# FY 2010
# BUDGET REQUEST
# TO THE CONGRESS

## Defense Nuclear Facilities Safety Board

May 2009

# 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 2009 and FY 2010, as well as representative accomplishments for FY 2005 through FY 2008, 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 2010 Congressional Budget Request**

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# 1. INTRODUCTION

## Defense Nuclear Facilities
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## APPROPRIATION & EXPENSE SUMMARY

(Tabular dollars in thousands.)

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OPERATING EXPENSES

| | ACTUAL FOR FY 2008 | FINANCIAL PLAN FOR FY 2009 | BUDGET REQUEST FOR FY 2010 |
|---|---|---|---|
| New Budget Authority | 21,909* | 25,000 ** | 26,086 |
| Obligations | 23,269 | 25,159 | 28,438 |
| Outlays | 22,338 | 24,655 | 27,869 |

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

** P.L. 111-008, "Omnibus Appropriations Act, 2009."

Enabling Statute:

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

As Amended by:

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

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

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

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

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

# Defense Nuclear Facilities
# Safety Board
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## PERSONNEL SUMMARY

| | FY 2008 ACTUAL | FY 2009 FINANCIAL PLAN | FY 2010 BUDGET REQUEST |
|---|---|---|---|
| Statutory Personnel Ceiling: (FTEs) [1/] | 150 | 150 | 150 |
| FTE Usage [2/] | 91 | 100 | 110 |
| Board Members and Permanent Employees at End of Fiscal Year | 95 | 105 | 115 |

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

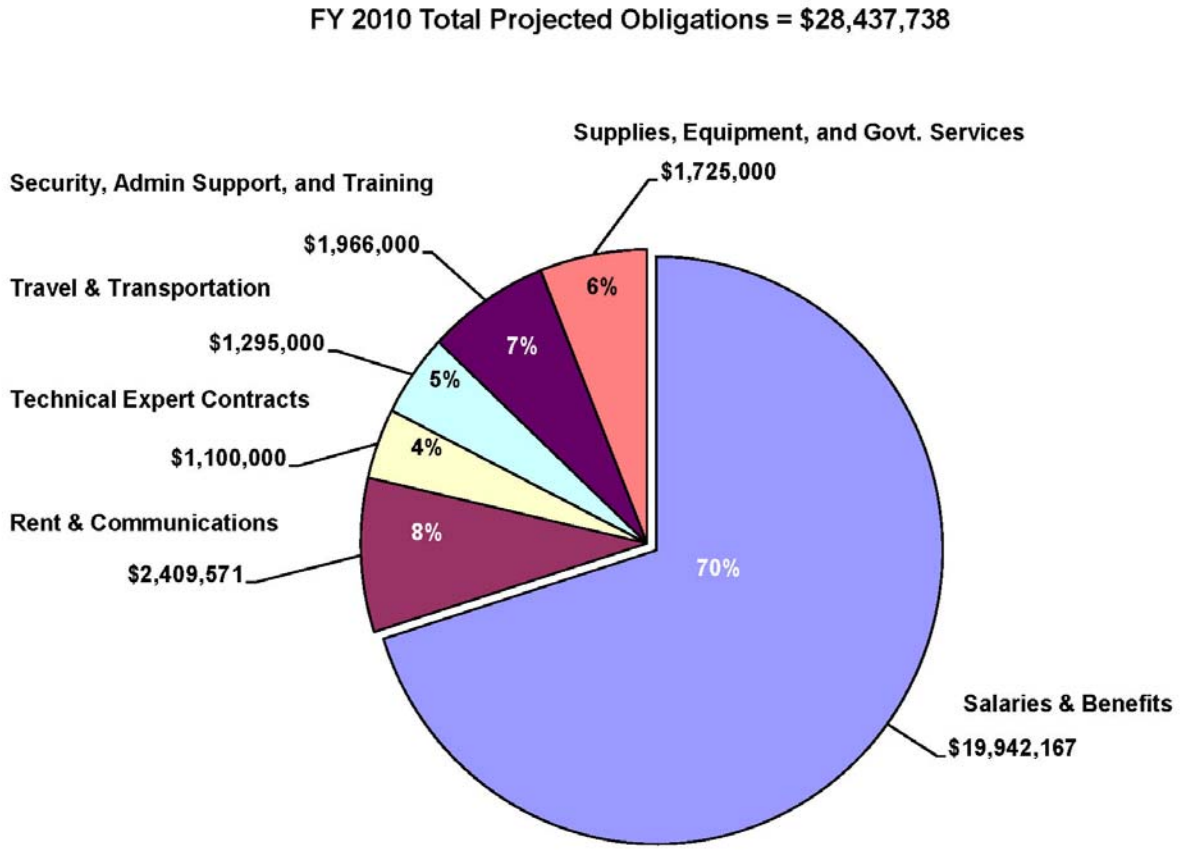
2/ Includes five full-time Board Members appointed by the President, by and with the advice and consent of the Senate.

# Defense Nuclear Facilities
# Safety Board
# FY 2010 Congressional Budget Request

## 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 1441, [$25,000,000] *$26,086,000* to remain available until expended. (*Energy and Water Development and Related Agencies Appropriations Act, 2009.)*


FY 2010 Total Projected Obligations = $28,437,738
Supplies, Equipment, and Govt. Services
$1,725,000
6%
Security, Admin Support, and Training
$1,966,000
7%
Travel & Transportation
$1,295,000
5%
Technical Expert Contracts
$1,100,000
4%
Rent & Communications
$2,409,571
8%
70%
Salaries & Benefits
$19,942,167

# Budget Request Summary

The Board's FY 2010 Budget Request for $26,086,000 and 110 FTEs includes funding for statutory increases in civilian salaries and associated employee benefits (i.e., employer contributions to employee health benefit and retirement accounts, matching Thrift Savings Plan contributions, etc.), as well as additional funding for recurring cost increases the Board experienced in FY 2010 that were not reflected in the FY 2009 President's Budget. A brief description of each requirement and associated funding request follows (a full explanation is included on the referenced page number):

| | New Budget Authority | FTEs | Page Ref. |
|---|---|---|---|
| **Baseline - FY 2009 New Budget Authority** | $25,000,000 | 105 | |
| **Funding for full impact of FY 2009 civilian pay raise in FY 2010.** [Note: this amount is the difference between the 2.9 percent pay increase included in the President's FY 2009 Budget and the enacted 3.9% pay increase—includes impact on employee benefits.] | $124,000 | | 9-10 |
| **Funding for the assumed 2.0% civilian pay raise effective in January and other salary adjustments.** [Note: budget projection based on paying increased salaries and benefits for nine months in FY 2010 for a 2% federal pay raise and other salary adjustments.] | $375,000 | | 9-10 |
| **Funding for additional FTEs to meet increasing workload in FY 2010 as a result of Congressional direction for increased oversight, increased activity at DOE defense nuclear facilities, and increased review of DOE Publications.** [Note: in response to Congressional demands (e.g., The Duncan Hunter National Defense Authorization Act of 2009) to improve the integration of safety early in the design process, the Board's 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 is increasing.] | $1,100,000 | 5 | 6-9 |
| **Funding for increased acquisition of assets.** [Note: budget projections for increased costs resulting from three year refreshment of IT equipment, renewal of Microsoft Enterprise License Agreement, and upgrade of network infrastructure.] | $300,000 | | 10 |
| **Funding for inflation (non-personnel accounts).** [Note: based on an assumed .5% increase due to inflation in non-personnel accounts, (e.g., other services, supplies and materials, etc.] | $40,000 | | 10 |

| | New Budget Authority | FTEs | Page Ref. |
|---|---|---|---|
| **Less: Change in Unobligated Balances.** [Note: increase in unobligated balance available as a budgetary resource in lieu of required new budget authority.] | ($853,000) | 5 | |
| **Total Additional Funding Requirements in FY 2010 Budget Request.** | **$1,086,000** | | |
| **FY 2010 New Budget Authority.** | **26,086,000** | **110*** | |

* Note: this represents a prorated value as the Board ramps up to 115 FTEs.

# 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 2010, the Board is requesting a total of $26,086,000 in new budget authority and 110 FTEs. Within this request, the Board seeks additional budget funding of $1,086,000, which will support the salary and benefits needs for the increased staff and help offset the impact of nondiscretionary cost-of-living pay adjustments and other inflation-based cost increases for the Board's existing positions.

In FY 2010, the Board will continue to evolve its health and safety oversight plan 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 is performing safety oversight on more than 20 DOE design and construction projects with an estimated value of more than $20 billion, including $12.2 billion for the Hanford Waste Treatment Plant. 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.

Second, the Board's Congressional oversight and appropriations committees have continued to demand that the Board increase both the scope and pace of its independent health and safety oversight reviews at <u>all</u> 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 have called upon the Board to apply its health and safety expertise at higher and higher levels. In perhaps the ultimate expression of the demand for the Board's unique capabilities the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Public Law 110-417, enacted a limitation on funding for the Chemistry and Metallurgy Research Replacement (CMRR) Project at Los Alamos National Laboratory until the Board and the National Nuclear Security Administration (NNSA) each certify that certain design issues reported by the Board have been resolved. Certification involves a level of rigor and expenditure of resources that is an order of magnitude greater than typical review activities.

Third, in early 2009, the DOE Office of Management revised DOE Order 251.1B, *Departmental Directives Program*, which establishes the framework for the entire DOE directives program and is a key safety directive. As a result of this revision, DOE will reissue all documents containing safety requirements during the coming years. This will be another resource intensive and time consuming task for the Board as it ensures DOE properly reissues appropriate safety related DOE directives while preserving the nuclear safety requirements that

have been painstakingly developed in the course of more than 60 years of nuclear operating experience.

The Board included a request for 105 FTEs in its FY 2009 Budget Request and explained in detail the rationale behind that request. As a result, the Board instituted an intense recruiting program that is expected to result in an on-board strength of at least 106 personnel in FY 2009. To meet the continued growth in scope and pace of oversight activities, the Board includes funding for five additional FTEs in its FY 2010 Budget Request.

The Board notes that the cost of re-engineering and making post-construction modifications to complex DOE defense nuclear facilities, due to the late identification of significant design flaws that could impact public and worker health and safety, would require significantly more resources than the 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. With DOE's design and construction budget exceeding $20 billion, each increase in project cost of one percent (1%) equates to a minimum increase of $200 million. Increases in project cost well in excess of this amount have driven the Congress, as evidenced by Public Law 110-417, to insist on identification of safety issues and their resolution early in the design stage. In this context, the Board provides cost-effective oversight.

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 2010 budget request of $26,086,000 in new budget authority and 110 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 2010 CONGRESSIONAL BUDGET REQUEST

| *FY 2010 Request Summary* | *Permanent Positions* | *FTE* | *Amount ($000)* |
|---|---|---|---|
| FY 2008 Actual | 95 | 91 | $21,909 |
| FY 2009 New Budget Authority | 105 | 105 | $25,000 |
| 2010 Budget Request | 115 | 110 | $26,086 |
| Total change 2009-2010 | 10 | 5 | $1,086 |

## 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 B), the Board plays a key role in maintaining the future viability of the Nation's nuclear deterrent capability by:

- Ensuring that the health and safety of the public and 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.** Stewardship and maintenance of the nuclear weapons stockpile, including assembly and disassembly, evaluation, maintenance, and dismantlement of nuclear weapons and the storage of special nuclear material, particularly plutonium pits.

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

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

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

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

- **Nevada Test Site in Nevada.** Stewardship of the nuclear weapons stockpile, including subcritical experiments and criticality experiments, and the packaging and disposal of radioactive waste.

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

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

- **Idaho National Laboratory (INL) in Idaho.** Storage and stabilization of high-level waste, 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 Plant (WIPP) in New Mexico.** Receipt, handling, and permanent deep geological disposal of transuranic wastes.

## The Risks

The potential for release of hazardous materials to the environment 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 must be equal to the challenges provided by earthquakes, extreme winds, floods, lightning, and other such natural phenomena.

Other potential release mechanisms include inadequate safety controls in new and old facility designs, human errors, equipment malfunctions, chemical reactions, fire, detonation of explosives, and inadvertent nuclear criticality events. Many DOE facilities continue to contain sufficient amounts of fissionable material such that the risk of an accidental nuclear criticality exists and must be controlled. Chemical reactions in materials used in 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. **Technical Nuclear Safety Oversight** is the number one priority for the Board and encompasses activities as outlined in the Board's enabling legislation and other Congressional direction included in authorization and/or appropriations legislation. As will be discussed in more detail later in this budget request, the Board focuses its Technical Nuclear Safety Oversight through four interdependent strategic goals:

Strategic Goal # 1: Safe Nuclear Weapons Operations

Strategic Goal # 2: Effective Nuclear Safety Programs and Analysis

Strategic Goal # 3: Safe Processing and Stabilization of Nuclear Material

Strategic Goal # 4: Safety in Nuclear Facilities Design and Infrastructure

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

Strategic Goal # 5: Management Excellence

**Human Capital - The Board's Greatest Asset**

Seventy 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. Virtually all of the technical staff personnel have technical master's degrees; those personnel who do not are actively pursuing graduate degrees. Approximately 20 percent of the Technical staff has 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.

As of the date of this budget request, the Board increased its staff from 95 personnel at the beginning of FY 2009 to 105 encumbered positions. All five Board Member positions are filled. The Board continues to make hiring exceptional technical talent a priority and plans to achieve full manning of 106 personnel by the end of FY 2009.

Building on its hiring successes of 2007 and 2008, the Board continues an aggressive approach, reaching 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 14.5 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 the commercial nuclear industry 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 the need 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 2009, three personnel will start the PDP program.

**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 requested workforce ceiling of 110 FTE will increase 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 2010, the Board will need an additional 5 additional FTEs and a $1,086,000 budget increase in order to meet a significant increase in its safety oversight responsibilities and corresponding workload. A summary follows:

- **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. For example, the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Public Law 110-417, enacted a

limitation on funding for the Chemistry and Metallurgy Research Replacement Project at Los Alamos National Laboratory until the Board and the National Nuclear Security Administration (NNSA) each certify that certain design issues reported by the Board have been resolved. The pertinent language reads as follows:

*SEC. 3112. LIMITATION ON FUNDING FOR PROJECT 04-D-125 CHEMISTRY AND METALLURGY RESEARCH REPLACEMENT FACILITY PROJECT, LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NEW MEXICO.*

*Of the amounts appropriated pursuant to an authorization of appropriations in this Act or otherwise made available for fiscal year 2009 for Project 04-D-125 Chemistry and Metallurgy Research Replacement (in this section referred to as ''CMRR'') facility project, Los Alamos National Laboratory, Los Alamos, New Mexico, not more than $50,200,000 may be made available until (1) the Administrator for Nuclear Security and the Defense Nuclear Facilities Safety Board have each submitted a certification to the congressional defense committees stating that the concerns raised by the Defense Nuclear Facilities Safety Board regarding the design of CMRR safety class systems (including ventilation systems) and seismic issues have been resolved; and (2) a period of 15 days has elapsed after both certifications under paragraph (1) have been submitted.*

The Board is applying significant effort toward accomplishing this certification. The Board has initiated review of design documentation supplied by NNSA and has established a process that will allow NNSA and the Board to reach mutual agreement on issues identified by the Board. Efforts such as these require additional FTEs.

- **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 projects to build nuclear material waste treatment facilities (Exhibit A). The Board is required by law to review DOE's design and construction projects to ensure that the health and safety of the public and workers is addressed early in the design process. In FY 2010, the Board will be required to expend considerable resources to review ongoing design efforts, as well as construction activities. More DOE defense nuclear facility design and construction projects are planned for the near future.

- R**eview of DOE Directives.** During 2008, the DOE Office of Management worked to revise DOE Order 251.1B, *Departmental Directives Program*, to comply with the principles the Secretary of Energy outlined in a memorandum of September 10, 2007. This order was signed in January 2009. Because DOE Order 251.1B establishes the framework for the entire directives program, it affects all DOE safety directives. Further, DOE's Office of Health, Safeguards, and Security (HHS) has been leading a multi-phased, multi-year effort to review and streamline key safety directives to ensure they meet the Secretary of Energy memorandum on an individual basis. Five key directives underwent this intensive red team review process in 2008; this cycle will also continue for the next several years, demanding rigorous attention by the Board and its staff to maintain the standing of the requisite nuclear safety requirements.

The resources implications of these revision efforts are potentially significant. As DOE reissues its directives to comply with the new program, and continues the HHS directive-by-directive reviews, the Board will need to review all of them to ensure health and safety requirements are properly included in the new directives.

## 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 2010. For FY 2010, the Board requires additional staffing in two areas.

- Experienced engineers to perform oversight functions to meet the Board's four technical safety oversight goals (Safe Nuclear Operations, Effective Nuclear Safety Programs and Analysis, Safe Processing and Stabilization of Nuclear Materials, and Safety in Nuclear Facilities Design and Infrastructure) to meet the increased workload generated by DOE. The Board estimates this additional level of effort to be three FTEs for FY 2010.

- Experienced engineers with backgrounds in safety standards who can review new DOE safety documents to ensure policies and procedures have been properly transferred from current orders, manuals, and other documents. The Board estimates that for FY 2010, this level of effort will increase the Board's workload by two FTEs.

## Additional Funding Needs

In addition to the funding needed for the increased 10 positions (5 FTEs) 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 2009 and to compensate for the assumed January 2010 pay raise. It also includes funding for inflationary cost increases to non-personnel accounts, as well as for projected cost increases in IT assets. Fortunately, as shown in the Introduction (pages vi-vii), $853,000 in increased carryover from the previous fiscal year is projected to be available as

a budgetary resource, so that a $1,086,000 (4.3%) increase in new budget authority is necessary. An explanation of each requirement and associated funding impact and object class (OC) is discussed as follows:

- **Fully Fund the Salaries and Benefits Account for FY 2010 (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 impacts of the enacted 3.9 percent and assumed 2.0 percent increases in January 2009 and January 2010, respectively. An additional $124,000 is needed to fund the full impact of the FY 2009 civilian pay raise at the enacted 3.9 percent level for FY 2009, and an additional $375,000 is needed to fund the President's assumed FY 2010 civilian pay raise of 2.0 percent. With the additional new budget authority, the Board would be able to support the increased personnel costs needed to carry out its responsibilities.

- **Funding for Acquisition of Assets Costs (OC 31)**

  For FY 2010, the Board is requesting an additional $300,000 in new budget authority for increased equipment and software costs that were not required in FY 2009. The Board "refreshes" its IT equipment on a three year schedule, with the last equipment refresh in FY 2007. Thus, the Board plans to replace its desktop computers in FY 2010 and has estimated $135,000 for that effort based on a 135 computers at $1,000 each. In addition, the Board's 3-year Enterprise License Agreement for Microsoft products (which was purchased in FY 2007 for $189,000) expires in FY 2010, and the Board has budgeted $65,000 for a one year extension. Finally, core components of the Board's internal network infrastructure, including all routers and switches, have exceeded their service life and increasingly prone to failure. The budget request includes $100,000 for replacement of ten telephone switches and related equipment. These cost increases include meeting new NIST and OMB security requirements to protect PII (Personal Identifying Information) and other sensitive information. In total, these additional requirements result in $300,000 in additional costs, which were not factored into the FY 2009 President's Budget, requiring new budget authority in that amount.

- **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 $40,000 in new budget authority to fund these increased costs. The estimate was based on .5% 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 FY 2010, the Board is requesting a total of $26,086,000 in new budget authority, and 110 FTEs.

The Board understands that the cost of re-engineering and making post-construction modifications to complex DOE defense nuclear facilities, due to the late identification of significant design flaws that could impact public and worker health and safety, would require significantly more resources than requested for the Board's safety oversight. 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 more than $20 billion in new DOE design and construction. Each increase in project cost of one percent (1%) equates to a minimum increase of $200 million. Increases in project cost well in excess of this amount have driven the Congress, as evidenced by Public Law 110-417, 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 $26.086 million in new budget authority and 110 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 – February of 2009 | | |
|---|---|---|---|---|---|
| | | | Critical Decision Approved | Design Completion | Construction Completion |
| **Hanford Site** | **Waste Treatment Plant** | 12,263 | | | **(*Operational 2019*)** |
| | a. Pretreatment Facility | | CD-3 | 67% | 25% |
| | b. High Level Waste Treatment Facility | | CD-3 | 86% | *21%* |
| | c. Low Activity Waste Facility | | CD-3 | 95% | *63%* |
| | d. Analytical Laboratory Facility | | CD-3 | 91% | *55%* |
| | **K-Basin Closure Project Sludge Treatment** | 220 (Estimated using new conceptual design) | Returned to CD-0 | 0% | ***(Operational to be determined)*** |
| | **Large Package and Remote Handled Waste Packaging Facility** | 390 | CD-0 | 0% | Deferred ***(Operational to be determined post-2016)*** |
| | **Tank Retrieval and Waste Feed Delivery System** | 1,140 | One sub-project not using the formal CD process. | Various degrees of completion. | Various degrees of completion and operations |
| **Idaho National Laboratory** | **Integrated Waste Treatment Unit project** | 570.9 | CD-3 | >90% | 20% ***(Operational 2011)*** |
| **Los Alamos National Laboratory** | **Chemistry and Metallurgy Research Replacement Project** | 725 - 975 Being Reevaluated | CD-1 | 90% | Some ground work **(*Operational 2016*)** |
| | **Technical Area 55 Reinvestment Project** | 72 | Phase A: CD-2<br>Phase B: CD-0 | Various degrees of completion | **(*Complete 2010*)**<br>**(*Complete 2015*)** |
| | **Upgrades to Pit Manufacturing Capability at Tech Area 55** | Annual funding | Not formally implementing critical decision process | Various degrees of completion | Work ongoing |
| | **Radioactive Liquid Waste Treatment Facility Upgrade Project** | 119-172 | CD-1 | 35% | **(*Operational 2014*)** |

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|---|---|---|---|---|---|
| | **New Solid Transuranic Waste Facility Project** | 133-199 | CD-0 | 60% | **(*Operational 2012*)** |
| | **Nuclear Material Safeguards and Security Upgrades Project Phase 2** | 240 | CD-1 | 30% | **(*Operational 2013*)** |
| | **Technical Area 55 Radiography Project** | 38 | CD-0 | 90%<br>on hold | ***On hold*** |
| **Nevada Test Site** | **Device Assembly Facility -- Criticality Experiments Facility** | 150 | CD-3 | 100% | 85%<br>**(*Operational 2010*)** |
| **Oak Ridge National Laboratory** | **Building 3019 -- Uranium-233 Downblending and Disposition Project** | 477 | CD-2/3A | 60% | **(*Operational 2012*)** |
| **Pantex Plant** | **Weapon Surveillance Facility (previously called Component Evaluation Facility)** | 112 | CD-0 | On hold | ***(Operational on hold)*** |
| **Savannah River Site** | **Pit Disassembly and Conversion Facility** | 2,400–3,200 | CD-1 | 50% | ***(Operational on hold)*** |
| | **Salt Waste Processing Facility** | 1,340 | CD-3 | 90% | Facility concrete placement started<br>**(*Operational 2013*)** |
| | **Plutonium Preparation Project** | 340-540 | CD-1A | 10% | ***(Operational 2014)*** |
| | **Waste Solidification Building** | 345 | CD-2/3 | 100% | ***(Operational 2013)*** |
| **Y-12 National Security Complex** | **Highly Enriched Uranium Materials Facility** | 549 | CD-3 | 100% | 92%<br>***(Operational 2009)*** |
| | **Uranium Processing Facility** | 1,400-3,500 | CD-1 | 10% | ***(Operational 2017)*** |

## Exhibit B. The Board's Legislative Mandate

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

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

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

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

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

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

# Annual Performance Budgeting Objectives for Fiscal Year 2010

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

The Board's Strategic Plan presents the four 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 2009 and FY 2010 that, when executed, will demonstrate continued progress toward the Board's goals. These annual performance objectives and measures establish projected levels of performance and reflect the nature of the Board's independent oversight function.

The Board's objectives as outlined in its strategic plan address multi-year efforts and encompass a broad spectrum of technical areas relevant to the safety of DOE's defense nuclear mission. This submission includes the Board's *Annual Performance Plan for FY 2010* 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 2009 and FY 2010. To place this planning information in context, the performance goals are followed by examples of the Board's accomplishments during the years FY 2005 through FY 2008, as required by OMB's instructions on preparing and submitting a performance budget.

A comprehensive assessment of progress during Calendar Year (CY) 2008 appears in the Board's *Nineteenth Annual Report to Congress*. The Board's annual performance reports are available for review on the Internet at www.dnfsb.gov under the *Public Documents/Reports to Congress* search headings.

## 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 FY 2010. 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 FY 2010 will include:

- *Nuclear Explosive Operations*—DOE's efforts to maintain an increased operational tempo at Pantex are expected to continue, due to life extension programs for aging weapon systems as well as the need to dismantle retired weapons as the nuclear weapons stockpile is reduced. 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 achieve readiness and be prepared to begin nuclear explosive operations at the Device Assembly Facility at NTS in FY 2009 and FY 2010, respectively. 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 and 2010.

- *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. Progress is being made, but 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.** |
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**FY 2010 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, W76, W84, and W88).
- Nuclear explosive operations at Pantex (e.g., conduct of operations, procedures, lightning protection, electrostatic discharge controls), and adequacy of the Nuclear Explosive Safety Study process.
- Laboratory support of nuclear explosive operations at Pantex (e.g., sensitivity testing of high explosives, electrostatic discharge and lightning protection studies, 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).
- Readiness activities for the Highly Enriched Uranium Materials Facility.
- Modernization plans for Y-12, including startup of 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.
- Nuclear explosive operations at the Device Assembly Facility at NTS.
- Readiness for Criticality Experiments Facility operations at the Device Assembly Facility at NTS.
- Authorization of SNL Auxiliary Hot Cell Facility and the Radioactive Mixed Waste Management Facility as Hazard Category 3 facilities.
- Instrumentation upgrade for SNL Annular Core Research Reactor.
- Authorization of criticality experiments at SNL Sandia Pulsed Reactor Facility.
- 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 2010.

| Performance Goal 1 | **Nuclear Weapon Operations.** DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of health and safety of the workers and the public. |
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**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, W76, W84, and W88).
- Nuclear explosive operations at Pantex (e.g., conduct of operations, procedures, lightning protection, electrostatic discharge controls), and adequacy of the Nuclear Explosive Safety Study process.
- Laboratory support of nuclear explosive operations at Pantex (e.g., sensitivity testing of high explosives, electrostatic discharge and lightning protection studies, weapon response evaluation and documentation).
- Review of CASTLE software which is to be used to exchange, store, and update safety basis information for various weapon programs.
- 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.
- Authorization of SNL Auxiliary Hot Cell Facility and the Radioactive Mixed Waste Management Facility as Hazard Category 3 facilities.
- Instrumentation upgrade for SNL Annular Core Research Reactor.
- Authorization of criticality experiments at SNL Sandia Pulsed Reactor Facility.
- 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. |
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**FY 2008 Performance Accomplishments**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Nuclear Criticality Safety at LANL.** The Board has provided safety oversight of the laboratory's attempt to develop a standards-based nuclear criticality safety program. During 2007, the Board assessed operations in the Plutonium Facility's vault for special nuclear materials and issued a letter on September 10, 2007, expressing concern over the laboratory's Materials Accountability and Safeguards System software and the criticality safety documentation for the vault. Subsequent to these questions, the laboratory determined the adequacy of some criticality safety evaluations to be in doubt. As a result, fissile material operations were paused until limits were reviewed and confirmed to be defensible.

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

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

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

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

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

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

| Performance Goal 1 | **Nuclear Weapon Operations.** DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of health and safety of the workers and the public. |
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**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. |
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**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. |
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**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 onsite 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 12,000$^{th}$ 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.

# 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 closed its Recommendation 94-1, *Improved Schedule for Remediation*, as all commitments under this Recommendation had been met by DOE or encompassed in Recommendation 2000-1, *Prioritization for Stabilizing Nuclear Materials*. Five milestones remain open under the Implementation Plan for Recommendation 2000-1: one at Hanford and four at Los Alamos National Laboratory. DOE originally intended to complete stabilization of all materials identified under Recommendation 2000-1 by December 2009, but this schedule will likely be delayed. The Board also closed its Recommendation 97-1, *Safe Storage of Uranium*-233, following DOE's fulfillment of all commitments under the associated Implementation Plan. At Oak Ridge National Laboratory, engineers are moving forward with the design of a process to downblend the inventory of uranium-233 in Building 3019 prior to shipment offsite for disposal.

*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*. One of the more significant of these activities is the consolidation and disposition of plutonium-bearing materials at the Savannah River Site. After years of evaluation and planning, DOE has demonstrated some progress. The National Nuclear Security Administration approved the establishment of the Office of Nuclear Materials Integration. The mission of this office is to support and integrate DOE's activities to consolidate or disposition nuclear materials, and it will replace the Nuclear Materials Disposition and

Consolidation Coordination Committee. The new office will also coordinate DOE's new *Management of Nuclear Materials* Order. The Board plans to conduct a thorough review of this document when it enters the formal review and comment system.

*High-Level Waste (HLW) Retrieval and Processing*—Workers at the Hanford Site, Savannah River Site and the Idaho Cleanup Project 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. DOE continues to 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. The Board plans close oversight of these waste retrieval operations, as well as the development, design, and operation of planned treatment facilities. The Board also continues to evaluate the structural integrity of the HLW tanks and to work closely with DOE's tank expert panel to plan and interpret corrosion testing and improve everyone's understanding of the factors affecting tank integrity. These activities will require a substantial share of the Board's resources for the indefinite future.

*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 had planned to complete removal of the sludge from the K-Basins by November 2009. However, several project management and engineering difficulties led DOE to return the project to the conceptual design phase. DOE plans to identify a new completion date as the project progresses through the critical decision process. During 2009, the Board will review the conceptual design for the sludge stabilization and packaging systems.

*Transuranic (TRU) Waste Management*—DOE stores large quantities of contact-handled (lower activity) TRU wastes on concrete pads and in soil-covered trenches at many sites. DOE has been retrieving these wastes for shipment to the Waste Isolation Pilot Plant (WIPP) for disposal since 1999. DOE has completed shipping most of the lower activity TRU wastes from Oak Ridge National Laboratory and the Savannah River Site to WIPP. What remains are drums and boxes of waste containing prohibited items and other hazardous materials that pose a greater risk to the workers and slow the retrieval work considerably. The Board will continue to provide increased oversight for these hazardous operations.

In addition, DOE stores significant quantities of remote-handled (higher activity) TRU waste in temporary storage at several of these same sites. DOE began shipment of the first of this remote-handled TRU waste from the Idaho Cleanup Project to WIPP in early 2007. DOE plans similar shipments from Oak Ridge National Laboratory in 2008 and from several other sites in the following years. The Board plans close oversight of these activities.

*Deactivation and Decommissioning (D&D)*—Although DOE curtailed its D&D activities in recent years, the Board expects that these activities will ramp up again soon. DOE owns and manages thousands of nuclear facilities that have been or will soon be deactivated and will need to be decommissioned and demolished. These activities present significant hazards that are often not well characterized, and warrant close oversight by the Board. The Board expects to increase its review of D&D activities at many DOE sites.

| 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. |
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**FY 2010 Performance Objectives**

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

- H-Canyon processing campaigns, life extension activities, and documented safety analysis upgrades.
- Long-term storage of neptunium oxides at the Idaho National Laboratory (INL) (Recommendation 2000-1).
- Complex-wide consolidation and disposition of special nuclear materials.
- Stabilization and disposal of plutonium-bearing residues at Los Alamos National Laboratory (LANL) (Recommendation 2000-1).
- Safety of efforts to consolidate, store, and disposition spent nuclear fuel at Hanford, INL, and SRS.
- Preliminary design of systems to treat and store spent nuclear fuel sludge at the Hanford Site (Recommendation 2000-1).
- Safety oversight of final design, construction, and preliminary startup activities for modifications to Building 3019 at Oak Ridge National Laboratory in preparation for processing of uranium-233.
- 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).
- Removal and processing of salt waste from HLW tanks by the Interim Salt Disposition Project at SRS.
- Closure of HLW Tanks 5, 6, 18, and 19 at SRS.
- HLW tank structural integrity at SRS and the Hanford Site and application of the results of DOE's corrosion testing program to corrosion chemistry controls.
- Operation of HLW retrieval and transfer systems at the Hanford tank farms.
- Conduct of operations and work planning at the Hanford Site.
- Safety of supplemental processing and treatment of waste from Hanford tanks.
- Handling and packaging of remote-handled transuranic (TRU) waste at Oak Ridge National Laboratory.
- TRU waste disposal operations at the Waste Isolation Pilot Plant.
- Retrieval, characterization, and packaging of contact-handled TRU waste at Hanford, LANL, NTS, SRS and the Idaho Cleanup Project.
- Deactivation and decommissioning of facilities throughout the DOE defense nuclear complex.

| 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. |
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**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:

- H-Canyon processing campaigns, life extension activities, and documented safety analysis upgrades.
- Long-term storage of neptunium oxides at the Idaho National Laboratory (INL) (Recommendation 2000-1).
- Complex-wide consolidation and disposition of special nuclear materials.
- Stabilization and disposal of plutonium-bearing residues at Los Alamos National Laboratory (LANL) (Recommendation 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 (Recommendation 2000-1).
- Safety of design and construction of modifications to Building 3019 at Oak Ridge National Laboratory in preparation for processing of uranium-233.
- 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).
- Removal and processing of salt waste from HLW tanks by the Interim Salt Disposition Project at SRS.
- Final cleanout of selected HLW tanks at SRS.
- HLW tank structural integrity at SRS and the Hanford Site and application of the results of DOE's corrosion testing program to corrosion chemistry controls.
- Operation of HLW retrieval and transfer systems at the Hanford tank farms.
- Conduct of operations and work planning at the Hanford Site.
- Implementation of lessons learned from the waste spill at the Hanford tank farms.
- Safety of supplemental processing and treatment of waste from Hanford tanks.
- Safety of the retrieval, characterization, and packaging of contact-handled transuranic (TRU) waste at Hanford, LANL, NTS, SRS and the Idaho Cleanup Project.
- Handling and packaging of remote-handled TRU waste at the Idaho Cleanup Project and Oak Ridge National Laboratory.
- TRU waste operations at the Waste Isolation Pilot Plant.

| 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. |
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**FY 2008 Performance Accomplishments**

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

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

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

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

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

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

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

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

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

**Corrective Actions from Waste Spill at Hanford Tank Farms.** Following the spill of radioactive wastes at Hanford's Tank Farms in July 2007, DOE completed several investigations and issued corresponding corrective action plans. The Board conducted reviews of the adequacy of the corrective actions and the implementation of those actions. The Board identified several concerns and made observations regarding conduct of operations, emergency management, oversight, and the issues management program. DOE is working to resolve the issues. The Board also monitored the spill clean-up efforts that were completed in July 2008.

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

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

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

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

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

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

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

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

| Performance Goal 2 | **Nuclear Material Processing 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. |
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**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. |
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**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 layup 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 layup 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. |
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**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.

# 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 2010 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 2010 in this strategic area of concentration are:

- Ensure adequate design and construction of the Waste Treatment Plant at the Hanford Site.
- Ensure adequate construction of the Integrated Waste Treatment Unit to treat sodium-bearing waste at Idaho National Laboratory.
- Ensure adequate design of the Chemistry and Metallurgy Research Replacement Project at Los Alamos National Laboratory.
- Ensure adequate design of the Radioactive Liquid Waste Treatment Facility Upgrade Project at 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 the Savannah River Site.

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

- Ensure adequate design of the Plutonium Preparation Project for disposition of plutonium-bearing materials at the Savannah River Site.

- Review safety system functional testing and preparations for the start of operations of the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex.

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

**Challenges for the Board's Safety Oversight:**

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

The Board has 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 are often expensive and cause schedule slippage. In December 2005, the Board held the first of 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 and resolution of technical issues.

Many of the actions needed to better incorporate safety into the design and construction of new nuclear facilities are beginning to take place. In March 2008, DOE published DOE Standard 1189, *Integration of Safety into the Design Process*. The Board was actively involved with the development of the standard. This standard establishes DOE's expectations for identifying and resolving safety issues earlier in the design process and clarifies expectations

associated with seismic design criteria, protection of co-located workers, and the significance of developing a safety design strategy early in the project life cycle. The Board expects that as this standard is fully implemented, consistent with the strategy outlined in the Joint Report to Congress dated July 19, 2007, the important safety aspects of the design will be addressed earlier. If issues arise, they will be addressed and resolved earlier and without the significant cost or schedule impacts that have been historically observed.

Further, the Board has become more proactive in identifying safety issues early in the design process and in assisting DOE to develop potential corrective actions. The Board's interactions with DOE on its defense nuclear projects must occur earlier in the design stages, contributing to the Board's need for additional resources. The Board intends to continue issuing a periodic report to Congress that identifies the Board's issues with new nuclear facilities. This report forms the basis for periodic discussions between the Board and DOE to help ensure DOE senior managers, project personnel and the Board share a common understanding of the Board's issues and actions needed to resolve the issues.

The Board's reviews of the design and construction of major facilities and projects are resource intensive and time consuming but result in significant safety improvements. The Board's early involvement in the design effort requires multiple reviews of safety systems to assess whether they are meeting design expectations. 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 four major nuclear facilities to pretreat and vitrify waste from the Hanford high-level waste tank farms. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.

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

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

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

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

- **Nevada Test Site** - Criticality Experiments Facility - A facility within the Device Assembly Facility to which the criticality experiment and complex-wide criticality training capabilities from TA-18 at Los Alamos National Laboratory are being transferred. HIGH SIGNIFICANCE, HIGH COMPLEXITY, MODERATE RISK.

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

- **Pantex Plant** - Weapon Surveillance Facility: new bay complex that will increase the Pantex Plant's existing capacity and provide new capabilities for the surveillance and requalification of weapons and weapon components. MODERATE SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.

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

- **Savannah River Site** - Pit Disassembly and Conversion 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** - Plutonium Preparation Project: to provide equipment and upgrades to the K-Area complex to prepare excess plutonium to allow disposition via either the H-Canyon facility or the MOX Fuel Fabrication Facility. 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 Fuel Fabrication Facility. MODERATE SIGNIFICANCE, LOW COMPLEXITY, LOW 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. |
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**FY 2010 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 conceptual design for the Large Package and Remote Handled Transuranic and Mixed Waste Facility at Hanford.
- Review construction and preparations for startup of the Integrated Waste Treatment Unit at Idaho National Laboratory.
- Review the final design of the Chemistry and Metallurgy Research Replacement facility at Los Alamos National Laboratory.
- Review the construction of the Radioactive Liquid Waste Treatment Facility Replacement Project at Los Alamos National Laboratory.
- Continue design and construction reviews 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 Savannah River Site.
- Review construction of the Salt Waste Processing Facility at Savannah River Site.
- Review the design of the Plutonium Preparation Project at Savannah River Site.
- Continue review of preparations for start of operations for the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex.
- Complete review of the preliminary design of the Uranium Processing Facility at the Y-12 National Security Complex. Review the final design supporting Site Preparation and Long-Lead Procurement.

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. |
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**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.
- Complete review of the design and continue construction reviews of the Integrated Waste Treatment Unit at the Idaho National Laboratory.
- Review the preliminary design of the Chemistry and Metallurgy Research Replacement facility at Los Alamos National Laboratory. Assess readiness to proceed into final design and initiate review of the final design.
- Review the design of the Radioactive Liquid Waste Treatment Facility Replacement Project at Los Alamos National Laboratory.
- Review design and construction activities for 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 Savannah River Site.
- Review the final design of the Waste Solidification Building at Savannah River Site.
- Complete review of the final design and review the construction of the Salt Waste Processing Facility at Savannah River Site.
- Review the design of the Plutonium Preparation Project at Savannah River Site.
- Continue safety system reviews and review preparations for start of operations for the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex.
- Continue reviews of 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.

Safety-in-Design. The Board will monitor DOE's implementation of DOE-STD-1189, *Integration of Safety into the Design Process*, and updates to DOE directives that have been identified as critical to successful implementation of DOE's overall safety-in-design objectives. These include updating the facility safety directive, seismic design standards, and the standard used to prepare nuclear safety design bases.

| 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. |
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**FY 2008 Performance Accomplishments**

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

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

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

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

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

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

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

**Demonstration Bulk Vitrification Facility at the Hanford Site.** The Board had identified concerns with the confinement strategy being developed for the nuclear wastes that would be processed in the Demonstration Bulk Vitrification Facility at the Hanford Site. DOE and project personnel revised the confinement strategy, leading to improvements in the confinement design for the facility. In December 2007, project personnel presented technical analyses and discussions supporting the adequacy of this strategy. The Board is now satisfied that the project's strategy for confinement is adequate. In 2008, the project was put on

hold and placed in a condition to support either restart or termination in FY 2010. The final design was completed and submitted to DOE in May 2008.

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

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

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

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

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

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

**Waste Solidification Building at the Savannah River Site.** In a letter dated June 25, 2008, the Board identified structural issues related to the roof design and the analytical approach to differential settlement. The Board has worked closely with the project to bring the issues identified in the letter to resolution. Additionally, the Board identified safety basis issues in a letter dated July 15, 2008, related to the application of DOE Standard 1189 to the design process and the analytical approach to evaluating hydrogen explosions in unvented pipes. The Board will continue to bring open issues to resolution and complete a final design review of the Critical Decision-2/3 design package prior to its approval.

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

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

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

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

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

| Performance Goal 3 | **Nuclear Facilities Design and Infrastructure.** 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. |
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**FY 2007 Performance Accomplishments**

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

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

Overall, the public meetings have led to:

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

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

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

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

that is operating. Design basis earthquake ground motions have increased by about 50% at LANL. The Board is following DOE efforts to update probabilistic seismic hazard curves at SRS and the Nevada 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 the Savannah River Site. A report documenting this study was issued in December 2003. The Board proposed nine actions it considered necessary to enhance safety, reliability, and functionality of the plutonium storage facilities at Savannah River Site. Congress also requested an annual report on the status of the proposals in this report. In June 2007, the Board issued its annual update to Congress. Based in part on extensive proposals, DOE decided against using 235-F and will only store plutonium in the KAMS facility. The Board agreed with this decision. DOE agreed with the Board's proposals to upgrade the KAMS facility. In 2007, DOE completed the last remaining upgrade to the fire protection system in the facility. The addition of a fire detection system permits plutonium to be stored safely in the KAMS facility until dispositioned by DOE.

| 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. |
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**FY 2006 Performance Accomplishments**

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

**Safety-in-Design Public Meetings.** 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. |
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**FY 2005 Performance Accomplishments**

The Board and its staff continued providing technical evaluations of numerous design and construction projects throughout the DOE complex. These evaluations have led to DOE improving 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.

## 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 2010, 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 2010 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. |
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**FY 2010 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 (ISM) 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. |
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**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 60 DOE directives that may impact public and worker health and safety will require review, of which many are likely to require significant Board and staff interaction to ensure satisfactory resolution of potential issues. This is a direct result of the DOE Safety Directives Review, which is an effort to revise and document the technical basis for requirements in 24 different health and safety directives of interest to the Board. 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 10 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 (ISM) 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 work planning and control, 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. Example reviews will include:

- Review technical capability of the workforce. This will be accomplished through reviews focused on qualification processes and how those capabilities are sustained and enhanced through continuing training programs.
- Evaluate DOE's effort to revise the directives governing the startup and restart of nuclear facilities and monitor DOE's effort to implement the changes in the field.
- Perform reviews of nuclear criticality safety programs at DOE sites under the Board's purview.
- Monitor progress on the implementation plan for Recommendation 2007-1, *Safety-Related In Situ Nondestructive Assay of Radioactive Materials,* and work with DOE to ensure that the milestones are met and that the results meet the expectations set forth in the Recommendation.
- Evaluate the effectiveness and implementation of DOE's efforts to satisfy Recommendation 2002-3, *Requirements for the Design, Implementation, and Maintenance of Administrative Controls.*
- Review the important aspects of safety system design, functionality, and maintenance at defense nuclear facilities including the implementation of quality assurance programs; specifically ensuring requirements flow down from DOE to the contractor as well as the implementation of those requirements.

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.

The Board will work with DOE to develop and implement a satisfactory approach for the use of Justifications for Continuing Operations (JCOs) in the defense nuclear complex. Board review of DOE's processes and practices associated with the use of JCOs at defense nuclear facilities review showed that DOE needs to develop more definitive guidance and expectations to structure the development and implementation of JCOs in the complex.

| 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. |
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**FY 2008 Performance Accomplishments**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

# 8. FINANCIAL TABLES

## OBJECT CLASS SUMMARY

Actual obligations for FY 2008, projected obligations for FY 2009 and the Board's Budget Request for FY 2010 are presented by object class accounts in Exhibit C. The Board proposes to utilize the budget resources requested in the following manner:

**Salaries and Benefits (Object Class 10)**

The FY 2010 request includes funding of $19,942,167 to support the projected salary and benefit costs for 110 FTEs. The rationale and justification for the additional salaries and benefits costs are explained in detail on pages 9 and 10. The funding for salaries and benefits represents 70 percent of the Board's FY 2010 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 3.9 percent beginning in January 2009.
- Pay increase of 2.0 percent beginning in January 2010.
- Employee benefits of 26.5 percent of salaries, or $34,889 per FTE in FY 2010.

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 small and highly talented technical staff with extensive backgrounds in science and engineering disciplines such as nuclear–chemical processing, conduct of operations, general nuclear safety analysis, conventional and nuclear explosive technology and safety, nuclear weapon safety, storage of nuclear materials and nuclear criticality safety, and waste management. Virtually all of the technical staff hold technical master's degrees, and approximately 20 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 $1,015,000 to support the official travel of the Board Members and staff. This amount is consistent with the amount requested in the FY 2009 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. During FY 2008, 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 to assist in carrying out its functions. The Board has assigned technical staff teams to round–the–clock monitoring of major startup, testing, or restart activities at various DOE sites. The presence of its technical staff has proved to be invaluable in providing the Board with firsthand information on the demonstrated readiness, capabilities, and performance of DOE and its contractors for ensuring safety in the conduct of such activities. During the coming fiscal years, the Board anticipates a continued need for Board technical staff teams to monitor construction and startup of new DOE defense nuclear facilities, such as the Waste Treatment 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 2010 Budget Request for the shipment of household goods for employees relocating to the Washington, DC area and/or to become site representatives at DOE, the same amount as included in the FY 2009 President's Budget.

**Rental Payments to GSA (Object Class 23.1)**

The Board requests funds totaling $2,189,571 to reimburse the General Services Administration (GSA) for projected office rental costs. This overhead expense represents approximately 8 percent of the Board's FY 2010 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 $2.190 million for FY 2010.

**Communications and Utilities (Object Class 23.3)**

The budget request includes $220,000 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 area of expertise, and a chart that reflects funding levels for this support are included on pages 91 through 94. The FY 2010 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, and the same amount included in the FY 2009 President's Budget.

**Other Services (Object Class 25.2)**

The budget request includes $1,850,000 to fund a wide range of recurring administrative support needs of the Board in FY 2010 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. This amount is consistent with the amount requested in the FY 2009 President's Budget adjusted for inflation and additional FTEs.

**Government Services (Object Class 25.3)**

The Board's budget request includes $815,000 for reimbursable support agreements with other federal agencies, the same amount included in the FY 2009 President's Budget. The Board utilizes cross-service providers for accounting and payroll processing services consistent with government-wide lines of business objectives, and also utilizes cross-servicing arrangements for services such as physical security, health unit, employee background investigations for security clearances, Employee Assistance Program services, the Library of Congress FedLink for legal and legislative research, and Defense Contract Auditing Agency (DCAA) services to assist in determination of fair and reasonable contracting costs.

**Operation and Maintenance of Equipment (Object Class 25.7)**

The Board requests $65,000 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 $385,000 for recurring software licenses/maintenance agreements supporting the Board's operations and to replace outdated office equipment such as printers and copiers, of which $10,000 is for new hardware and software licenses associated with the additional FTEs. In addition, the Board requests $300,000 for non-recurring requirements as explained on page 10 of the Executive Summary.

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 2010.

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

### 2010 CONGRESSIONAL BUDGET REQUEST

| BUDGET ACCOUNT -- (OC) | 2008 OBLIGATIONS (Actual) | FY 2009 FINANCIAL PLAN | FY 2010 BUDGET REQUEST |
|---|---|---|---|
| PERSONNEL SALARIES -- (11) | $ 11,819,067 | $ 13,484,743 | $ 15,121,622 |
| PERSONNEL BENEFITS -- (12) | $ 3,379,613 | $ 4,093,651 | $ 4,820,545 |
| TRAVEL -- (21) | $ 860,459 | $ 935,000 | $ 1,015,000 |
| TRANSPORTATION OF THINGS -- (22) | $ 156,438 | $ 155,000 | $ 280,000 |
| RENTAL PAYMENTS TO GSA -- (23.1) | $ 2,190,395 | $ 2,173,851 | $ 2,189,571 |
| COMMUNICATIONS & UTILITIES (23.3) | $ 209,729 | $ 165,056 | $ 220,000 |
| PRINTING & REPRODUCTION -- (24) | $ 32,264 | $ 50,000 | $ 51,000 |
| ADVISORY & ASSISTANCE SERVICES -- (25.1) | $ 1,079,634 | $ 900,000 | $ 1,100,000 |
| OTHER SERVICES -- (25.2) | $ 2,235,842 | $ 1,840,163 | $ 1,850,000 |
| GOVERNMENT SERVICES -- (25.3) | $ 681,433 | $ 731,592 | $ 815,000 |
| OPERATION & MAINT. OF EQUIPMENT -- (25.7) | $ 64,262 | $ 65,000 | $ 65,000 |
| SUPPLIES & MATERIALS -- (26) | $ 206,092 | $ 215,000 | $ 225,000 |
| ACQUISITION OF ASSETS -- (31) | $ 353,290 | $ 350,000 | $ 685,000 |
| *** TOTAL OBLIGATIONS *** | $ 23,268,517 | $ 25,159,056 | $ 28,437,738 |
| NEW BUDGET AUTHORITY | $ 21,909,000 | $ 25,000,000 | $ 26,086,000 |
| UNOBLIGATED BALANCE - PREV. FY | $ 3,950,891 | $ 3,250,056 | $ 3,091,000 |
| RECOVERY OF PRIOR YR OBLIGATIONS | $ 658,682 | $ - | $ - |
| TOTAL BUDGETARY RESOURCES | $ 26,518,573 | $ 28,250,056 | $ 29,177,000 |
| EST. UNOBLIGATED BAL. - CUR. FY | $ 3,250,056 | $ 3,091,000 | $ 739,262 |
| OUTLAYS | $ 22,337,734 | $ 24,655,875 | $ 27,868,983 |

**Exhibit C**

# TECHNICAL SUPPORT CONTRACTS SUMMARY

A list of major (> $25,000 in estimated annual expenditures) technical support contracts, with a brief description of each contractor's areas of expertise, follows. The FY 2010 Budget Request includes $1,100,000 in this account for technical support contracts to assist the Board in its health and safety reviews.

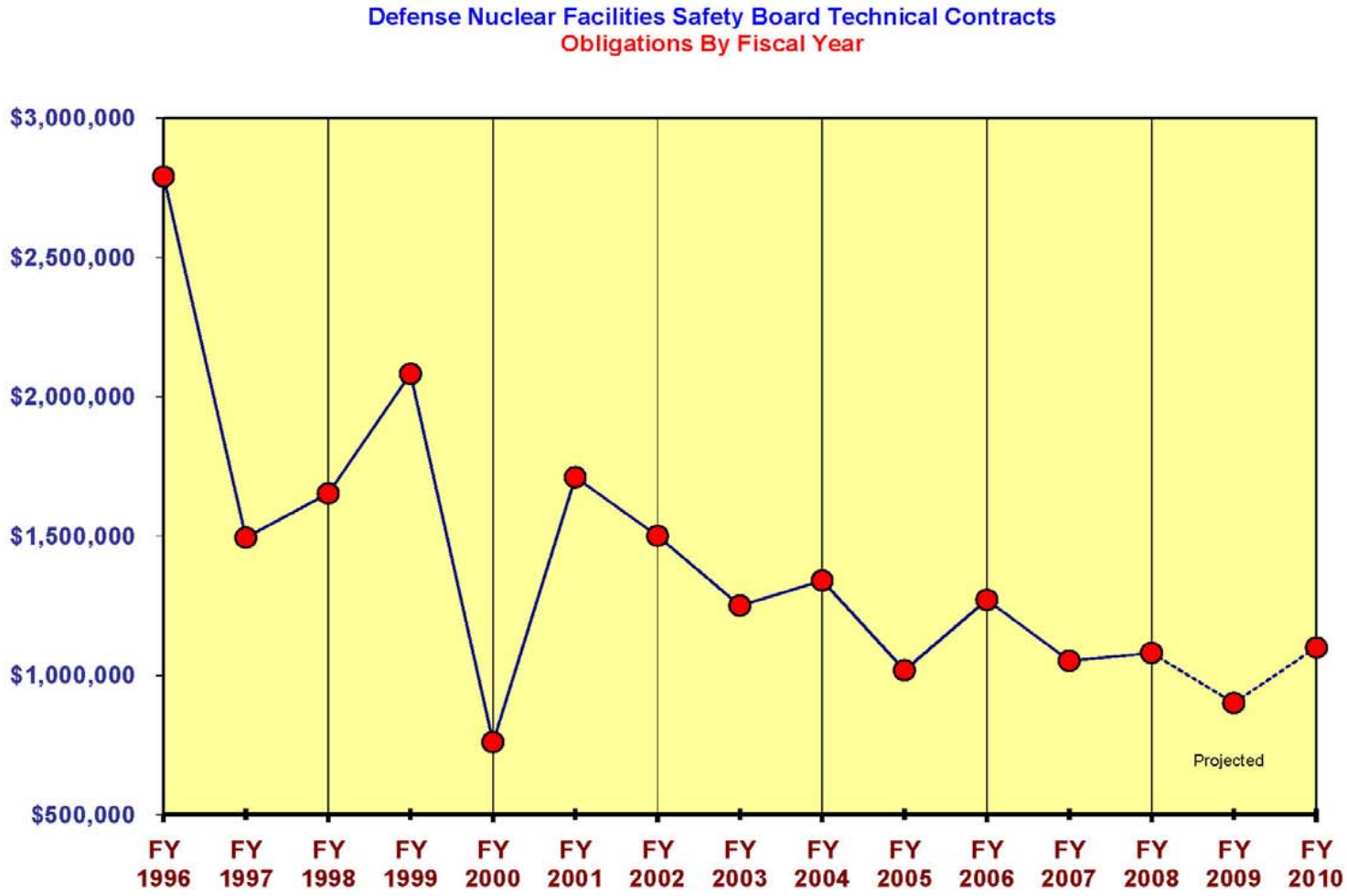
## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

## TECHNICAL SUPPORT CONTRACTS

(Status as of April 30, 2009)

| Contractor | Contract Expiration Date | Description of Work |
|---|---|---|
| Boeing Corporation | 12/31/09 | 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 in and around large structures. |
| David S. Boyd, Inc. | 3/31/10 | Provide technical support to the Board, specifically involving the evaluation of directives and procedures governing operation and maintenance of defense nuclear facilities. In addition, provides technical support evaluating the implementation of Integrated Safety Management (ISM) for ongoing operations and maintenance, and also preparations for startup or restart of defense nuclear facilities. Example of work includes supporting review of readiness preparations for restart of at the Pantex Plant. |
| Mr. Joseph King | 3/31/10 | 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 | 3/31/10 | 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 ISM for ongoing operations and maintenance, and for preparations for startup or restart of defense nuclear facilities. |
| Dr. James L. Liverman | 6/30/09 | Provide technical support to the Board in the general subject area of ISM, quality assurance and radiation protection, specifically involving review and evaluation of amendments to 10 CFR 835 Rule, radiological protection standards, other radiological and environmental health and safety issues, and review of the development of DOE's quality assurance improvement plan. |

| Contractor | Contract Expiration Date | Description of Work |
|---|---|---|
| Mr. Lew Miller | 8/17/09 | Provide technical support to the Board in the general subject area of defense nuclear facility design, including design basis accident analysis, safety system classification, application of national consensus codes and standards, application of DOE directives, and the review of technical documents supporting the DOE Critical Decision Process. . |
| Paul C. Rizzo & Assoc., Inc. | 12/31/09 | 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 | 12/31/09 | 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. | 12/31/09 | 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. |
| William Yeniscavich | 4/13/10 | Provide technical support to the Board, specifically involving the area of materials performance (e.g., national safety codes and specifications, stress and temperatures, corrosion and welding fundamentals, inspection and testing techniques.) |


Defense Nuclear Facilities Safety Board Technical Contracts
Obligations By Fiscal Year
$3,000,000
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
Projected
FY 1996
FY 1997
FY 1998
FY 1999
FY 2000
FY 2001
FY 2002
FY 2003
FY 2004
FY 2005
FY 2006
FY 2007
FY 2008
FY 2009
FY 2010