to improve the content, clarity, and consistency in safety requirements and guidance. At year's end, both staffs were in the process of resolving issues on 19 pending directives to improve the content, clarity, and consistency in safety requirements and guidance. Examples include:

- DOE Order 251.1X, *Directives Program*
- DOE Order 151.1X, *Comprehensive Emergency Management System*
- DOE Standard 1104, *Review and Approval of Nuclear Facility Safety Basis Documents*
- DOE Order 420.1B, *Facility Safety*

Electrical Safety Handbook. The Board identified weaknesses with the proposed revision to the *Electrical Safety Handbook*, DOE-HDBK-1092-98, and requested that DOE provide effective, detailed guidance to contractors on electrical safety programs. In December 2004, DOE issued the revised handbook.

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 in safety functions. DOE developed a new standard governing the development and implementation of specific administrative controls in the defense nuclear complex. Additionally, DOE has developed a set of training materials that were used to introduce the new and revised requirements to its field elements. Further, as a result of the Recommendation, DOE is actively verifying the adequacy and implementation of the revised guidance and expectations throughout the complex. The Board continues to work closely with DOE to finalize the guidance to ensure that proper safety focus is afforded to administrative controls that provide important safety-related functions at DOE facilities.

Review of Documented Safety Analyses, Safety Basis Assumptions, and Safety Programs. The development of a comprehensive safety basis and the identification and selection of an appropriate control set are essential cornerstones of safe operation at defense nuclear facilities. The Board conducted numerous reviews of the safety bases throughout the DOE complex. The Board reviewed the critical assumptions used in the development of the safety bases as well as the control strategies used to prevent and mitigate accident scenarios of concern. The Board identified a number of specific weaknesses in the development and implementation of the safety bases at defense nuclear facilities. In particular, the Board highlighted concerns with the safety bases at the Nevada Test Site's Device Assembly Facility (DAF), as well as the training program at the DAF. Further, the Board continues to closely follow site specific concerns at the Pantex plant involving a number of weaknesses in the tooling program. As a result of these concerns, DOE and its contractors are implementing corrective actions to address these issues.

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, DOE has developed a draft policy governing the use of risk assessment methodologies at defense nuclear facilities.

Oversight of Complex, High-Hazard Nuclear Operations. From 2003-2004, the Board conducted eight public hearings to examine DOE's and NNSA's current and proposed methods of ensuring safety at its defense nuclear facilities. The Board cautioned DOE and NNSA that if any such changes are made, they must be done formally and

deliberatively, with due attention given to unintended safety consequences that could reduce the present high level of nuclear safety. The Board also sought to benefit from the lessons learned as a result of investigations conducted following the Columbia Space Shuttle disaster and the discovery of the deep corrosion in the reactor vessel head at the Davis-Besse Nuclear Power Plant. From these hearings, the Board concluded that there was cause for concern with regard to the potential increase in the possibility of nuclear accidents as evident in: (1) the increased emphasis on productivity at the possible expense of safety, (2) the loss of technical competency and understanding at senior management levels within DOE's and NNSA's organizational structure, (3) the apparent absence of a strong safety research focus, and (4) the reduced central oversight of safety.

On May 21, 2004, the Board issued Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*, to ensure that any fundamental reorganization at DOE and NNSA does not degrade nuclear safety, and that the likelihood of a serious accident, facility failure, construction problem, or nuclear incident will not be increased as a result of well-intentioned changes. On July 21, 2004, the Secretary of Energy accepted the Board's Recommendation, however, the DOE implementation plan submitted to the Board on December 23, 2004, did not provide sufficient emphasis and detail that would strengthen DOE's federal safety assurance, ability to learn from internal and external operating experience, or revitalize Integrated Safety Management (ISM). The Board rejected the implementation plan in a letter to DOE on February 14, 2005, and identified areas requiring further attention. Since that time, DOE has delivered a more thorough implementation plan, which was accepted by the Board on August 5, 2005, and has taken steps to create a DOE and an NNSA Office of the Central Technical Authority (CTA), and a Nuclear Safety Research function. DOE has also issued two DOE directives on DOE Oversight process. The Board will continue monitor DOE's progress in upgrading its technical staffing and qualification of federal safety assurance personnel, establishing new processes and criteria for safety delegations, implementing its Operating Experience Program, and reinvigorating its ISM System to improve its work planning and work control.

NNSA Facility Representative Staffing and Training. In March 2004, the Board conducted on-site reviews of the staffing levels and training of Facility Representatives (FR) at the Pantex Site Office, the Sandia Site Office, and the Los Alamos Site Office. The Board observed that these three NNSA sites were not staffed with a sufficient number of FRs to perform their facility oversight responsibilities. Further, two sites had been under reporting their FR staffing needs for the past four years. Contributing to this deficiency is that the guidance in the FR staffing analysis in DOE-STD-1063-2000, *Facility Representatives*, did not adequately account for all of the hazardous facilities for which DOE and NNSA have oversight responsibility, and did not capture all of the FR work demands. During the review, the FR continuing training programs were found to be unstructured, informal, and generally weak in execution. In a letter dated May 14, 2004, the Board noted these concerns. During latter part of 2004 and into 2005, NNSA has taken steps to improve its activity-specific hazard training for Facility Representatives. NNSA also developed and executed a more rigorous staffing analysis that determined that 20 additional Facility Representatives were needed at six NNSA sites. Actions to hire 10 FRs for this fiscal year are underway, and a budget request for 10 more FR positions has been submitted for FY2006. Additionally, the guidance for the FR staffing analysis in DOE-STD-1063-2000 is being revised, and projected for re-issuance in mid-2006.

Software Quality Assurance (SQA). The Board issued Recommendation 2002-1, *Quality Assurance for Safety-Related Software*, to correct problems caused by inadequate design, implementation, testing, and configuration management of safety-significant computer software. During the past year, DOE has completed identification, selection, and assessments of safety system software and firmware at its defense nuclear facilities. In addition, DOE has made some progress in properly training and qualifying personnel assigned to SQA positions to the requirements of DOE-STD-1172-2003, *Safety SQA Functional Area Qualification Standard*. Finally, DOE has issued three SQA-related directives and has revised DOE M 411.1C, *Safety Management Functions, Responsibilities and Authorities Manual* to reflect software-related organizational changes and responsibilities.

Performance Goal 4

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 protect adequately the health and safety of the workers and the public.

FY 2004 Performance Accomplishments

10 CFR 851, Worker Safety and Health. The Bob Stump National Defense Authorization Act, Public Law 107-314, directed DOE to promulgate regulations on worker safety and health, rather than rely exclusively on a contractual approach to establish safe and healthy workplaces. On December 8, 2003, DOE provided notification of a proposed rule on worker protection, Title 10 Code of Federal Regulations, Part 851 (10 CFR 851), *Worker Safety and Health*, in the Federal Register. The Board is required by law to review and evaluate all applicable DOE Orders, regulations, and requirements. The Board conducted a detailed review of the proposed rule and provided comments to DOE on January 23, 2004. As a result, the Secretary suspended the rulemaking until the Board's issues could be resolved. The Board worked closely with DOE to develop a new regulation, and in June 2004 a draft of the revised rule was sent to the Office of Management and Budget to be prepared for publication in the Federal Register. The new rule will assist in implementing Integrated Safety Management at the activity level, helping to assure the safety of the workforce.

Software Quality Assurance (SQA). The Board issued Recommendation 2002-1, *Quality Assurance for Safety-Related Software*, to correct problems caused by inadequate design, implementation, testing, and configuration management of safety-significant computer software. During the past year, DOE has responded to the Recommendation by developing new directives for SQA and software safety, training personnel whose duties involve SQA, and improving the quality of selected software codes used across the complex for the analysis of potential accidents.

Implementation of ISM: Activity-Level Work Planning. The Board reviewed the incorporation of safety into work planning at several NNSA sites, evaluating how each site accomplished the five ISM core functions (define the scope of work, analyze the hazards, develop and implement controls, perform the work, and provide feedback and continuous improvement) for programmatic work as well as maintenance. The Board's reviews revealed significant deficiencies in the ability to effectively incorporate ISM into the process for work planning and control. Problems were noted in the tailoring of generic work documents, the processes used to identify and analyze hazards, the development of appropriate and unambiguous controls to be included in work packages, the use of a hierarchy of controls, and the ability to effectively identify areas for improvement and take action accordingly. In a letter dated May 21, 2004, the Board noted that actions to address some of these issues were being developed; however, significantly more senior management attention was required. DOE and NNSA are just beginning to address these issues. The Board will continue to work with them throughout FY 2005 to improve performance in this key area.

Site Specific Safety Reviews. The development of a comprehensive safety basis and the identification and selection of an appropriate control set are essential cornerstones of safe operation at defense nuclear facilities. The Board conducted numerous reviews of the site-specific safety bases throughout the DOE complex. In particular, the Board reviewed the critical assumptions used in the development of the safety bases as well as the control strategies used to prevent and mitigate accident scenarios of concern for facilities and activities such as the Savannah River Site (SRS) and Hanford tank farms, the Waste Isolation Pilot Plant (WIPP) Mobile Waste Characterization and Loading Units, the Pantex Plant Onsite Transportation Program, Los Alamos National Laboratory's "Armando" subcritical experiment, Hanford Spent Nuclear Program's Sludge Removal Project, Sandia National Laboratories' Auxiliary Hot Cell Facility, and the Nevada Test Site (NTS) Device Assembly Facility, G-tunnel, and Onsite Transportation Programs. During the course of these reviews, the Board identified a number of specific instances where inappropriate assumptions and methodologies were used in the development of safety bases. These included analyses which did not always use bounding input assumptions and which implicitly credited non-qualified plant indications and equipment in the development of the safety analyses. These deficiencies resulted in situations where the safety analyses may not have appropriately bounded the actual hazard conditions for the facilities concerned. As a result of these concerns, DOE/NNSA and its contractors have implemented a number of corrective actions to address these issues. For example:

- At the Pantex Plant, multi-unit nuclear explosive operations remain suspended for the present until further testing and analysis can resolve the concerns or until adequate controls can be developed. Additional

controls have also been imposed on some operations to assure safety given new information regarding electro-static discharge environments.

- At the Hanford Tank Farms, DOE rewrote the Technical Safety Requirements to reinstate key controls (such as Process Control Plans) that the Board had discovered were improperly eliminated. A second independent review was convened to ensure all safety controls had been implemented. The contractor has increased the frequency of taking key tank waste measurements so that current waste conditions were better understood, due to the Board's discovery that the contractor had inadvertently put a tank at risk of retaining and releasing significant quantities of flammable gas.
- DOE is revising the Basis for Interim Operation (BIO) for the WIPP Mobile Waste Characterization and Loading Units to address the significant technical deficiencies identified by the Board, including incorrect modeling of accident scenarios; lack of proper documentation of accident analyses; and potentially inadequate identification and classification of controls for protection of the public and workers.

Recommendation 2002-3. 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 has developed and implemented a plan to improve the reliability and effectiveness of administrative controls that serve safety functions. Recent efforts have focused on development of a draft standard governing the development and implementation of specific administrative controls in the defense nuclear complex. Additionally, DOE has developed a set of training materials to be used to introduce the new and revised requirements to its field elements. The Board continues to work closely with DOE to finalize this guidance to ensure that a proper safety focus is afforded on administrative controls that provide important safety-related functions.

NNSA Training and Qualification. The Board noted concerns with Federal oversight of training and qualification at the Pantex Plant. Most notably, required reviews of contractor training and qualification programs were not being performed. In July, the Board broadened its review to all National Nuclear Security Administration (NNSA) sites, citing the concern that failure to verify the adequacy of training and qualification programs would raise questions regarding the reliability of the significant number of administrative control programs within the NNSA system. In response, NNSA initiated a review at all field sites, and identified three sites, in particular, that did not meet program requirements. However, by August 2004, the Board found that senior NNSA management had not taken prompt action to upgrade the programs at these three sites. A letter to NNSA identified this situation as unacceptable—NNSA was given 45 days to define the bounds of the problem, and 30 days to develop a corrective action plan.

Functions Responsibilities and Authorities (FRA) Documents. The Board continued to follow DOE activities in the closure process associated with Recommendation 98-1, *Resolution of Issues Identified by DOE Internal Oversight*. DOE is also obligated under DOE Manual 411.1, *Safety Management Functions Responsibilities and Authorities (FRA) Manual* to annually update the FRA Manual to reflect changes in organizational responsibilities and authorities. After significant effort on the part of the Board, DOE has developed a credible FRA Manual at the corporate level, and sub-tier FRAs in key DOE organizational elements (e.g., the Office of Environmental Management, and NNSA). The Board will continue to work with the DOE program offices throughout FY 2004 to refine their FRA documents to ensure safety roles and responsibilities are clearly defined.

NNSA's Facility Representative Staffing and Training. In a letter dated May 14, 2004, the Board noted concerns with the insufficient staffing levels of Facility Representatives (FR), and the inadequate level of activity-specific hazards training, at the Pantex Site Office, the Sandia Site Office, and the Los Alamos Site Office. The Board broadened their concern to all NNSA sites, citing a concern that inadequate staffing of FRs at the NNSA sites will result in significant challenges to NNSA's ability to monitor nuclear weapon activities and perform assigned safety responsibilities. In response, NNSA is taking steps to improve its activity-specific hazard training for FRs, and will conduct more rigorous staffing analyses to ensure that staffing levels for NNSA's FRs are sufficient.

8. FINANCIAL TABLES

OBJECT CLASS SUMMARY

Actual obligations for FY 2007, projected obligations for FY 2008 and the Board's Budget Request for FY 2009 are presented by object class accounts in Exhibit D. The Board proposes to utilize the budget resources requested in the following manner:

Salaries and Benefits (Object Class 10)

The FY 2009 request includes funding of \$18,533,694 to support the projected salary and benefit costs for 105 FTEs. The rationale and justification for the additional salaries and benefits costs are explained in detail on page 15. The funding for salaries and benefits represents 70 percent of the Board's FY 2009 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:

- Pay increase of 3.5 percent beginning in January 2008.
- Pay increase of 2.9 percent beginning in January 2009.
- Employee benefits of 25.9 percent of salaries, or \$34,618 per FTE in FY 2009.

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 the Board's mission. The Board has assembled a 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. Most of the technical staff hold technical master's degrees, and approximately 18 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 ten full-time site representatives are stationed at five 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; and 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.

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 Board requests \$920,000 to support the official travel of the Board Members and staff. This amount is consistent with the amount requested in the FY 2008 President's Budget adjusted for inflation and additional FTEs. 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. In FY 2007, Board Members, technical staff, and the Board's outside technical experts made 131 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 during critical construction and testing periods. 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 FY 2009, 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 Facility in Richland, Washington, and the Highly Enriched Uranium Materials 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.

Transportation of Things (Object Class 22)

The Board has included \$280,000 in its FY 2009 Budget Request for the shipment of household goods for employees relocating to the Washington, DC area and/or to become site representatives at DOE.

Rental Payments to GSA (Object Class 23.1)

The Board requests funds totaling \$2,173,851 to reimburse the General Services Administration (GSA) for projected office rental costs. This overhead expense represents approximately 8 percent of the Board's FY 2009 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 \$2.174 million for FY 2009.

Communications and Utilities (Object Class 23.3)

The FY 2009 Budget Request includes \$210,000 for projected communications support costs. 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. 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 budget request includes \$51,000 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 Plant at Hanford. This includes the review of seismic analysis, structural loading, and construction plans to ensure the safety of this \$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 lightning protection, geotechnical investigation, 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 major technical support contracts, with a brief description of each contractor's areas of expertise, and a chart that reflects funding levels for this support are included on pages 91 through 95. The FY 2009 Budget Request includes \$1,100,000 in this account for technical support contracts to assist the Board in its health and safety reviews, consistent with historical obligations, but a \$200,000 increase from the FY 2008 President's Budget, excluding inflation.

The rationale and justification for the additional contract costs are explained in detail in the Executive Summary on page 16.

Other Services (Object Class 25.2)

The budget request includes \$1,760,000 to fund a wide range of recurring administrative support needs of the Board in FY 2009 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. The rationale and justification for the additional other services costs are explained in detail in the Executive Summary on page 16.

Government Services (Object Class 25.3)

The Board's budget request includes \$815,000 for reimbursable support agreements with other federal agencies. The budget request is based on FY 2009 estimates already received from some providers (e.g., Department of Homeland Security for building services) or FY 2008 actual agreement amounts adjusted for inflation. 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, 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 Board requests \$55,000 for maintaining and repairing Board equipment (i.e., copier maintenance agreements, repair of office equipment, etc.).

Supplies and Materials (Object Class 26)

The Board requests \$225,000 for continued access to numerous technical standards databases, legal research services, maintenance of the technical reference information for its library, and for general office supplies and materials.

Acquisition of Assets (Object Class 31)

The Board requests \$375,000 for recurring software licenses/maintenance agreements supporting the Board's operations and to replace outdated office equipment such as computers, printers, and copiers.

The Board's budget request for assets does not include funding for any new systems. It does include a small amount (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 spend on systems enhancement without first ensuring systems meet existing security requirements or will meet them as a result of the enhancement). The Board's life-cycle replacement policy for IT equipment is every three years, with the next replacement scheduled for FY 2011.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

2009 CONGRESSIONAL BUDGET REQUEST

BUDGET ACCOUNT -- (OC) -----	2007 OBLIGATIONS (Actual) -----	FY 2008 FINANCIAL PLAN -----	FY 2009 BUDGET REQUEST -----
PERSONNEL SALARIES -- (11)	\$ 11,303,242	\$ 12,751,356	\$ 14,034,500
PERSONNEL BENEFITS -- (12)	\$ 3,032,701	\$ 4,156,258	\$ 4,499,194
TRAVEL -- (21)	\$ 771,187	\$ 850,000	\$ 920,000
TRANSPORTATION OF THINGS -- (22)	\$ 45,364	\$ 180,000	\$ 280,000
RENTAL PAYMENTS TO GSA -- (23.1)	\$ 2,154,919	\$ 2,148,897	\$ 2,173,851
COMMUNICATIONS & UTILITIES (23.3)	\$ 144,928	\$ 185,000	\$ 210,000
PRINTING & REPRODUCTION -- (24)	\$ 42,373	\$ 50,000	\$ 51,000
ADVISORY & ASSISTANCE SERVICES -- (25.1)	\$ 1,051,556	\$ 1,000,000	\$ 1,100,000
OTHER SERVICES -- (25.2)	\$ 1,678,582	\$ 1,700,000	\$ 1,760,000
GOVERNMENT SERVICES -- (25.3)	\$ 914,216	\$ 750,000	\$ 815,000
OPERATION & MAINT. OF EQUIPMENT -- (25.7)	\$ 51,326	\$ 52,500	\$ 55,000
SUPPLIES & MATERIALS -- (26)	\$ 195,562	\$ 210,000	\$ 225,000
ACQUISITION OF ASSETS -- (31)	\$ 996,784	\$ 325,000	\$ 375,000
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*** TOTAL OBLIGATIONS ***	\$ 22,382,741	\$ 24,359,011	\$ 26,498,545
NEW BUDGET AUTHORITY	\$ 21,914,054	\$ 21,909,000	\$ 25,499,000
UNOBLIGATED BALANCE - PREV. FY	\$ 3,443,743	\$ 3,950,891	\$ 1,500,880
RECOVERY OF PRIOR YR OBLIGATIONS	\$ 975,835	\$ -	\$ -
TOTAL BUDGETARY RESOURCES	\$ 26,333,632	\$ 25,859,891	\$ 26,999,880
EST. UNOBLIGATED BAL. - CUR. FY	\$ 3,950,891	\$ 1,500,880	\$ 501,335
OUTLAYS	\$ 21,244,231	\$ 23,871,831	\$ 25,968,574

Exhibit D

TECHNICAL SUPPORT CONTRACTS SUMMARY

A list of major technical support contracts, with a brief description of each contractor's areas of expertise, follows. The FY 2009 Budget Request includes \$1,100,000 in this account for technical support contracts to assist the Board in its health and safety reviews.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

TECHNICAL SUPPORT CONTRACTS

(Status as of February 6, 2008)

Contractor	Contract Expiration Date	Description of Work
David S. Boyd, Inc.	3/31/08	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 for ongoing operations and maintenance, and also preparations for startup or restart of defense nuclear facilities. Examples of work include supporting review of readiness preparations for restart of at the Pantex Plant and supporting the review of programs and activities at Idaho National Laboratory.
Mr. Richard Collier	9/30/08	Provide expertise related to lightning safety issues at DOE's defense nuclear facilities. These services include assisting the Board in review, analysis, and modeling of lightning protection systems. Examples of work include analysis of the risk presented by lightning in explosive areas and in and around large structures.
Dr. James Jirsa	6/30/08	Provide technical support to the Board, specifically in review and evaluation of concrete structures. These efforts include review of construction designs for structural performance during normal and extreme loading events, natural phenomenon events, and application of national consensus codes and standards.
Mr. Joseph King	3/31/08	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.
Mr. Robert Lewis	3/31/08	Provide technical support to the Board, specifically involving the evaluation of directives and procedures governing operation and maintenance of defense nuclear facilities. In addition, provide technical support evaluating the implementation of Integrated Safety Management for ongoing operations and maintenance, and for preparations for startup or restart of defense nuclear facilities.

Contractor	Contract Expiration Date	Description of Work
Dr. James L. Liverman	6/30/08	Provide technical support to the Board in the general subject area of Integrated Safety Management (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.
Mr. Lary McGrew	6/30/08	Provide expertise related to safety issues associated with those facilities involved in the assembly, disassembly, and testing of nuclear weapons systems. Specifically, advise the Board from direct experience in conventional and nuclear explosive technology and safety, nuclear materials handling and storage, criticality safety, and nuclear weapons assembly, storage and testing. Examples of work include review of the W79 and W56 dismantlement processes and the W78 and W88 assembly and disassembly and inspection processes at the Pantex Plant.
Paul C. Rizzo & Assoc., Inc.	12/31/08	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 various types of analyses performed by DOE contractors, seismological hazards, safety analysis, hydrology, and environmental related issues.
J.D. Stevenson Consulting	12/31/08	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.
D. Volgenau Associates, Inc.	3/31/08	Provide technical support to the Board, specifically involving the evaluation of directives and procedures governing operation and maintenance of defense nuclear facilities. In addition, provide technical support evaluating the implementation of Integrated Safety Management for 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.

**Defense Nuclear Facilities Safety Board Technical Contracts
Obligations By Fiscal Year**

