

**FY 2007
BUDGET REQUEST
TO THE CONGRESS**

**Defense Nuclear Facilities
Safety Board**



February 2006

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 which indicate the progress toward achievement of the strategic plan's goals and objectives. The Board's performance objectives for FY 2006 and FY 2007, as well as representative accomplishments for FY 2002 through FY 2005, 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 and identify remaining problems, please see the Board's Reports to Congress which can be reviewed at the above Web address.

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Introduction

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APPROPRIATION & EXPENSE SUMMARY

(Tabular dollars in thousands.)

OPERATING EXPENSES

	ACTUAL FOR <u>FY 2005</u>	FINANCIAL PLAN FOR <u>FY 2006</u>	BUDGET REQUEST FOR <u>FY 2007</u>
New Budget Authority	20,106*	21,812 **	22,260
Obligations	20,243	22,357	22,731
Outlays	19,704	21,911	22,277

* \$20,268,000 Appropriation: \$162,144 rescission included in FY 2005 Omnibus Appropriations Bill.

** \$22,032,000 Appropriation included in FY 2006 Energy & Water Development Appropriations Bill: \$220,320 (1%) rescission included in FY 2006 Defense Appropriations Bill.

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

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

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PERSONNEL SUMMARY

	<u>FY 2005 ACTUAL</u>	<u>FY 2006 FINANCIAL PLAN</u>	<u>FY 2007 BUDGET REQUEST</u>
Statutory Personnel Ceiling: (FTE's) ^{1/}	150	150	150
FTE Usage ^{2/}	91	100	100
<hr style="width: 20%; margin-left: 0;"/>			
Board Members and Permanent Employees at End of Fiscal Year	89	100	100

^{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. This statutory employment ceiling does not include Board Members, who by virtue of the Board's enabling legislation may hire up to the equivalent of 150 full-time employees. See 42 U.S.C. § 2286b(b)(1)(A).

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

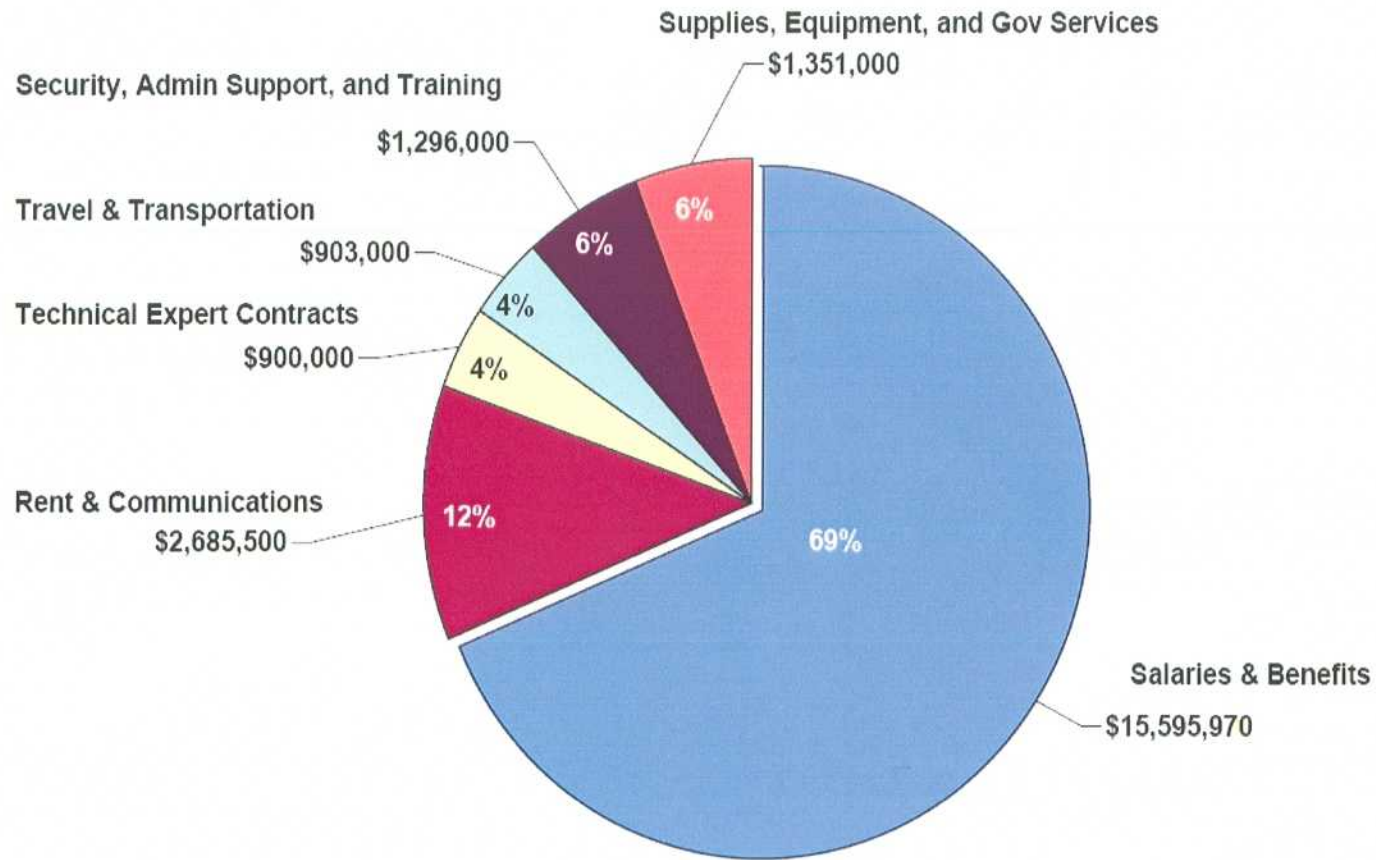
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PROPOSED APPROPRIATION LANGUAGE

SALARIES AND EXPENSES

For necessary expenses of the Defense Nuclear Facilities Safety Board in carrying out activities authorized by the Atomic Energy Act of 1954, as amended by Public Law 100-456, section 1441, \$22,260,000 to remain available until expended. [*Energy and Water Development Appropriations Act, 2006*]

FY 2007 Total Projected Obligations = \$22,731,470



Percentage may not add due to rounding

Budget Request Summary

The Board's FY 2007 budget request for \$22,260,000 and 100 FTEs includes funding for statutory increases in civilian salaries and associated employee benefits (e.g., employer contributions to employee health benefits accounts, matching Thrift Savings Plan contributions).

	<u>New Budget Authority</u>	<u>FTEs</u>	<u>Page Ref.</u>
Baseline - FY 2006 Congressional Budget Request Appropriation without rescission	\$22,032,000	100	
Funding for full impact of FY 2006 civilian pay raise in FY 2007. [Note: this amount is the difference between the 2.3% pay increase included in the President's FY 2006 Budget and the proposed Congressional 3.1% pay increase—includes impact on employee benefits.]	\$85,000		10
Funding for the proposed 2.3% civilian pay raise effective in January 2007. [Note: budget projection based on paying additional salaries and benefits for nine months in FY 2007—includes impact on employee benefits.]	\$250,000		10
Office space lease for DNFSB Washington, DC Headquarters Current GSA lease will expire on March 6, 2006. After GSA conducted competitive lease negotiations on behalf of the DNFSB, the most cost-effective option for the Board is to remain at its existing location with existing floor plans and no build-out. The GSA rent estimate under the new lease, plus GSA's management fee of 8%, is approximately \$2.513 million for FY 2007, slightly higher than estimated last year.	\$13,000		10
Projected FY 2006 carryover available as FY 2007 budget resource	(\$120,000)		
Total FY 2007 Budget Request	\$22,260,000	100	

Executive Summary

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2. EXECUTIVE SUMMARY

The Defense Nuclear Facilities Safety Board's (Board) Fiscal Year 2007 Budget Request is for \$22.260 million in new budget authority and 100 full-time equivalent staff years. The requested increase in funds and associated FTE's is necessary if the Board is to continue its vital health and safety oversight role with its unique scientific and technical expertise.

The Board plays a key role in maintaining the future viability of this Nation's nuclear deterrent capability by:

- ensuring that the health and safety of the public and workers at the Department of Energy's (DOE) defense nuclear facilities located throughout the United States are adequately protected, as DOE attempts to maintain readiness of the nuclear arsenal, dismantle surplus weapons, dispose of excess radioactive materials, clean up surplus defense facilities, and construct more than 20 new 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 configurations as a direct result of the Board's oversight operations; and,
- providing for the early identification of health and safety vulnerabilities, allowing the Secretary of Energy to address problems before they become national catastrophes.

The technical challenges of maintaining a viable oversight program over geographically dispersed defense nuclear programs are very demanding. Consequently, having the resources to maintain a highly competent and experienced engineering staff is key to fulfilling this oversight mission. Nearly 70 percent of the Board's budget request for FY 2007 is dedicated to paying the salary and benefits for 95 staff and five full-time Board Members. As will be fully discussed later in our budget request, the Board has requested additional 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 2006, as well as funding to compensate for the projected January 2007 pay raise.

Since our technical oversight operations are directly dependent on the expertise of the staff, the Board is particularly concerned with the recent loss of technical competence due to retirements and the loss of scarce engineering talent to other organizations, both public and private. During FY 2005, the Board lost 15 staff, including 9 engineers. The Board has implemented an aggressive recruiting campaign to replace key engineering and management talent losses.

The Board also has been pressed to keep pace with the significant increase in new defense nuclear facilities in the design and construction phase. DOE has more than 20 design and construction projects currently underway or planned for the near future. In particular, the design and

Unlike commercial nuclear facilities, DOE's nuclear weapons stockpile stewardship and management operations conducted at facilities such as the Pantex Plant in Texas and the Los Alamos National Laboratory in New Mexico are unique in that they include nuclear explosive activities and experiments involving collocated high explosives and nuclear material. The risks at these defense nuclear facilities are not solely a function of the quantities of nuclear material present and associated criticality safety concerns, but more importantly, the material processes involved, which include the potential for explosive dispersal of radioactive materials or inadvertent nuclear detonation.

Tons of radioactive and toxic materials exist throughout the defense nuclear complex, and there are many pathways by which these hazards might be released, creating risks to the workers and the public. Consequently, the operation of many of DOE's defense nuclear facilities can pose significant hazards to the environment, the public, and the workers. Most of the facilities in the complex were constructed many years ago and are deteriorating as they age. The integrity of facilities or structures that confine hazardous materials can be threatened by earthquakes, extreme winds, floods, lightning, and other such natural phenomena.

Other potential release mechanisms include inadequate safety controls in new and old facility designs, human errors, equipment malfunctions, chemical reactions, fire, detonation of explosives, and inadvertent nuclear criticality events. Nuclear-related accidents in other countries underscore the significance of the risks in the DOE nuclear weapons operations. For example, on September 30, 1999, a nuclear criticality accident occurred at nuclear fuel processing plant at Tokaimura, Japan. The accident occurred due to human error, serious breaches of nuclear material safety principles, and a mind-set that a criticality accident was incredible. The accident resulted in severe overdoses to three workers, two of whom have died. There have been no criticality accidents in the United States since 1978. However, many DOE facilities contain sufficient amounts of fissionable material such that the risk of an accidental criticality exists and must be controlled.

Also, unpredictable chemical reactions in materials used extensively in defense nuclear work have resulted in several accidents. In 1957, a liquid radioactive waste storage tank exploded at the Mayak, Russia, nuclear complex, contaminating an area equal to the size of New Jersey. It is estimated that this nuclear accident released twice the amount of curies of the Chernobyl reactor accident and forced the evacuation of 11,000 people. The DOE defense nuclear complex includes millions of gallons of radioactive liquid waste, which represents a source of hazard that must be addressed.

Management & Policy Overview

The Board believes that identifying potential accident conditions and mitigating their consequences is very important for risk management. Safety is assured by working to understand and reduce the likelihood of events that are adverse to safety and by limiting the consequence of events if they do occur. In addition, safety is assured through robust systems that use multiple layers of protection such that no single layer is depended upon to ensure safety. This concept is called "defense in depth."

Considering the scope of the Board's oversight responsibilities and the risks involved, the Board must function as an oversight organization comprised of technical experts that can quickly recognize problems in the hundreds of hazardous operations conducted daily throughout the DOE defense nuclear complex. 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. Assigning review priorities based on perceived risk levels is a continual process influenced by the technical expertise of the Board Members, as well as by reports from the Board's site representatives, staff issue papers, site visits, implementation plans for the Board's recommendations, responses to reporting requirements, correspondence from workers at DOE sites, testimony from public hearings and meetings, and Congressional inquiries. The Board's outcome measure of successful oversight operations is the early identification of health and safety issues, long before these issues become significant problems and potentially, accidents that could threaten public health and safety and the continued viability of DOE's nuclear weapons and cleanup missions.

The means for an effective Board oversight program begins with a determined, focused, and well-executed human capital program. This program uses all available tools to attract and retain the technical talent necessary to accomplish the job that Congress has asked the Board to do. After years of careful recruiting and selection, the Board's technical staff is composed of approximately 60 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 and nuclear criticality safety, and waste management. Essentially all of the technical staff have technical master's degrees, and approximately 20 percent have doctoral degrees. Because the Board's health and safety Recommendations and other advisories to the Secretary of Energy are based on in-depth technical information and detailed safety analyses, the recruitment and retention of scientific and technical staff members with outstanding qualifications continues to be critical to the successful accomplishment of the Board's mission.

During FY 2005, the Board lost 15 staff due to retirement and attrition, including 9 engineers. The Board has attempted to plan for the loss of technical competence due to retirements, as well as the loss of scarce engineering talent to other organizations, both public and private. While the technical staff expertise of the Board has been reduced, the Board continues to provide adequate health and safety oversight of DOE's defense nuclear activities. As of September 30, 2005, the Board was operating with 85 staff, 57 percent of our statutory staffing ceiling. The Board is conducting an aggressive recruiting campaign to fill key technical and managerial positions, and is ensuring that new and existing staff possess the requisite work experience.

The Board must also plan for additional staff retirements that will impact our technical capabilities. More than 17 percent of the Board's technical staff and 33 percent of our Senior Executives are eligible for regular retirement today. In FY 2007, the number of technical staff eligible for retirement rises to 22 percent of our technical workforce.

In addition to continuing our recruitment of experienced engineering talent to fill immediate staff needs, the Board also needs to focus its recruiting effort on attracting the next generation of engineers.

The Board developed and previously implemented a three-year Professional Development Program (PDP). This recruitment and development program brings entry-level technical talent into professional positions within the Board. 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. This is a highly competitive program designed to attract the next generation of scientific and technical talent to Federal service through an extensive college recruiting program.

The Board was able to hire only one PDP candidate in FY 2005. As staff vacancies occur and resources permit, the Board will attempt to accelerate this succession planning effort. This will ensure that qualified scientists and engineers are hired and trained to perform the Board's critical oversight mission.

Major Health and Safety Oversight Initiatives

Oversight of New DOE Design and Construction Projects

The Board is required by law to review DOE's design and construction projects to ensure that the safety of the public and workers is addressed early in the design process. In FY 2007, the Board will continue to expend considerable resources to review the ongoing design effort, as well as the construction activities at 25 DOE defense nuclear facilities currently underway or planned for the near future. (See page 39, *Nuclear Facilities Design & Infrastructure* for a full discussion of these projects.) The following table provides an informal rating using three project assessment characteristics for each of these 25 projects:

1. Significance = overall importance of the facility to the mission of the complex;
2. Complexity = an assessment of the difficulty in successfully implementing the design; and,
3. Risk = an assessment of programmatic risk and safety risk for the facility.

NEW DOE DESIGN & CONSTRUCTION PROJECTS

RATING			
	SIGNIFICANCE	COMPLEXITY	RISK
HIGH	19	9	11
MODERATE	6	9	9

The Board plans to concentrate its oversight attention on the projects with high risk, significance, and complexity. One prominent example of a high risk, new facility undergoing both design and construction is the Waste Treatment Plant (WTP) in Richland, Washington. The WTP project consists of three major nuclear facilities to pretreat and vitrify high-level waste stored in underground tanks at Hanford. This project, now estimated to cost \$10 billion, has evolved from a facility designed to treat only 10 percent of the tank waste at Hanford to one that is proposed to be used to process all of the high-level waste inventory from the underground tanks by 2028. WTP is a complex, high risk program that has constantly changing design and construction parameters and will require more than 15 years to complete.

The design and construction reviews conducted by the Board on WTP and other new DOE facilities are resource intensive and time consuming, but are key in preventing safety flaws in design and construction that could render a newly constructed facility unusable. The Board plans to use technical contract funds in FY 2007 to continue to obtain highly specialized skills in areas such as seismic engineering of structures, geotechnical reviews, concrete chemistry, systems engineering, and hazard analyses that are critical to performing the technical oversight reviews of new DOE projects.

One of the dominant accidents at all defense nuclear facilities, both new and existing, is a major fire. The Board must provide constant oversight and vigilance in the area of fire protection detection and suppression systems to ensure these key safety controls are designed, installed, and maintained correctly. In February 2005, the Board provided DOE a report detailing unresolved fire protection issues at the WTP. The Board will continue to provide staff resources to review the WTP fire protection system designs as they evolve in FY 2006 and FY 2007.

The Board will also require additional structural and mechanical engineering expertise to evaluate the design, selection, and installation of safety-related mechanical systems such as ventilation systems, process piping, pumps and valves, and to evaluate technical issues that continue to evolve, such as erosion and corrosion estimates and limits, black cell design issues, and melter design.

The WTP Safety Analysis is the largest and most complex analysis reviewed by the Board in its history. The review of this key safety document is a daunting task that continues to consume extensive Board resources. It is a critical task that must be performed in a timely manner to ensure

all the hazards are identified and appropriate engineered safety controls are developed early in the design process, reducing the cost impact of changes later in the design process.

Finally, the Board also requires additional chemical process and nuclear waste vitrification expertise to provide technical oversight of the complex WTP processes. The need for this expertise is also expanding due to the addition of other new projects in the DOE complex, such as the Salt Waste Processing Facility and the Plutonium Disposition and Conversion Facility at the Savannah River Site.

Safety of Nuclear Weapon Activities

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

To effectively oversee the health and safety issues and maintain the pace of this expanded weapons program, the Board will need to fill key vacancies in its technical staff with subject matter experts and field site representatives, as well as contract for unique specialized technical expertise (e.g., in-depth knowledge of a particular weapon design). In FY 2004, the Board established a site office at the Lawrence Livermore National Laboratory, and assigned additional site representatives to monitor nuclear weapon-related activities at the Pantex Plant (Texas), the Oak Ridge Y-12 National Security Complex (Tennessee), and the Los Alamos National Laboratory (New Mexico). As site representative vacancies occur, the Board has reassigned experienced headquarters staff to fill these demanding positions in the field. Thus, the Board must backfill the technical vacancies at headquarters to ensure that it has the expertise to conduct oversight operations and to prepare suitable candidates for future field assignments.

DOE will be finalizing testing and start-up of new tritium processing facilities at the Savannah River Site in FY 2006. The new Tritium Extraction Facility will process highly radioactive tritium producing burnable absorber rods that have been irradiated in a commercial reactor. Some of the processes used at the Tritium Extraction Facility will be new and others will involve operations not conducted at the tritium processing facilities for more than a decade. Because the hazards of radioactive tritium gas are different than the hazards at most other DOE defense nuclear facilities, the Board will need to devote substantial, specialized technical expertise to oversee the start-up, testing, and initial operation of these activities to ensure safety.

In FY 2006 and FY 2007, the Board plans to focus additional technical oversight on nuclear explosive operations. The Board's technical staff members with this knowledge and background are currently fully occupied. Additional expertise may be required in the areas of high explosives

(particularly with respect to high explosives reaction in abnormal environments such as fires or drops) and nuclear weapon design, production, and testing.

A unique and particularly devastating potential accident in the nuclear weapons complex involves an inadvertent nuclear detonation at:

- 1) the Pantex Plant during nuclear explosive operations, or
- 2) at the Nevada Test Site while working on a damaged nuclear weapon or an improvised nuclear device.

The Board must provide comprehensive and effective oversight to ensure an accident with the absolutely unacceptable consequence of a nuclear detonation never occurs.

It is anticipated that the current operational tempo in nuclear explosive operations at the Pantex Plant will likely increase due to increased requirements to surveil our aging stockpile, particularly in the absence of underground testing, and pressure to dismantle our retired nuclear weapons as we draw down our nuclear weapons stockpile. In addition, NNSA plans to begin operations involving nuclear explosives for the first time ever at the Device Assembly Facility at the Nevada Test Site to support dismantlement of retired weapons. Oversight of this particular activity will require significant staff resources.

In addition, the Board has been urging DOE to develop a capability at NTS to disposition a damaged nuclear weapon or improvised nuclear device. While a significant amount of progress has been made, there is still much work to be done. Additionally, there is always the possibility of a national crisis that would require a return to underground testing at NTS. In fact, there is a Presidential requirement to maintain the capability to do this with 18 months. Finally, the Nation's capability to perform nuclear criticality experiments is being moved from LANL to NTS during the next few years.

Special Study of Facilities for Storage of Plutonium and Plutonium Materials at the Savannah River Site

In the FY 2003 *National Defense Authorization Act*, Congress tasked the Board to conduct a special study of the adequacy of K-Area Materials Storage (KAMS) facility and related support facilities such as Building 235-F, at the Savannah River Site, and submit a report to Congress and the Secretary of Energy not later than one year after the date of the enactment of the Act. The required study was completed in December 2003 and provided to the Congress and the Secretary of Energy. In this report the Board made nine proposals it considered appropriate to enhance safety, reliability, and functionality of the plutonium storage facilities at the site.

Congress also directed the Board to submit a yearly report on the actions taken by the Secretary of Energy in response to the Board's proposals. This followup effort requires a continuing evaluation of the plans for plutonium storage at the Savannah River Site, as well as an independent assessment of the safety analysis and hazards, including the specified safety-related controls for these hazards. Further assessment of modifications to the safety-related systems and components will be

necessary to fully review the Secretary's actions to ensure safe, reliable storage of the Nation's excess plutonium until a permanent disposition path is determined. As currently planned, plutonium could be stored in 50-year old facilities for another 20 years. It is imperative that the storage facilities provide the necessary protection for the public, workers, and environment.

These assessments require an extensive commitment of the Board's staff resources. Several of the assessments will require that the Board obtain specific outside expertise (e.g., geotechnical expertise). The Board's effort to continue the needed assessments is estimated to require 1900 technical staff hours, 350 outside expert hours, and ten on-site reviews. Accordingly, it is estimated that the Board will expend approximately \$300,000 in FY 2007 to continue its efforts on this important, Congressionally mandated study.

Administrative Funding Needs

The Board's budget request also includes funding to respond to several non-discretionary requirements that are resource intensive and are beyond the capabilities of the Board to absorb or perform without additional funds. An explanation of each requirement and associated funding impact is discussed as follows:

Fully Fund the Salaries and Benefits Account For FY 2007

During the past several fiscal 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 adjusted to reflect the actual pay raise. With nearly 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 have the financial flexibility to recover from shortfalls in our salary and benefits account.

The Board needs additional funding to help pay for the out-year impacts of the enacted 3.1 percent and projected 2.3 percent increases in January 2006 and January 2007 respectively. An additional \$85,000 is needed to fund the full impact of the FY 2006 civilian pay raise at the 3.1 percent level for FY 2007, as well as an additional \$250,000 to fund the President's proposed FY 2007 civilian pay raise of 2.3 percent effective in January 2007.

Without full funding of these accounts, the Board has no alternative but to reduce staff—the backbone of our health and safety oversight program. As of February 6, 2006, the Board is operating with only 84 staff and three full-time Board Members (56 percent of its statutory employment ceiling). Recruitment and retention of scientific and technical staff with outstanding qualifications will continue to be critical to the successful accomplishment of the Board's mission.

Expiration of the Board's Office Space Lease

The current GSA lease for the Board's office space in Washington, DC, will expire on March 6, 2006. The Board has been located at its current office facility since 1990, and has maintained and periodically upgraded the office support architecture (e.g., telecommunications, security equipment, video conferencing) as new technology became necessary. In addition, the physical security of the building was upgraded substantially as a result of the September 11 terrorist attacks.

GSA recently completed an open lease competition to secure office space for the Board. The bid submitted by the current landlord offered the best value, and subject to finalizing the terms of a new lease, the Board will remain at its current headquarters location. For FY 2007, GSA estimates that the new lease will require the Board to pay GSA \$2.513 million for its current office space. This amount included the 8 percent Public Building Service fee that GSA charges all of its client agencies for its support. Since the preliminary estimate for a new lease under current market conditions was approximately \$2.5 million, an additional \$13,000 is requested in our FY 2007 budget.

The Bottom Line

The Defense Nuclear Facilities Safety Board requests additional new budget authority funding of \$228 thousand in FY 2007 above the FY 2006 pre-rescission level of funding to meet the Board's statutory health and safety oversight workload and the associated financial needs. This increase is needed to fund the non-discretionary annual cost-of-living pay increases that the Board does not have the financial capability to absorb, when coupled with the across-the-board appropriation rescissions totaling \$382 thousand for FY 2005 and FY 2006. The Board is proposing to offset increased costs by using projected carryover funding in order to minimize the increase in new budgetary authority.

The Board's role in providing independent oversight of health and safety issues throughout the DOE defense nuclear complex for the Secretary of Energy, the Administration, and the Congress places intense pressure on our ability to provide timely and accurate assessments. The Board is the last line of defense in preventing costly mistakes and tragic accidents from occurring in very complex, dangerous programs. Having to abandon or extensively rebuild a newly constructed facility such as the Waste Treatment Plant in Hanford, costing billion of dollars, due to an undiagnosed safety flaw in the design or construction process is inexcusable. An accidental detonation of a nuclear weapon during the evaluation, maintenance, or dismantlement process, resulting in catastrophic impacts on lives and property, as well as on our Nation's nuclear deterrent capability is unimaginable. The primary purpose for the Board's existence is to significantly reduce the chances of failed programs and devastating accidents from becoming a reality.

The Board's budget request of \$22.260 million constitutes a wise investment toward improving the safety and reliability of the vital defense activities conducted at DOE's defense nuclear facilities, at a small fraction of the potential economic and health costs of a nuclear accident. We ask for your support of the full amount requested.

Annual Performance Budgeting Objectives for Fiscal Year 2007

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

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

1. **Nuclear Weapon Operations:** DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of 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 adequately protect 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 the 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 Fiscal Year (FY) 2006 and FY 2007 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. The Board's *Annual Performance Plan for FY 2007* 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 the positive outcomes embedded in 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 defense nuclear 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 2006 and FY 2007. To place this planning information in context, the performance goals are followed by examples of the Board's accomplishments during the years FY 2002 through FY 2005, as required by OMB's instructions on preparing and submitting a performance budget.

The examples provided in the four major performance goals do not represent the entire scope of progress made on the FY 2005 Performance Goals. A comprehensive assessment of progress during Calendar Year (CY) 2004 appears in the Board's *Fifteenth Annual Report to Congress*. The Board's *Sixteenth Annual Report to Congress*, due for publication in early 2006, will cover accomplishments during CY 2005. The Board's annual performance reports are available for review on the Internet at www.dnfsb.gov under the *Public Documents/Reports to Congress* research headings.

Nuclear Weapon Operations

3. 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.

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 stockpile activities will verify necessary improvements in safety.

SUMMARY:

DOE actions to increase nuclear weapon activities at Pantex, in response to new stockpile reduction initiatives and life extension programs, will add to the Board's oversight workload in Fiscal Year 2007. At the same time, the relocation of hazardous missions to the Nevada Test Site and startup of a major new tritium facility at the Savannah River Site will increase demands on the Board's safety oversight. Key areas of oversight for the Board in Fiscal Year 2007 will include:

- *Nuclear Explosive Operations*—DOE's operational tempo will likely continue to be higher than in recent years due to increased requirements to evaluate our aging stockpile, as well the need to dismantle our retired weapons as we draw down our nuclear weapons stockpile.
- *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, it is likely that DOE will begin nuclear explosive operations for the first time ever at the Device Assembly Facility at the Nevada Test Site to support dismantling of retired weapons, and subcritical experiments will continue to be conducted at NTS in support of nuclear weapon programs. Finally, the Nation's single capability to perform nuclear criticality experiments is being moved from LANL to NTS. The Board will be required to assess the safety of criticality operations at NTS in FY 2007.
- *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 LLNL plutonium facility later were curtailed based on assessments of its safety programs. Similarly, reviews by the Board at the Sandia National Laboratories found extensive deficiencies in the authorization bases and safety programs for its nuclear facilities. Resolution of the underlying safety-related deficiencies will take NNSA and the laboratories years. In addition, transition to a new operating contract at LANL likely will result in the need for additional safety oversight.

Performance Goal 1

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

FY 2007 Performance 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 aspects of safety management systems. These reviews will focus on activities at the Pantex Plant, Y-12 National Security Complex, SRS tritium facilities, Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratories (SNL), as well as 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 developed in response to 10 CFR 830).
- Annual updates of documented safety analyses developed in response to 10 CFR 830.
- Weapon-specific safety analyses and controls identification and implementation for nuclear weapon activities (the W76, B53, W80, and W84).
- Nuclear explosive operations at Pantex (e.g., the B83, special purpose facilities, and onsite transportation).
- Laboratory support of nuclear explosive operations at Pantex (e.g., sensitivity testing of high explosives). Cross-cutting functional areas at the Pantex Plant, Y-12 National Security Complex, LANL, LLNL, or SRS tritium facilities (e.g., legacy material disposition, nuclear criticality safety, fire protection, nuclear explosive safety, seismic design, conduct of operations, work planning, tooling, configuration management).
- Special studies of unique or significant hazards at DOE nuclear facilities (e.g., classified projects, process technology alternatives, and disposition of special items and by-product materials).
- Startup of Saltless Direct Oxide Reduction at Y-12.
- Relocation of Quality Evaluation facilities at Y-12.
- Plans for the management of special nuclear material at Y-12 during the transition period before the new enriched uranium facilities are designed and constructed.
- Plutonium pit manufacturing and certification at LANL.
- Preparations to dispose of damaged nuclear weapons or improvised nuclear devices at NTS.
- Subcritical experiments at NTS.
- Readiness to resume underground nuclear weapons testing at NTS, if testing were to resume.
- Readiness for nuclear explosive operations at the Device Assembly Facility at NTS.
- Safety of criticality reactor operations at the Device Assembly Facility at NTS.
- Preparations for startup of the Tritium Extraction Facility at SRS.
- Age-related changes in nuclear weapons components for weapon systems in the enduring stockpile.
- Implementation of corrective actions identified during standdown and resumption of defense nuclear activities at LANL and LLNL.
- 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 dismantlement projects at the Pantex Plant, Y-12 National Security Complex, or NTS that start in FY 2007.

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- Development, implementation, and refinement of site-wide and facility-specific safety analyses and controls for nuclear facilities and activities (e.g., safety analysis reports developed in response to 10 CFR 830).
- Annual updates of documented safety analyses developed in response to 10 CFR 830.
- Weapon-specific safety analyses and controls identification and implementation for nuclear weapon activities (the W76, B53, B61, W80, W87, W88, and W84).
- Nuclear explosive operations at Pantex (e.g., the B61, W76, W87, special purpose facilities, and onsite transportation).
- Laboratory support of nuclear explosive operations at Pantex (e.g., sensitivity testing of high explosives).
- Cross-cutting functional areas at the Pantex Plant, Y-12 National Security Complex, LLNL, LANL, or SRS tritium facilities (e.g., legacy material disposition, nuclear criticality safety, fire protection, nuclear explosive safety, training, conduct of operations, work planning, tooling, maintenance, configuration management).
- Special studies of unique or significant hazards at DOE nuclear facilities (e.g., classified projects, process technology alternatives such as the Saltless Direct Oxide Reduction [SDOR], disposition of special items and by-product materials).
- Startup of microwave casting and new glovebox in the assembly/disassembly building at Y-12.
- Relocation of quality evaluation facilities at Y-12.
- Plans for the management of special nuclear material at Y-12 during the transition period before the new enriched uranium facilities are designed and constructed.
- Plutonium pit manufacturing and certification at LANL.
- Startup of the Full-Scale Aqueous Processing Line for ²³⁸Pu at LANL.
- Preparations to dispose of damaged nuclear weapons or improvised nuclear devices at NTS.
- Readiness of the Device Assembly Facility at NTS for nuclear facility operations.
- Subcritical experiments at NTS.
- Preparations for startup of the Tritium Extraction Facility at SRS.
- Age-related changes in nuclear weapons components for weapon systems in the enduring stockpile.
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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 on site transportation. Satisfactory completion of these important commitments continues to be delayed. At the Board's request, senior NNSA 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. NNSA 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. The Board observed a follow-on review performed by NNSA in September FY 2005 which identified several issues, but found the vast majority of the improvement actions had been accomplished. The principal remaining issue is the large backlog of tooling design, fabrication, and maintenance work which accumulated while improvements in the tooling program were being pursued.

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 NNSA regarding development of a plan to improve conduct of operations. In response, NNSA 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. NNSA has now placed a required second type of container in service. Overall, NNSA has repackaged its 12,000th pit. The Board has now closed this recommendation.

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

FY 2005 Performance Accomplishments

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 NNSA 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 NNSA 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. NNSA 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, NNSA'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. NNSA responded on May 14, 2004, and presented a reasonable approach to address many of the issues raised by the Board. In FY 2005, NNSA 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 NNSA had committed remained unfinished. By March, 2005, NNSA 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, NNSA 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 NNSA and LANL personnel responsible for resumption activities. The Board has been encouraging NNSA 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. NNSA is currently preparing a plan and

FY 2005 Performance Accomplishments

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 NNSA 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 NNSA 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, NNSA 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 NNSA's system for identifying and implementing safety requirements, and omitted relevant safety requirements. The Board issued a letter to NNSA on December 16, 2004, identifying these problems. The RFP was subsequently amended to address the issues raised by the Board, significantly strengthening NNSA'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 NNSA's plan to build a replacement facility by 2013, the Board encouraged NNSA to take steps to implement practical facility modifications in the near term and reduce the quantity of at-risk nuclear material. NNSA is developing a plan to address this issue.

FY 2005 Performance Accomplishments

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 NNSA 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, NNSA 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 NNSA to complete them in a timely manner. As a result, NNSA 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 NNSA'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, NNSA 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. NNSA 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 NNSA on March 8, 2005, cautioning NNSA 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, NNSA and LLNL briefed the Board on a generally acceptable path forward toward achieving and verifying readiness to resume a limited scope of programmatic operations. NNSA provided the details of this plan to the Board in a September 2005 letter. 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, NNSA directed the laboratory to evaluate this problem and make improvements to ensure the safe storage of these materials.

Performance Goal 1

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Examples of FY 2004 Accomplishments

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

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

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

Readiness to Dispose of a Damaged Nuclear Weapon. The Board has consistently highlighted to DOE, the need to develop the programs and infrastructure at NTS necessary to safely dispose of a damaged nuclear weapon or improvised nuclear device. In FY2004, DOE made substantial organizational and procedural improvements, and provided training, and developed a safety basis for G-tunnel. As a result, DOE has made substantial physical and procedural improvements and provided training to be prepared to safely dispose of a damaged nuclear weapon should the need arise.

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

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

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

Lightning Protection at NTS. In 2003, the Board noted that lightning protection at NTS did not appear to provide adequate protection for the nuclear operations and personnel. In response, NTS initiated compensatory measures and a study of the lightning protection needs at NTS. In 2004, lightning protection controls were included in the

Examples of FY 2004 Accomplishments

safety basis of several nuclear facilities. As a result, NTS acknowledged the need to make safety improvements, implemented lightning protection controls, and continues to study lightning protection for NTS.

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

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

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

Hoisting and Rigging Operations. During FY2003 and FY2004, the Board's staff reviewed the hoisting and rigging programs at the Savannah River Site, the Pantex Plant, the Nevada Test Site, and Sandia National Laboratory. In letters dated July 10, 2003 and January 21, 2004, the Board expressed concerns regarding the maintenance of hoisting equipment, the safety classification of hoisting, vendor communication, and training for emergency scenarios. The Board also provided DOE substantive comments for the revision of DOE standard 1090, "Hoisting and Rigging." The safety of hoisting and rigging operations across the complex has improved, in particular the hoisting and rigging program at the Pantex Plant.

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

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

Y-12 Building 9212 B-1 Wing Fire Protection. The Board identified concerns to NNSA Headquarters regarding the adequacy of fire protection in the B-1 wing of Building 9212 at Y-12. Following a performance-based review, YSO recommended upgrades that include installation of sprinklers on the first floor, a new system shutdown interlock and relocation of certain equipment, and the installation of fire-protective coatings on portions of primary extraction column supports, as well as changes (e.g., new catch basin) to divert primary and secondary extraction

Examples of FY 2004 Accomplishments

combustible liquids to the first floor. Design and planning efforts for the modifications/upgrades have been started by BWXT. The full project is planned (and is to be funded) to be completed by late Fiscal Year 05. When completed, it will improve the degree of fire protection in the facility to a level appropriate for the remaining life of the facility.

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

Y-12 Conduct of Operations. The Board raised concerns over the formality of operations at Y-12 and the adequacy with which management oversight was exercised. An overall improvement initiative was started by Y-12 that includes a management observation program to provide increased and documented on-the-floor observations of nuclear operations. Y-12 also instituted a "Conduct of Operations Representatives" program to provide ongoing, independent oversight and mentoring during nuclear operations. Six of these representatives have now been deployed.

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

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

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

Performance Goal 1

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Examples of FY 2003 Accomplishments

W84 Disassembly and Inspection Operations. W84 disassembly and inspection operations have not been conducted at Pantex since 1998, and the authorization basis is no longer valid. The Board briefed National Nuclear Security Administration (NNSA) management on several occasions regarding efforts to restart the W84 disassembly and inspection operations without an adequate authorization basis. The Board raised numerous potential safety issues, which resulted in NNSA conducting an internal study that ultimately validated the Board's concerns. W84 operations have been postponed until these issues can be adequately addressed.

Support of the Defense Nuclear Complex. As a result of concerns over the continued erosion of technical competence and a need to reemphasize the priority of work that directly supports nuclear safety, the Board issued Recommendation 2002-2, *Weapons Laboratory Support of the Defense Nuclear Complex*. DOE's Implementation Plan (IP) was negotiated over the next several months and was issued on June 30, 2003. DOE has taken preliminary steps to reemphasize the priority of nuclear weapons work. DOE is also establishing at each site an office that will track and ensure closure of nuclear safety support requirements for weapon laboratories.

Storage of "Pits." Continuing to respond to the Board's Recommendation 99-1, *Safe Storage of Fissionable Material called "Pits,"* in FY 2003, DOE repackaged its 7500th pit into a robust container suitable for interim storage. The associated container surveillance program has also been rejuvenated; almost all of the surveillance backlog will be eliminated by the end of FY 2003.

Criticality Safety at Y-12. The Board expressed its concern that line management at Y-12 was not placing sufficient emphasis on simplifying and standardizing all fissile material handling operations in order to build a criticality safety program structured to assure success. The confusing controls that exist in many current Y-12 facilities with many different forms of uranium, dozens of different containers, and different postings for storage arrays have resulted in a significant number of operator failures. The letter stated that the standardization should extend to requirements, postings, and containers. In response, NNSA has started to reduce the amount of stored nuclear materials and to standardize fissile material storage containers.

Nuclear Explosive Operations at Pantex. The Board has been urging DOE to improve the safety of weapons-related work at the Pantex Plant since it issued Recommendation 98-2, *Safety Management at the Pantex Plant*. Principle among the Board's recommendations was that DOE simplify and expedite its process for re-engineering nuclear explosive processes at Pantex such that the attendant safety improvements could be put in place earlier than planned. In FY 2003, DOE completed the start-up of the Seamless Safety for the 21st Century (SS-21) W62 Disassembly & Inspection Program. This program is now significantly safer and more robust than weapons programs to which the SS-21 process has not yet been fully applied. In FY 2003, the Pantex contractor took delivery of the prototype SS-21 tooling for W88 bay operations and W78 bay and cell operations.

Procedural Compliance at Pantex. In October 2001, the Board sent NNSA a letter expressing concern with the increasing number of procedural adherence issues observed at Pantex. Although an action was initiated to address this problem, in March 2002, the Board wrote NNSA, noting that further improvements were still warranted. During FY 2003, observations indicate that a significant improvement has been achieved.

Building 12-64 Seismic Analysis at Pantex. In 1998, the Board wrote to DOE expressing concern with the seismic response of Building 12-64. In 2002, NNSA informed the Board of its intention to upgrade Building 12-64 in preparation for resuming nuclear explosive operations there. Subsequent meetings and discussions in FY 2002 and 2003 between NNSA personnel and the Board's staff have identified concerns with analyses that had been completed to address the Board's original concerns. Although NNSA's conceptual design for upgrading Building 12-64 addresses the concern for the seismic response of the facility, specific details regarding corrective actions are lacking. Efforts to improve the analyses and identify potential engineering solutions continue.

Examples of FY 2003 Accomplishments

Pantex Fire Protection. In FY 2003, DOE completed modification of the fire detection and suppression system in Building 12-44 and completed its Readiness Assessment Report for Fire Protection at the Pantex Plant. DOE has taken beneficial occupancy of the 12-44 facilities. DOE experienced numerous delays within their readiness activities for fire protection and completion of the fire protection final report. Under the impetus of continual Board urging, DOE ultimately completed the Readiness Assessment Report for Fire Protection, and delivered it to the Board as Commitment 4.3.2 to Recommendation 98-2.

Improvements in Safety Bases for the Pantex Plant. Fulfilling commitments made in response to Recommendation 98-2, DOE completed the Transportation Safety Analysis Report, Phase 1, Group 1, Readiness Assessment; the Readiness Assessment Report for Fire Protection; and approved the Transportation Safety Analysis Report (SAR) and Technical Safety Requirements (TSRs), as well as Pantex Zone 12 & Zone 4 Staging Facilities SAR and TSRs. Although these accomplishments provide improvements in the safety bases for the Pantex Plant, final implementation of these onsite transportation controls remains to be completed. The Board continues to urge DOE to expedite the implementation of onsite transportation controls.

NTS 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 2003, DOE responded by improving its capabilities to conduct these activities safely, including making further physical improvements to and maintaining G-tunnel, conducting training on specific hazards and controls and disposition capabilities, beginning the development of a safety basis for G-tunnel, and beginning to improve NTS conduct of operations. As a result, DOE has made substantial physical and procedural improvements and provided training to be prepared to safely dispose of a damaged nuclear weapon (should such a need arise).

Emergency Power System at the LLNL Plutonium Facility. In April 2002, the Board identified deficiencies in LLNL's emergency electrical power system, which did not meet safety-class standards and IEEE codes. As a result of the Board's efforts, LLNL developed an action plan to correct the deficiencies. As of August 2003, LLNL has completed most of the commitments related to this action plan, including system upgrades and updating important system drawings and calculations. The remaining commitments will ensure that the system will be assessed against appropriate electrical standards, and that backfits involving further upgrades will be considered, if necessary.

Lightning Protection at LANL. The Board noted that the safety-class lightning protection system at LANL's Weapons Engineering and Tritium Facility (WETF) did not appear to provide adequate lightning protection for the facility. In addition, the Board submitted a report presenting additional deficiencies with the lightning protection systems at various facilities at LANL. In March 2003, a subject matter expert study of the WETF lightning protection system concluded that the existing system could not perform its safety-class function. To adequately protect this operating nuclear facility against lightning hazards, a defensible lightning protection scheme must now be developed and implemented at WETF.

Deficiencies in LLNL Safety Bases. The Board identified significant deficiencies in the current safety bases for some of LLNL's defense nuclear facilities, most notably the Plutonium Facility, Building 332. A lack of vigorous DOE oversight has allowed these deficiencies to exist for years. In a letter dated April 10, 2003, the Board established a 60-day reporting requirement for DOE to ensure that these identified weaknesses are adequately addressed in a timely manner or establish appropriate compensatory measures until the deficiencies can be adequately addressed.

Subcritical Experiments. The Board reviewed DOE's assessments and readiness for subcritical experiments, identifying inadequate nuclear safety management programs; inadequate mechanisms for verification of readiness of subcritical experiments and test readiness (should nuclear weapons testing be resumed); and inadequate commitment to improve the readiness review process for subcritical experiments and nuclear weapons testing. In FY 2003, NNSA's Nevada Site Office committed to improve the safety basis documents, develop a USQ process, and improve the readiness review process. As a result, subcritical experiment program requirements are being revised, safety basis documents are being improved, and a USQ process is being developed.

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.

Examples of FY 2002 Accomplishments

Maintenance Improvement Program at Y-12. In 2001, Y-12 responded to Board concerns about overdue and deferred maintenance of safety systems by implementing a maintenance improvement program. In 2002, the Board found that the program did not incorporate certain fundamental requirements, such as integrated scheduling of maintenance and comprehensive tracking of material history and equipment failures. Y-12 has now instituted systematic, scheduled outages at nuclear facilities, while prioritizing and reducing the maintenance backlog.

Material Storage Facilities at Y-12. The Board has highlighted the accumulation of unneeded nuclear materials stored in unsatisfactory configurations at Y-12. During 2002, Y-12 stabilized or disposed of many of the materials, particularly non-Material Access Area legacy items and the uranium inventory in Building 9206.

Chemical Safety at Y-12. Problems with the management of chemicals at Y-12 have been highlighted in extensive correspondence from the Board. In 2002, as a result of the Board's interactions, Y-12 made improvements in the chemical safety program. The site has issued a *Chemical Safety Management Program*, Operational Safety Boards continue to improve, Hazard Surveys are on track for completion, Authorization Basis documents for Chemically Hazardous Facilities have been issued, and the Hazardous Material Inventory System has been upgraded.

Recommendation 99-1. Continuing to respond to Board Recommendation 99-1, *Safe Storage of Fissionable Material called "Pits,"* DOE repackaged its 5000th pit into a robust container suitable for interim storage in July 2002. The associated container surveillance program has also been rejuvenated, with more than half of the surveillance backlog worked off in FY 2002.

Fire Protection at Pantex. In early 2002, LLNL conducted a baseline needs assessment of the Pantex Fire Department, identifying numerous significant safety-related deficiencies. However, the Pantex Plant contractor exhibited reluctance to act on these findings. The Board intervened to emphasize the need for NNSA and its contractor to act promptly to address the deficiencies. As a result, the contractor has placed more emphasis on this issue, and a corrective action plan is being implemented to improve Fire Department readiness.

Deactivation LLNL Heavy Element Facility. The Board reviewed LLNL's plans for deactivation of the Heavy Element Facility, including the removal of nearly 300 radioactive items, some of which pose significant radiological risk. Planning for the project was being approached piecemeal, rather than in a systematic and integrated manner. In March, 2002, the Board informed DOE that comprehensive planning methods, such as those contained in DOE Order 430.1A, *Life Cycle Asset Management*, should be used to better identify hazards and necessary controls, improve sequencing of tasks, and identify repetitive tasks that could be standardized. LLNL is currently working to address this issue.

Readiness to Dispose of a Damaged Nuclear Weapon at NTS. The Board has consistently highlighted to DOE the need to develop the programs and infrastructure at NTS to safely dispose of a damaged nuclear weapon or improvised nuclear device. In FY 2002, DOE responded by upgrading its capabilities to conduct these activities safely, including making further physical improvements to G-tunnel, preparing to develop a safety basis for G-tunnel, and conducting a number of exercises to identify policy, personnel, and procedure requirements and provide training. As a result, DOE has made substantial physical and procedural improvements and provided training to ensure that it will be prepared to safely dispose of a damaged nuclear weapon should the need arise.

**Nuclear Material Processing
& Stabilization**

4. PERFORMANCE GOAL 2: NUCLEAR MATERIAL PROCESSING AND STABILIZATION

The processing, stabilization, and disposition of DOE defense nuclear materials are performed in a manner that ensures adequate protection of 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. Although these activities will ultimately improve the safety posture of the defense nuclear complex, cleanup work is itself hazardous and demands effective safety oversight. The Board is devoting a significant share of its resources to oversight of DOE's stabilization and cleanup work. The demand for such oversight is continuing to increase as additional cleanup projects commence. Examples of the most significant new and ongoing projects are summarized below:

Nuclear Material Stabilization—The Board's Recommendations 94-1 and 2000-1 focused on improving the safety of nuclear materials stored across the DOE defense nuclear complex through stabilization and disposal. Significant stabilization activities continue at the Hanford Site and the Savannah River Site (SRS). However, much remains to be done. Within the NNSA, several sites, including LANL, continue to manage large inventories of nuclear materials that are not in suitable forms or packaging for extended storage. In response to suggestions from the Board, LANL is now pursuing an appropriate stabilization and disposition program, and NNSA managers are planning for the stabilization or disposal of additional inactive actinides. These efforts will require continued safety oversight by the Board to ensure the work is performed safely and does not languish.

Nuclear Material Consolidation, Storage, and Disposition—DOE continues to plan for the safest and most efficient ways to relocate and consolidate nuclear materials containing plutonium, uranium, and neptunium. Plutonium suitable as feed material for the Mixed-Oxide Fuel Fabrication

Facility at SRS continues to be shipped to and stored at SRS. DOE is considering its options for the consolidation of all other plutonium materials. Neptunium-bearing materials are to be consolidated at the Idaho National Laboratory. The Board plans to work closely with senior DOE managers who serve on a newly formed Nuclear Materials Disposition and Consolidation Coordination Committee. The Board expects its efforts in this area to increase substantially.

High-Level Waste (HLW) Retrieval and Processing—The Hanford and Savannah River Sites are continuing decades-long projects to retrieve HLW from tanks that date as far back as the World War II-era Manhattan Project. At Hanford, retrieval of waste from more than 100 leak-prone single-shell tanks is only now beginning in earnest. In coming years, DOE plans to significantly expand waste retrieval activities, with the attendant hazards of extremely radioactive liquids and sludges, old systems and equipment, and conditions that are poorly characterized. Safe operation of complex waste concentration and transfer systems is also required once wastes are retrieved into more modern tanks at these sites. Large new facilities needed to treat and dispose of the wastes are in various states of design and construction. Oversight of retrieval operations, as well as the development, design, and operation of planned treatment facilities will require a substantial share of the Board's resources for the indefinite future.

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 did not meet its commitments to the Board for completing this activity, and is presently attempting to consolidate the sludge to allow for retrieval, treatment, and safe interim storage of the sludge by 2007. The Board continues to review the designs of the required retrieval, transfer, stabilization, and packaging systems; to perform oversight of the preparations for startup of each of these systems; and to assess the safety of operations once they finally begin. Finally, DOE plans to begin decommissioning and removal of the basin structures in parallel with the sludge cleanup, which will also require safety oversight by the Board.

Facility Decommissioning—The DOE Office of Environmental Management is pursuing accelerated decommissioning of defense nuclear facilities at several sites. In addition to closure activities that are nearing completion at Fernald, Mound, and Rocky Flats, DOE is putting contracts in place to expand this effort to major portions of the Hanford Site, the Savannah River Site, and the Idaho National Laboratory. The transition from operations to deactivation and decommissioning involves major changes in the type of work performed and a change from a stable work environment to a dynamic, often poorly characterized environment in which conditions are changing and new hazards are encountered. The Board's experience with recent DOE closure activities, particularly at Rocky Flats and Fernald, has made it clear that these activities pose significant risk to workers and require continued close oversight as long as significant radiological hazards remain.

Transuranic (TRU) Waste Management—Several DOE sites store large quantities of TRU waste (some more than 100,000 cubic meters) on concrete pads and in soil-covered trenches. Many sites are actively retrieving relatively low-activity TRU waste and shipping it to the Waste Isolation Pilot Plant (WIPP) for disposal. The Board has encouraged DOE and the contractor at WIPP to improve cooperation and communications between WIPP and various TRU waste storage/generator

sites to overcome weaknesses in the National TRU Waste Program. The Board plans to continue to follow DOE's efforts to improve cooperation, communication, and safety as additional quantities of TRU wastes are permanently disposed at WIPP. The Board also expects to review preparations for initial characterization, shipment and disposal of higher hazard, remote-handled, TRU waste at WIPP. This activity is anticipated to begin in FY 2006 and culminate in routine remote handled-TRU disposal operations during FY 2007.

Performance Goal 2

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

FY 2007 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:

- Stabilization, packaging, and storage of plutonium metal and oxide at the Savannah River Site (SRS) (Recommendations 94-1/2000-1).
- Safe long-term storage of neptunium oxides at the Idaho National Laboratory resulting from stabilization operations at the SRS (Recommendations 94-1/2000-1).
- Complex-wide legacy nuclear material issues, including evaluation of materials not addressed by Recommendations 94-1 and 2000-1 and utilization of stabilization and disposition capabilities.
- Safety of processing and packaging of cesium and strontium capsules for dry storage at the Hanford Site.
- Design and construction of ORNL's system for medical isotope extraction and downblending of ²³³U (Recommendation 97-1).
- Stabilization and disposal of plutonium-bearing residues at LANL (Recommendations 94-1/2000-1).
- Consolidation of complex wide activities involving ²³⁸Pu used for national security purposes.
- Design of treatment facilities for HLW liquids and salts at the SRS, and system improvements to ensure safe management of the SRS HLW (Recommendation 2001-1).
- Maintaining HLW tank structural and leak integrity at SRS and the Hanford Site and application of the results of DOE's corrosion testing program to corrosion chemistry controls.
- Safe operation of HLW retrieval and transfer systems at the Hanford tank farms.
- Safety of supplemental processing and treatment of waste from Hanford tank farms.
- Safety of sludge retrieval, treatment, and storage at the Hanford Site (Recommendations 94-1/2000-1).
- SRS deactivation activities, including F-Canyon, FB-Line, and Building 235-F.
- Idaho National Laboratory decommissioning activities.
- Hanford Site decommissioning activities (e.g., monitoring of decommissioning work at the Plutonium Finishing Plant and the K-Basins).
- Final closure activities at the Fernald and Miamisburg Closure Projects.
- Savannah River Site decommissioning activities.
- Hanford Site decommissioning activities (e.g., monitoring of decommissioning work at the Plutonium Finishing Plant, K-Basins, and River Corridor Closure Contract).
- Oak Ridge National Laboratory decommissioning activities at the Waste Processing Facility.
- Safety of the retrieval, characterization, and packaging of TRU waste drums at the Hanford Site, the Idaho National Laboratory, and the Savannah River Site.
- Safe operations at the Melton Valley TRU/alpha low level waste treatment facility at Oak Ridge National Laboratory (ORNL) including processing of remote-handled TRU waste.
- Safety of ongoing contact-handled TRU waste operations and new remote-handled TRU waste operations at the Waste Isolation Pilot Plant (WIPP).
- Improvement in cooperation and communication between the WIPP contractor and TRU waste storage/generator sites.

Performance Goal 2

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

FY 2006 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:

- Stabilization, packaging, and storage of plutonium metal and oxide at the Savannah River Site (SRS) (Recommendations 94-1/2000-1).
- Safe long-term storage of neptunium oxides at the Idaho National Laboratory resulting from stabilization operations at the SRS (Recommendations 94-1/2000-1).
- Complex-wide legacy nuclear material issues, including evaluation of materials not addressed by Recommendations 94-1 and 2000-1 and utilization of stabilization and disposition capabilities.
- Design and construction of ORNL's system for medical isotope extraction and downblending of ²³³U (Recommendation 97-1).
- Stabilization and disposal of plutonium-bearing residues at LANL (Recommendations 94-1/2000-1).
- Consolidation of complex wide activities involving ²³⁸Pu used for national security purposes.
- Design of treatment facilities for high-level waste liquids and salts at the SRS, and system improvements to ensure safe management of the SRS high-level waste (Recommendation 2001-1).
- Maintaining HLW storage tank structural and leak 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 additional tank farms at Hanford.
- Conduct of operations and work planning at the Hanford tank farms.
- Safety of supplemental processing and treatment of waste from Hanford tank farms.
- Continued safe operation of the Melton Valley TRU/alpha waste treatment facility at Oak Ridge National Laboratory (ORNL).
- Safety of spent nuclear fuel sludge retrieval, treatment, and storage at the Hanford Site (Recommendations 94-1/2000-1).
- Safety of ongoing contact-handled TRU waste operations and safe startup of anticipated remote-handled TRU waste operations at the Waste Isolation Pilot Plant (WIPP).
- Safety of the retrieval, characterization, and packaging of TRU waste drums at the Hanford burial grounds.
- SRS deactivation activities, including F-Canyon and the Naval Fuels Fabrication Facility.
- Idaho National Engineering and Environmental Laboratory decommissioning activities.
- Hanford Site decommissioning activities (e.g., monitoring of decommissioning work at the Plutonium Finishing Plant, K-Basins and River Corridor Closure Contract).
- Final closure activities at the Fernald and Miamisburg Closure Projects.
- Safety of the retrieval, characterization, and packaging of TRU waste drums at the Hanford Site, the Idaho National Laboratory, and the Savannah River Site.
- Safe processing of contact-handled TRU solids at the Melton Valley TRU waste treatment facility at the ORNL.
- Safety of ongoing contact-handled TRU waste operations and preparations for startup of remote-handled TRU waste operations at WIPP.
- Improvement in cooperation and communication between the WIPP contractor and TRU waste storage/generator sites.

Performance Goal 2

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

FY 2005 Performance 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, 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 was 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 the 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.

FY 2005 Performance Accomplishments

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.

FY 2005 Performance Accomplishments

The Board provided oversight of these activities and ensured that lessons learned from decommissioning activities at other DOE sites were incorporated into the deactivation and decommissioning work.

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

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

Performance Goal 2

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

Examples of FY 2004 Accomplishments

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

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

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

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

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

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

Examples of FY 2004 Accomplishments

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

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

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

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

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

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

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

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

Examples of FY 2004 Accomplishments

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

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

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

Performance Goal 2

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

Examples of FY 2003 Accomplishments

Inactive Actinide Materials. The Board evaluated the National Nuclear Security Administration's (NNSA) plans for improving the management of non-programmatic actinide materials stored at sites such as Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and the Y-12 National Security Complex (Y-12). The Board found that NNSA did not define and execute adequately its strategy to characterize materials for storage or disposition, to identify which materials fall under this effort, and to analyze and upgrade, where appropriate, material packaging and storage facility conditions. The Board continues to evaluate the approaches taken by each NNSA site, as well as the programmatic direction provided by NNSA Headquarters.

Depleted Uranium at Savannah River Site (SRS). The Board continued to pursue the disposition of depleted uranium stored in inadequate containers and facilities at SRS. During FY 2003, the disposal of the most vulnerable materials began safely with the first shipments of such items to an offsite low-level waste disposal facility.

High-Level Waste Tank Integrity. During FY 2003, as the culmination of an effort that began with the Board's Recommendation 2001-1 in 2001, the Board obtained a commitment from DOE to accomplish ultrasonic inspections of all double-shell high-level waste tanks at SRS by 2006. This plan represents a significant increase in scope and a significant acceleration compared with the proposed inspection program.

Documented Safety Analysis for the SRS High-Level Waste System. The Board's review of the new documented safety analysis for the high-level waste facilities at SRS found that it did not provide a bounding unmitigated accident analysis as required by DOE directives. This problem resulted from the use of non-bounding input values and assumptions regarding operator actions to detect and terminate accidents. In response to a Board letter on this subject, DOE required the contractor to perform additional analyses and to implement specific administrative controls to protect assumptions made in the documented safety analysis.

Advanced Mixed-Waste Treatment Project. The Board identified significant shortfalls in the quality of the activity-level hazards analysis performed to support the identification of effective controls to protect workers involved in waste retrieval in the Advanced Mixed-Waste Treatment Project at the Idaho National Engineering and Environmental Laboratory (INEEL). In response, DOE required the contractor to implement conservative protective measures and to improve its analysis of the hazards associated with this work.

Hanford Spent Nuclear Fuel Project. The Board evaluated readiness preparations for startup of the K-Basins Fuel Transfer System and determined that the contractor had not corrected persistent problems regarding the premature declaration of readiness to operate. DOE identified a series of corrective actions that proved to be inadequate, as demonstrated by the failed attempt to start up the K-East Basin Sludge Water System later in the fiscal year. The Board is continuing to provide input and oversight as DOE works to solve this problem.

Laboratory Support for Long-Term Plutonium Storage. The Board identified that DOE was not planning to provide adequate resources for surveillance, laboratory testing, and shelf-life studies, which provide essential technical support for the safe long-term storage of plutonium. In response, DOE committed to provide adequate resources to continue the required activities and to develop a program plan that would identify how these activities would be carried out in future years.

Sodium Fluoride Traps at Oak Ridge National Laboratory (ORNL). DOE has begun to take actions in response to a letter issued by the Board in late-FY02 regarding the safe storage of sodium fluoride traps containing uranium-233. These vessels store uranium-233 recovered from the Molten Salt Reactor Experiment, and are becoming pressurized from radiolytic gas production. ORNL has completed the depressurization of several traps in the interim, and is evaluating the results to determine the path forward for the remaining traps.

Examples of FY 2003 Accomplishments

Fernald Closure Project. A review by the Board indicated significant progress is being made toward cleaning up and remediating the Fernald Site. However, there has been an increase worker injuries and near misses. The site attributed this rise in the accident rate to an increase in the number of new workers and the greater amount of work being performed on the site. The Board informed DOE that additional training to identify clearly the safety responsibilities and activities of all levels of management, the development of performance-based safety incentives for the contractor, and a more thorough screening of the qualification of new workers ought to be considered.

Rocky Flats Environmental Technology Site (RFETS) Vandalism. In May 2003, the Board learned that 14 high-efficiency particulate air filters installed in the Building 771 ventilation exhaust system had been vandalized by decommissioning workers and had to be replaced. The Board's evaluation of this event found that the report filed by RFETS in the DOE Occurrence Reporting and Processing System was inaccurate and did not acknowledge that the filter deficiencies were the result of deliberate vandalism. The Board further determined that neither the manager of the DOE Rocky Flats Field Office nor appropriate personnel within DOE Headquarters were aware of the vandalism. A corrected occurrence report was issued after the Board notified DOE Headquarters of the situation. The Board discussed this matter directly with the senior management of the RFETS contractor and the DOE field office manager to ensure they understood the seriousness of the workers' actions and the inaccurate reporting of this incident.

RFETS Building 371 Fire. The Board evaluated a significant fire that occurred on May 6, 2003, during glovebox removal activities in Building 371 at RFETS. The Board's review confirmed DOE's findings that inadequate work planning was a key contributor to the fire and that the workers' response to the fire could have resulted in serious harm to the workers, but found that the site's investigation into the cause of the fire was not adequate. The Board issued correspondence requesting DOE to document measures that had been taken to ensure that ongoing glovebox removal operations were safe and to ensure that materials recovered from the scene of the fire were adequately analyzed to support determining the cause of the fire. The Board further determined that there were fundamental weaknesses in procedure compliance by decommissioning workers and in DOE oversight, including the failure to provide DOE Facility Representatives to cover decommissioning activities in Building 371. These problems were identified to DOE, and corrective actions continue.

Activity Level ISM of Hanford Decommissioning Work. The Board continued to review planning and implementation of work being done at Hanford. The Board found that the work control procedures and practices need improvement to meet the intent of Integrated Safety Management and the DOE Orders and Guides for worker protection. The approach to hazard analysis does not use techniques such as those described by the American Institute of Chemical Engineers Guidelines for Hazard Evaluation Procedures, or the U.S. Department of Labor, Occupational Safety and Health (OSHA) publication, OSHA 3071, Job Hazard Analysis. These deficiencies are such that it is not clear that the controls are adequate to protect personnel performing decommissioning work at Hanford. Areas in need of improvement have been communicated directly to DOE. Some improvements are being implemented and have proven to be effective, however further effort is necessary.

Mound Closure Project. The Board reviewed decommissioning activities at Mound following the implementation of a new accelerated closure contract. DOE plans to reduce and relocate the DOE site office staff, while accelerating cleanup of the site. The Board informed DOE that the impacts on DOE's ability to provide adequate safety oversight of closure activities needed to be addressed.

Lawrence Livermore National Laboratory. The Board reviewed preparations for deactivation of Building 251 at the Lawrence Livermore National Laboratory and observed a readiness assessment for removal of heavy elements from the underground storage vaults. Weaknesses in conduct of operations and the use of procedures were identified to the laboratory. Corrective actions are in progress.

Performance Goal 2

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

Examples of FY 2002 Accomplishments

Stabilization and Storage of Legacy Materials. In Recommendations 94-1 and 2000-1, the Board urged DOE to address legacy nuclear materials remaining following the shutdown of many defense nuclear facilities, recognizing that unstable materials and undesirable storage conditions would worsen with age. In November 2001, the Board provided further suggestions regarding the strategy and schedule for stabilization activities at SRS and LANL. In July 2002, DOE provided an acceptable plan for SRS. However, DOE still has not developed an adequate plan for the materials at LANL, and in August 2002, the Board reiterated the need to expedite stabilization activities there and suggested means by which this could be achieved.

Plutonium Stabilization. DOE completed several significant milestones in implementation of Board Recommendation 94-1. Rocky Flats Environmental Technology Site completed repackaging more than 100 tons of plutonium-bearing residues and about one half of its plutonium metal and oxide. Hanford completed packaging its plutonium metal and stabilized all of its plutonium solutions.

Uranium-233 Stabilization. In response to Board Recommendation 97-1, DOE commenced its ²³³U inspection program at Oak Ridge National Laboratory. This program will characterize the hazards of materials stored for more than 20 years with little surveillance. So far, most packages inspected have been found to be in good condition, except for a package containing an uncommon form of ²³³U. The inner can of this package was severely corroded.

Hanford Spent Nuclear Fuel Project. During FY 2002, substantial progress was made in implementation of Recommendation 94-1 to stabilize spent nuclear fuel from the Hanford K-Basins. Removal, treatment, and packaging of fuel from K-West Basin continued throughout the year, although recurring equipment problems hampered initial progress. The Board's review of DOE's maintenance management program led to improved equipment availability and an increase in the fuel removal rate. The risk from continued storage of the degrading fuel and sludge in the K-East Basin will be mitigated when this system becomes operational in early FY 2003.

Hanford High-Level Waste System. Following a leak from the primary to secondary hose in a high-level waste transfer line, the Board discussed with Hanford personnel the need to revise qualification tests for transfer lines, inspect the hose assembly to identify the failure mechanism, and address component aging issues. The Board again met with Hanford senior managers after it became apparent that similar waste transfers were being planned and that needed inspections had not been performed. Subsequently, DOE directed the contractor to perform the necessary evaluations and provide written justification prior to conducting waste transfers through such transfer lines.

Savannah River Confinement System Integrity: In June 2002, the Board determined that DOE was not taking appropriate actions to correct a known deficiency with the H-Canyon confinement ventilation system. An interface with a non-seismically sound system renders the facility vulnerable to an unfiltered ground-level release of contamination during canyon accidents, especially a seismic event. The Board notified DOE of this vulnerability and requested timely corrective actions.

Savannah River Depleted Uranium Storage. In March 2002, the Board identified the need for DOE to address large quantities of depleted uranium materials stored in deteriorating containers and facilities at Savannah River. As a result, senior DOE management has initiated actions to disposition the material.

Y-12 National Security Complex. As a result of continuing efforts by the Board, the safety posture of Building 9206 has been improved. Stabilization of pyrophoric materials in Building 9206 was completed during FY 2002. Other highly reactive material has been processed and shipped out of the facility. Progress was also made in reducing the building's inventory of containerized highly-enriched uranium solids.

Examples of FY 2002 Accomplishments

Lawrence Livermore National Laboratory. In March 2002, the Board issued a letter to DOE highlighting the need to strengthen program planning and work integration for the deactivation of the LLNL Heavy Element Facility, Building 251. Subsequently, the laboratory began to implement the applicable DOE requirements. A project management plan that is now being developed has resulted in a better understanding of the complexity of the proposed work.

Rocky Flats Deactivation and Decommissioning (D&D) Activities. In a March 2002 letter to DOE, the Board identified that improvements in activity-level work planning were needed to ensure that the often unique tasks associated with D&D work at Rocky Flats could be conducted safely. The Board also highlighted the need for improved DOE oversight of the contractor's work planning, and for improved feedback and improvement processes to ensure that the underlying causes of problems in the planning and execution of D&D work are identified and corrected. DOE is taking comprehensive actions to address these issues.

An increasing amount of decommissioning work at Rocky Flats is planned to be performed by subcontractors and other personnel not directly assigned to the major D&D projects. The Board observed that actions planned by DOE and its contractor to address past problems with this approach did not clearly address the flow-down of safety requirements and processes for work planning and work control, or the need for stronger on-the-floor oversight. In response, DOE has identified actions to address these weaknesses and ensure that D&D work performed by subcontractors and other outside organizations is planned adequately, controlled properly, and conducted safely.

The Board observed that the D&D projects in Rocky Flats Building 707 and Building 776/777 had experienced many punctures of glovebox gloves. Onsite evaluations by the Board also noted that D&D personnel were not consistently using cut-resistant gloves while handling sharp objects during D&D activities. Board discussions with Rocky Flats management personnel led to an increased emphasis on the use of cut-resistant gloves for D&D work, which is expected to help reduce worker injuries and contamination.

Hanford D&D Activities. The Board identified a concern regarding the potential for worker injuries due to the use of canvas gloves to remove stuck and damaged blades from a large portable band saw used in D&D work in a nuclear facility at Hanford. Hanford management agreed with the concern, and has directed workers perform such activities using tools rather than their hands.

Miamisburg Environmental Management Project (MEMP). During a review of the MEMP work control program, the Board identified discrepancies between the integrated work control and maintenance control procedures, and a need for improved linkage between the two documents. The contractor took corrective actions to improve the work flow and the safety of maintenance activities.

**Nuclear Facilities
Design & Infrastructure**

5. 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 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 five to ten years, DOE is undertaking significant development of new capability to process legacy special nuclear materials, as well as replacing aging facilities needed to maintain the nuclear weapons complex. DOE design and construction activity in FY 2007 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 2007 in this strategic area of concentration are:

- Ensure adequate design and construction of the Waste Treatment Plant at the Hanford Site.
- Continue construction reviews of the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex.
- Review the construction of a treatment facility for high-level waste liquids and salts at the Savannah River Site (SRS).
- Review construction of the Pit Disassembly and Conversion Facility at SRS.
- Ensure adequate design and construction of the Sodium-Bearing Waste Treatment Facility at the Idaho National Laboratory.
- Review the preliminary design of the Chemistry and Metallurgy Research Replacement Project at the Los Alamos National Laboratory.

- Review the design of the Component Evaluation Facility at the Pantex Plant.
- Ensure probabilistic seismic hazard assessments provide adequate conservatism as sites update their seismic requirements.

Future 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 a robust 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's reviews of the design and construction of major facilities and projects are resource intensive and time consuming, but they result in significant safety improvements. The Board has demonstrated the value of rigorous technical oversight to ensure that safety is addressed early in the design process. The following list provides a brief description of major DOE projects currently underway, or planned for the near future, which will require significant Board resources to review. The list describes each project and provides an informal rating of three characteristics: Significance (overall importance of the facility to the mission of the complex); Complexity (relative assessment of the difficulty in successfully implementing the design); and Risk (assessment of programmatic risk and safety risk for the facility).

- **Hanford Site (Office of River Protection) - Waste Treatment Plant** - A project consisting of three major nuclear facilities to pretreat and vitrify some of the waste from the Hanford high-level waste tank farms. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.
- **Hanford Site (Office of River Protection) - Initial Tank Retrieval Systems and Waste Feed Delivery System** - long-term project to provide feed to the proposed Hanford Waste Treatment Plant. This project combines the Tank Farm Restoration and Safe Operation Project and Waste Feed Delivery System Project. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.
- **Hanford Site (Office of River Protection) - Immobilized High-Level Waste Interim Storage Facility** - to provide storage for glass waste canisters produced at the Waste Treatment Facility. HIGH SIGNIFICANCE, LOW COMPLEXITY, LOW RISK.

- **Hanford Site (Office of River Protection)** - Demonstration Bulk Vitrification facility - a new facility to demonstrate the capability to vitrify low-activity Tank Farm waste. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE RISK.
- **Idaho National Laboratory**- Sodium Bearing Waste Treatment Facility - a new facility being planned to treat about one million gallons of sodium-bearing wastes. MODERATE SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.
- **Lawrence Livermore National Laboratory** - Tritium Facility Modernization Project - Modify the existing Tritium Facility to expand tritium research and development capability. MODERATE SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE RISK.
- **Los Alamos National Laboratory** - TA-18 Mission Relocation - to relocate to the Nevada Test Site and/or upgrade the criticality facility to replace the current facility. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.
- **Los Alamos National Laboratory** - Site-Wide Fire Alarm - to replace the current outmoded and unreliable fire alarm system with a modern system tied into the new Emergency Operations Center. MODERATE SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.
- **Los Alamos National Laboratory** - TA-54 Waste Management Mitigation - to mitigate fire-related vulnerabilities in TA-50 (radioactive liquid waste operations) and TA-54 (solid waste) operations. MODERATE SIGNIFICANCE, LOW COMPLEXITY, LOW RISK.
- **Los Alamos National Laboratory** - Chemistry and Metallurgy Research Replacement Facility Replacement - to replace the current aging and deteriorating facility with a modern facility. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.
- **New Pit Production Facility (final location to be determined)** - new facility for production of pits for the nuclear stockpile. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.
- **Pantex Plant** - Building 12-64 Upgrade - to upgrade the existing facility to current standards for nuclear explosive operations to provide for future and near-term, weapons systems refurbishment capacity. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, HIGH RISK.
- **Pantex Plant** - Component Evaluation Facility - new facility that will increase existing capacities and provide new capabilities for the surveillance and re-qualification of weapons and weapons components. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, HIGH RISK.

- **Pantex Plant** - Special Nuclear Material Component Requalification Facility - to convert an area in 12-86 (currently used for joint test assembly operations) for use with various operations necessary to requalify certain special nuclear material for reuse. MODERATE SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.
- **Savannah River Site** - Tritium Extraction Facility - to provide a new facility to extract tritium from tritium producing burnable absorber rods (TPBAR) that will be irradiated in commercial power reactors. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.
- **Savannah River Site** - Extended Plutonium Storage - to provide a capability to store, stabilize and package plutonium consolidated at the Site from the DOE complex. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH 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** - Waste Solidification Building - to process waste streams generated in the Pit Disassembly and Conversion Facility and MOX Plant. MODERATE SIGNIFICANCE, LOW COMPLEXITY, LOW RISK.
- **Savannah River Site** - Glass Waste Storage Building #2 - to provide a second storage building for glass waste canisters produced at the Defense Waste Processing Facility. MODERATE SIGNIFICANCE, LOW COMPLEXITY, LOW RISK.
- **Savannah River Site** - High Activity Treatment Facility - Transuranic (TRU) Waste - to provide capability to size reduce and re-package high activity transuranic waste in large containers that are incompatible with shipping in TRUPACTs to WIPP. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE RISK.
- **Savannah River Site** - Intermediate Level Tritiated Vault - to receive tritium contaminated waste to support an expected increase in tritium contaminated waste material from the Tritium Extraction Facility. HIGH SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.

- **Savannah River Site - Actinide Removal Process** - to modify an existing facility (Late Wash Facility) in order to install equipment to remove actinides from high-level waste prior to treatment or disposal. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE RISK.
- **Y-12 National Security Complex - Highly Enriched Uranium Materials Facility** - to provide long term consolidated storage for all highly enriched uranium material forms at the Y-12 Site. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE RISK.
- **Y-12 National Security Complex - Uranium Processing Facility** - a new facility to replace aging facilities and consolidate current capability to process uranium materials at the Y-12 Site. HIGH SIGNIFICANCE, HIGH COMPLEXITY, MODERATE RISK.

Performance Goal 3

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

FY 2007 Performance Objectives

The Board and its staff will continue its 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. Begin reviews of plans for Waste Treatment Plant testing and commissioning.
- Continue construction reviews of the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex.
- Review modifications to existing Savannah River Site (SRS) processing facilities to support plutonium disposition activities.
- Review modifications to existing SRS facilities to increase long-term plutonium storage capacity and provide long-term stabilization/packaging capability. (Public Law 107-314, Section 3183)
- Review the construction of the Pit Disassembly and Conversion Facility at SRS.
- Review the preliminary design of the Chemistry and Metallurgical Research Replacement Facility at the Los Alamos National Laboratory.
- Review the construction of a treatment facility for high-level waste liquids and salts at SRS.
- Complete review of the design and construction of the Sodium-Bearing Waste Treatment Facility at the Idaho National Laboratory.
- Continue review of the design of the Component Evaluation Facility at the Pantex Plant.
- Review construction of the Building 12-64 Upgrade Project at the Pantex Plant.
- Review design and construction of the Criticality Experiments Facility at the Device Assembly Facility at Nevada Test Site.

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 health and safety of the workers and the public.

FY 2006 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; 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.
- Continue final design and construction reviews of the Demonstration Bulk Vitrification facility at the Hanford Site.
- Continue construction reviews of the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex.
- Review modifications to existing SRS facilities to increase long-term plutonium storage capacity and provide long-term stabilization/packaging capability. (Public Law 107-314, Section 3183)
- Complete construction design reviews of the Pit Disassembly and Conversion Facility at SRS and complete review of the design for seismic surface settlement.
- Review the design of the Chemistry and Metallurgy Research Replacement Facility at the Los Alamos National Laboratory (LANL).
- Review the construction of a treatment facility for high-level waste liquids and salts at SRS.
- Overview the DOE Operational Readiness Review for the Tritium Extraction Facility at SRS.
- Review conceptual design of the Component Evaluation Facility at the Pantex Plant.
- Review final design and construction of the Building 12-64 Upgrade Project at the Pantex Plant.
- Continue final design and construction reviews of the Special Nuclear material Component Requalification Facility at the Pantex Plant.
- Review of the design of the Sodium-Bearing Waste Treatment Facility at the Idaho National Laboratory.
- Review the development of geotechnical probabilistic seismic hazard curves for the SRS and LANL sites.

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 health and safety of the workers and the public.

Examples of FY 2005 Accomplishments

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

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

- The Board had earlier identified that the DOE-specified seismic requirements may not have been sufficiently conservative. DOE evaluation of this concern identified that the seismic requirements were underestimated by about 40 percent. DOE and its contractor are now evaluating the impact this increase will have on the design of the structure and equipment.
- DOE significantly underestimated the impact of hydrogen hazards on pipes and small process vessels and components. At the urging of the Board, DOE is now evaluating design solutions to address the issue.
- At the Board's suggestion, DOE completed a detailed review of the blackcell concept. Components in the blackcells will not be readily accessible for the life of the plant. This review revealed problems associated with erosion of components. DOE has now enhanced their 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 them 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, as well. DOE commissioned an independent review team of subject matter experts to review the Board's issue. This independent review team agreed with the Board's issue and made recommendations to improve the design criteria for the facility. As a result, DOE is developing new criteria to ensure that the design of the facility 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.

Examples of FY 2005 Accomplishments

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

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

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

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

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

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

Performance Goal 3

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

Examples of FY 2004 Accomplishments

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

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

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

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

Pit Disassembly and Conversion Facility. The Board has been reviewing the structural design for the Pit Disassembly and Conversion Facility (PDCF) to be located at the Savannah River Site. The Board has ensured the structural design criteria were adequate, the geotechnical evaluations were appropriate, and the soil-structure interaction (SSI) analysis was adequate for the PDCF structures. In response to a Board letter dated May 13, 2003,

Examples of FY 2004 Accomplishments

the contractor conducted a fire risk analysis to assess a seismically induced full-facility fire. The Board is reviewing the final design to ensure that it is adequate and incorporates appropriate defense-in-depth.

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

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

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

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

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

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

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 health and safety of the workers and the public.

Examples of FY 2003 Accomplishments

Hanford Waste Treatment Plant. The Board continued to review the design and construction activities related to the Hanford Site's Waste Treatment Plant. Reviews of concrete quality, structural adequacy, site geotechnical, process safety, electrical system design, and adequacy of standards were conducted. The Board issued letters on November 4, 2002, addressing safety and design basis concerns; January 21, 2003, addressing Hanford ground motion issues; March 7, 2003, addressing electrical concerns; and on May 29, 2003, addressing authorization basis and standards issues. Resolution of the issues raised by the Board is taking place as the design progresses.

High Enriched Uranium Materials Facility (HEUMF). In a Board letter dated December 27, 2002, concerns were expressed about the confinement system design for HEUMF at the Y-12 National Security Complex, which was based on isolation (holdup) of the facility following a design basis fire event. The Board also identified potential inadequacies related to the form and packaging requirements of uranium for long-term storage at HEUMF. In response, the ventilation system design has been modified to address this safety issue and the contractor is developing a plan to evaluate facility storage containers and determine a minimum set of storage containers that meet facility safety and operational needs.

HEUMF-Geotechnical. In December 2002, the Board informed DOE about concerns with the foundation design for the HEUMF. The contractor had started the structural design process without completing the geotechnical report and using only a best estimate of the required seismic loading. Also, the proposed foundation fill material had not been tested and the response of this material under earthquake loading was unknown. The contractor has subsequently completed the necessary geotechnical studies to address the Board's concerns and is finalizing the foundation design. It was concluded from the studies that the use of limestone fill as a base for the foundation could produce adverse building responses during an earthquake. Currently, the site is evaluating using concrete as the engineered fill below the building foundation.

Nevada Test Site Electrical and Lightning Protection Systems. In a letter dated July 1, 2003, the Board noted that compensatory measures to mitigate potential lightning hazards are needed at the Nevada Test Site (NTS) until robust lightning detection and protection programs have been implemented. The Board also identified deficiencies with the electrical systems for selected facilities at NTS. DOE is evaluating these conditions.

Tritium Extraction Facility Design Review. During the past five years, the Board has conducted extensive design reviews of the Tritium Extraction Facility (TEF) at the Savannah River Site. The Board has provided a series of comments to DOE as the design progressed from its initial conceptual stage to its final form. DOE formally responded to all of the issues raised by the Board and on December 19, 2002, the Board issued a response concurring with DOE's proposed resolution. As a result, the safety of TEF has been significantly improved.

Hanford 221-T Building (T-Plant) Design. The T-Plant has been proposed as a potential storage facility for K-Basin sludge. Due to the age (built in 1944) and configuration of the structure, this facility presented a unique condition, to which the Uniform Building Code's simplified procedures were not easily applied. The Board conducted a structural evaluation and informed DOE in a letter dated May 30, 2003, that the structure was adequate for its intended storage mission, but new missions that increased the material at risk would require further evaluation.

Fire Safety at LANL. The Board continued to follow the fire protection upgrade program and Cerro Grande Fire recovery work currently underway at Los Alamos National Laboratory (LANL). In a January 2003 letter to the Secretary of Energy, the Board expressed concern over the safety impacts of rescinding \$75M of Cerro Grande funds on fire protection projects. The funds were subsequently reinstated for these critical projects.

Examples of FY 2003 Accomplishments

Pit Disassembly and Conversion Facility. The Board has been reviewing the Title I design for the Pit Disassembly and Conversion Facility (PDCF). While the main structure of the PDCF Plutonium Processing Building was designed to survive the design basis earthquake, this is not the case for many of the 2-hour fire barriers between fire zones. As a result, a postulated seismically-induced full-facility fire could lead to calculated offsite dose that exceed the evaluation guideline. The Board issued a letter on May 13, 2003, urging DOE to consider upgrading the design of the fire barriers to withstand the design basis earthquake, eliminating the potential for a full-facility fire.

Emergency Operations Center at LANL. The Board identified a weakness in DOE's plans for construction of a new Emergency Operations Center (EOC) at LANL. Located on a seismic fault, the EOC could itself become nonoperational during a seismic event, and thus be unable to coordinate emergency operations related to that event. The Board suggested that it would be better to consider the new EOC as one element in an emergency system that included an older EOC and a mobile command center. In FY 2003, a mobile command center was procured and the new EOC system is now nearing completion.

Plutonium-238 Scrap Recovery Line at LANL. In FY 2003, the Board urged DOE and LANL to take action to address safety issues with startup of the new Pu-238 scrap recovery line that had been identified by the Board in FY 2002. DOE and LANL have taken some actions to improve safety, including revising the process hazard analysis. The Board continues to urge DOE and LANL to make improvements in implementing engineered controls and Technical Safety Requirements (TSRs) that are appropriate for a production operation. While these activities are in progress, LANL and DOE have deferred the start-up of the scrap recovery line.

LANL Classified Experiment. For several years, the Board has pushed for resolution of longstanding concerns regarding the hazards of certain portions of the operations associated with the LANL dynamic experiments. The Board has observed some improvements; however, the preliminary design review suffered from inadequate coverage of the relevant engineering disciplines and limited participation from the reviewers. These concerns were communicated to DOE and LANL management. As a result, portions of the design review will be repeated. The Board also successfully enforced agreement on a project standard on vessel construction.

Plutonium Storage at SRS. In response to a Congressional reporting requirement, the Board has performed numerous reviews of the adequacy of facilities and systems for long-term storage of plutonium at SRS. This study is not yet complete, but the Board has already informed DOE of several issues of near-term safety significance regarding fire protection; lightning protection; electrical, instrumentation, and control systems; and the safety bases for plutonium storage and packaging facilities at SRS.

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 health and safety of the workers and the public.

Examples of FY 2002 Accomplishments

Fire Protection in B-1 Wing at Y-12. Proposed upgrades to the fire protection program supporting the wet chemistry area consisted of minor plant improvements and nearly 35 administrative controls. The Board noted significant problems with maintaining administrative controls at Y-12, and identified inconsistencies in the safety basis supporting this operation. Based on interactions with the Board, NNSA acknowledged the safety issue, re-evaluated the safety basis, and is considering fixed fire suppression to protect the structure and its workers.

Building 12-64 Seismic Analysis at Pantex. In 1998, the Board wrote DOE, expressing concern with the seismic response of Building 12-64. In 2002, NNSA informed the Board of its intention to upgrade Building 12-64 in preparation for resuming nuclear explosive operations there. A subsequent meeting between NNSA personnel and the Board's staff identified concerns with analyses that had been completed to address the Board's original concerns. Efforts to improve the analyses and identify potential engineering solutions have begun.

Plutonium-238 Scrap Recovery Line at LANL. LANL was proceeding toward initial operation of the plutonium-238 scrap recovery line by the end of FY 2002. The Board noted that the project had not fully characterized and developed controls to address the hazards associated with this operation. DOE and LANL actions to respond to these issues and safely start up the scrap recovery line have just begun.

LANL Classified Experiment. The Board noted that for key aspects of this experiment, engineering approaches developed to control hazards have been insufficient, particularly given the stated schedule and intent to complete a documented safety analysis consistent with that schedule. DOE is reviewing potential actions.

Emergency Power System at the LLNL Plutonium Facility. In April, 2002, the Board identified deficiencies in LLNL's emergency electrical power system, which did not meet safety-class standards and IEEE codes. As a result of the Board's efforts, LLNL developed an action plan to correct the deficiencies.

Lightning Protection at LANL. In a letter dated August 6, 2002, the Board noted that the safety-class lightning protection system at the LANL's Weapons Engineering and Tritium Facility does not appear to provide adequate lightning protection for the facility. In addition, the Board attached a report presenting additional deficiencies with the lightning protection systems at various facilities at LANL. LANL personnel are working to address these issues.

Emergency Operations Center at LANL. The new Emergency Operations Center (EOC) was tentatively sited in the deformation zone associated with the seismically active Pajarito fault. The Board noted that basic emergency operations could be impacted in the event of an earthquake, and that it would be better to consider the new EOC as one element in an emergency system which included an older EOC and a mobile command center. LANL agreed that this concept provided a more robust capability, and it is being implemented.

Hanford Spent Nuclear Fuel Project. During FY 2002, substantial progress was made in implementation of Recommendation 94-1 to stabilize spent nuclear fuel from the Hanford K-Basins. DOE completed construction of a system to remove fuel from the K-East Basin for stabilization. The risk from continued storage of the degrading fuel and sludge in the K-East Basin will be mitigated when this system becomes operational in early FY 2003.

Site-Specific Safety Issue Reviews. At LLNL, a review of the emergency power system in Building 332 disclosed a lack of understanding of system vulnerabilities. As a result of this review, the contractor has committed to perform a comprehensive reliability study of the system.

Highly Enriched Uranium Materials Facility at Y-12. The Board's staff conducted in-depth reviews of the design of the Highly Enriched Uranium Materials Facility at Y-12. The Board concluded that additional design work was needed in order to more accurately document the design bases and to specify the general design criteria and specific

Examples of FY 2002 Accomplishments

requirements for safety class systems, structures, and components at the facility. As a result of the Board's efforts, a number of immediate safety improvements were implemented. DOE agreed to address the Board's concerns regarding building foundation alternatives and the need to obtain higher-quality data on soil and rock material properties of the site.

In addition, the general design criteria have been changed to more adequately capture the appropriate codes and standards.

Hanford Waste Treatment Plant. The Board's staff continued the review of the design and construction activities related to the Hanford Site's Waste Treatment Plant. Specific structural reviews focused on the facility site geotechnical issues, site seismicity, and the structural adequacy of the facility basemat design. The Board issued a letter to DOE on August 8, 2002, describing concerns regarding the structural design margins being used in view of the aggressive design and construction schedule for this project.

**Nuclear Safety
Programs and Analysis**

6. PERFORMANCE GOAL 4: NUCLEAR SAFETY PROGRAMS AND ANALYSIS

DOE develops, maintains, and implements regulations, requirements, and guidance; and establishes and implements safety programs at defense nuclear facilities as necessary to ensure adequate protection of 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 2007, 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 2007 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 is used to reduce further the risks of future work.
- Ensure that 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.

Performance Goal 4

Nuclear Safety Programs and Analysis. DOE develops, maintains, and implements regulations, requirements, and guidance; and establishes and implements safety programs at defense nuclear facilities as necessary to ensure adequate protection of health and safety of the workers and the public.

FY 2007 Performance Objectives

The Board will continue to assess the adequacy of proposed changes to DOE directives to ensure that any revisions are appropriate and adequate. The results of reviews completed by the Board will be provided to DOE for action. The Board anticipates that approximately 20 DOE directives that may impact public and worker health and safety require review, of which two or three are likely to require significant Board and staff interaction to ensure satisfactory resolution of potential issues. In those rare cases in which new directives are determined to be required, the Board will work with DOE to ensure that the applicable documents are developed adequately. The Board also expects to continue its involvement in the efforts of the National Nuclear Security Administration (NNSA) to establish its own directive system. It is estimated that 25 NNSA directives will also require review. As a result of these reviews, new or modified health and safety directives will be issued in an enhanced form, resulting in improved safety through standardized requirements and guidance that provide for adequate protection of the workers and the public. As a result of the creation of the Office of Nuclear Safety Research in response to Recommendation 2004-1, DOE is expected to issue several implementing guides, research protocols, and the components of a safety research program, which the Board will review to ensure it has the impact on safety intended in the Board's recommendation.

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

- Activity-level ISM implementation at sites with performance indicators judged to have higher than expected rates of abnormal occurrences related to worker protection.
- Activity-level ISM for non-10 CFR 830 activities.
- Validation of at least one site office review of activity-level ISM.
- Validation of at least one ISM review by the DOE Office of Independent Oversight and Performance Assurance.
- Implementation of line oversight of ISM per DOE P 226.1 at one EM site and one NNSA site.
- Implementation of Recommendation 2000-2, *Configuration Management, Vital Safety Systems*.
- Implementation and effectiveness of ISM at defense nuclear facilities.

The Board has noted that considerable progress has been made in the implementation of ISM, but that continued DOE efforts are necessary to maintain ISM systems and ensure continuous improvement across the complex. Specific functional areas will be sampled to a greater depth, such as training and qualification, quality assurance, nuclear criticality safety, software quality assurance, conduct of operations, readiness preparations, hoisting and rigging. As a result of these reviews, DOE will provide an adequate approach and schedule for resolution of identified issues that supports safe operation of defense nuclear facilities.

The Board will complete its initiative to identify the potential issues associated with DOE's and NNSA's new policies on line oversight and contractor assurance and ensure DOE and NNSA senior management address these issues before implementing the new policies. The Board anticipates that the effort to complete the implementation plan associated with Recommendation 2004-1, *Oversight of Complex, High Hazard Nuclear Operations*, will require significant Board and staff interaction with multiple federal and contractor agencies.

The Board will verify that roles, responsibilities, experience, and competencies required to protect the workers and the public are explicitly defined and implemented for both DOE and its contractor personnel.

Performance Goal 4

Nuclear Safety Programs and Analysis. DOE develops, maintains, and implements regulations, requirements, and guidance; and establishes and implements safety programs at defense nuclear facilities as necessary to ensure adequate protection of health and safety of the workers and the public.

FY 2006 Performance Objectives

The Board will continue to assess the adequacy of proposed changes to DOE directives to ensure that any revisions are appropriate and adequate. The results of reviews completed by the Board will be provided to DOE for action. The Board anticipates that approximately 30 DOE directives that may impact public and worker health and safety require review, of which two or three are likely to require significant Board and staff interaction to ensure satisfactory resolution of potential issues. In those rare cases in which new directives are determined to be required, the Board will work with DOE to ensure that the applicable documents are developed adequately. Many of these changes will be as a result of the impact of DOE Order 226.1, Implementation of DOE Oversight Policy, on the orders of interest to the Board.

The Board also expects to continue its involvement in the efforts of the National Nuclear Security Administration (NNSA) to establish its own directive system. It is estimated that 25 NNSA directives will also require review. As a result of these reviews, new or modified health and safety directives will be issued in an enhanced form, resulting in improved safety through standardized requirements and guidance that provide for adequate protection of the workers and the public.

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- Activity-level ISM implementation at sites with performance indicators judged to have higher than expected rates of abnormal occurrences related to worker protection.
- Activity-level ISM for non-10 CFR 830 activities.
- Validation of at least one site office review of activity-level ISM
- Validation of at least one ISM review by the DOE Office of Oversight.
- Implementation of line oversight of ISM per DOE P 226.1 at one EM site and one NNSA site.
- Implementation of Recommendation 2000-2, *Configuration Management, Vital Safety Systems*.
- Implementation and effectiveness of ISM at defense nuclear facilities.

The Board has noted that considerable progress has been made in the implementation of ISM, but that continued DOE efforts are necessary to maintain ISM systems and ensure continuous improvement across the complex. Specific functional areas will be sampled to a greater depth, such as training and qualification, quality assurance, nuclear criticality safety, software quality assurance, conduct of operations, readiness preparations, hoisting and rigging. As a result of these reviews, DOE will provide an adequate approach and schedule for resolution of identified issues that supports safe operation of defense nuclear facilities.

The Board will complete its initiative to identify the potential issues associated with DOE's and NNSA's new policies on line oversight and contractor assurance and ensure DOE and NNSA senior management address these issues before implementing the new policies. The Board anticipates that the effort to complete the implementation plan associated with Recommendation 2004-1, *Oversight of Complex, High Hazard Nuclear Operations*, will require significant Board and staff interaction with multiple federal and contractor agencies.

The Board will verify that roles, responsibilities, experience, and competencies required to protect the workers and the public are explicitly defined and implemented for both DOE and its contractor personnel.

Performance Goal 4

Nuclear Safety Programs and Analysis. DOE develops, maintains, and implements regulations, requirements, and guidance; and establishes and implements safety programs at defense nuclear facilities as necessary to ensure adequate protection of health and safety of the workers and the public.

Examples of FY 2005 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 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. The Department has also initiated a major effort to improve electrical safety across the complex.

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 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

Examples of FY 2005 Accomplishments

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 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 analyses that determined that 20 additional Facility Representatives were needed at six NNSA sites. However, funding only allowed hiring 5 FRs in FY 2005, and a budget request for 15 more FR positions has been submitted for FY2006. Additionally, the guidance for the FR staffing analysis in DOE-STD-1063-2000 is being revised, and projected for re-issuance in mid-2006.

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

Performance Goal 4

Nuclear Safety Programs and Analysis. DOE develops, maintains, and implements regulations, requirements, and guidance; and establishes and implements safety programs at defense nuclear facilities as necessary to ensure adequate protection of health and safety of the workers and the public.

Examples of FY 2004 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 37 directives associated with, but not limited to, worker protection management, electrical safety, software quality assurance, and DOE's Occurrence Reporting and Processing System. 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:

- **Applicability of DOE Order Requirements.** The Board has been instrumental in preventing enactment of a DOE proposal to restrict "the applicability of DOE Orders to only major facility management contractors." This proposal would have the detrimental effect of undermining the application of specific safety-related requirements to a wide range of DOE contractors and sub-contractors, including contractors whose personnel are conducting hands-on work on nuclear materials.
- **Electrical Safety.** In June 2001, the Board urged DOE to take a proactive stance to ensure adequate electrical safety. DOE agreed to update the *Electrical Safety Handbook* in August 2002. However, in July 2003 the Board learned that DOE had deleted much of the technical content in the proposed revision. The Board informed DOE that this was unacceptable, especially in light of the high rate of electrical safety incidents observed across the defense nuclear complex. DOE agreed to revise the handbook to include the details of electrical safety and a guidance for effective electrical safety program. The Board worked closely with DOE to ensure appropriate technical safety content was included. In July 2004, DOE submitted a revised handbook to the Board and to the field for comment. DOE plans to issue the handbook by October 2004.
- **DOE Functional Area Qualification Standards.** During the past three years, the Board has driven DOE to upgrade and incorporate 30 functional area qualification standards for federal employees into the DOE Directives System. During the past year, the Board's staff reviewed and evaluated the final 14 DOE functional area qualification standards in such areas as nuclear safety, construction management, facility maintenance, technical training, and civil engineering. This effort significantly improved the technical content and rigor of these DOE qualification standards, and will help to raise the technical competence of DOE personnel.
- **Hoisting and Rigging Safety.** The Board continued to follow closely DOE's programs, policies, and practices in activities related to hoisting and rigging at defense nuclear facilities. Insights from a number of field reviews were integrated to provide substantive input toward revising DOE-STD-1090-2001, *Hoisting and Rigging*. As a result of the Board's observations and input, significant revisions were made to this standard that will further enhance the safety of hoisting and rigging activities throughout the DOE complex.

Oversight of Complex, High-Hazard Nuclear Operations. During FY 2004, the Board conducted eight public hearings to examine DOE's methods of ensuring safety at defense nuclear facilities. The Board was concerned that changes in oversight contemplated by DOE and NNSA could unintentionally reduce nuclear safety. The Board also sought to benefit from the lessons learned as a result of investigations conducted by the Columbia Accident Investigation Board and the U.S. Nuclear Regulatory Commission following the discovery of the deep corrosion in the reactor vessel head at the Davis-Besse Nuclear Power Station. The Board concluded that there was cause for concern with regard to the potential increase in the possibility of nuclear accidents in the nuclear defense complex as evident in: (1) DOE's increased emphasis on productivity at the possible expense of safety, (2) the loss of technical competency and understanding at high levels of DOE's organizational structure, (3) the apparent absence of a strong safety research focus, and (4) the reductions in the central oversight of safety. On May 21, 2004, the Board issued Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*, to ensure that the likelihood of a serious accident, facility failure, construction problem, or nuclear incident will not be increased as a result of DOE's well-intentioned changes. On July 21, 2004, the Secretary of Energy accepted the Board's Recommendation and tasked a team to begin developing an adequate implementation plan.

Examples of FY 2004 Accomplishments

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

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

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

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

- At the Pantex Plant, multi-unit nuclear explosive operations remain suspended for the present until further testing and analysis can resolve the concerns or until adequate controls can be developed. Additional controls have also been imposed on some operations to assure safety given new information regarding electro-static discharge environments.

Examples of FY 2004 Accomplishments

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

Recommendation 2002-3. In Recommendation 2002-3, *Requirements for the Design, Implementation, and Maintenance of Administrative Controls*, the Board identified the need for DOE to improve its guidance and expectations with respect to important administrative controls at defense nuclear facilities. As a result of the Board's Recommendation, the Department has developed and implemented a plan to improve the reliability and effectiveness of administrative controls that serve safety functions. Recent efforts have focused on development of a draft standard governing the development and implementation of specific administrative controls in the defense nuclear complex. Additionally, DOE has developed a set of training materials to be used to introduce the new and revised requirements to its field elements. The Board continues to work closely with DOE to finalize this guidance to ensure that a proper safety focus is afforded on administrative controls that provide important safety-related functions at DOE facilities.

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

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

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

Performance Goal 4

Nuclear Safety Programs and Analysis. DOE develops, maintains, and implements regulations, requirements, and guidance; and establishes and implements safety programs at defense nuclear facilities as necessary to ensure adequate protection of health and safety of the workers and the public.

Examples of FY 2003 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 34 directives associated with, but not limited to, worker protection management, electrical safety, software quality assurance, and DOE's Occurrence Reporting and Processing System. At year's end, both staffs were in the process of resolving issues on 26 pending directives to improve the content, clarity, and consistency in safety requirements and guidance. Examples include:

- **Worker Protection Management.** Members of the Board's staff worked closely with DOE to revise the requirements in Change 1 to DOE Order 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*. This effort was completed in June 2003, culminating in an updated directive that included important new biological agent protection requirements developed in response to increased homeland security awareness.
- **Electrical Safety.** In June 2001, the Board had urged DOE to take a proactive stance to ensure adequate electrical safety. DOE agreed to update the *Electrical Safety Handbook* in August 2002. However, in July 2003 the Board learned that DOE had deleted much of the technical content in the proposed revision. The Board informed DOE that this was unacceptable, especially in light of the high rate of electrical safety incidents observed across the defense nuclear complex. DOE is now revising the handbook.
- **Environment, Safety and Health Reporting.** During most of 2003, the Board worked closely with DOE to consolidate and revise the various DOE reporting orders into a single directive. The Board provided formal comments on draft DOE Order 231.1A, *Environment, Safety and Health Reporting*, plus its many supporting documents, including DOE Manuals 231.1-1, 231.1-2, *Occurrence Reporting and Processing of Operations Information*, and DOE Guides 231.1-1, *Occurrence Reporting and Performance Analysis Guide*, and 231.1-2, *Occurrence Reporting Causal Analysis*. These revisions, which are key to maintaining a strong feedback and improvement program across the defense nuclear complex, are being implemented at the start of FY 2004. The Board will monitor closely the effectiveness of the revised program during this implementation phase.

National Nuclear Security Administration (NNSA) Policy Letters. During FY 2003, NNSA instituted an internal system of directives under the authority of Public Law 106-65. However, the Board initiated a review of the system and found that the system architecture had not been adequately described, directives being issued were potentially in conflict with existing DOE directives, and all of the conditions of the public law had not yet been satisfied. The Board worked closely with NNSA throughout the year to design a system that would meet the needs of NNSA, while protecting the integrity of the environment, safety, and health requirements already established under DOE. This effort will continue into FY 2004. In the interim, the Board has reviewed 22 advance copies of proposed NNSA Policy Letters, in anticipation of their issue.

Software Quality Assurance: Considerable Board resources were expended during FY 2002 reviewing draft DOE Order 203.X, *Software Quality Assurance (SQA)*. As a result of inadequate progress toward resolution of the Board's concerns with SQA, on September 23, 2002, the Board issued Recommendation 2002-1, *Quality Assurance for Safety-Related Software*. Development of the Implementation Plan (IP) for this recommendation required significant interaction between the Board and DOE—it was finally accepted by the Board on April 10, 2003. The Board will follow DOE's implementation efforts closely in FY 2004. In a related effort, members of the Board's staff are leading efforts to revise and update ANSI/ANS Standard 10.4, *Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry*. This standard will be important to both the Nuclear Regulatory Commission (NRC) and DOE.

Integration of Hazards Analyses. The Board reviewed the contents of several DOE directives that contain requirements for hazard and accident analyses, performed site reviews, and identified less-than-adequate implementation of safety requirements due to inconsistencies and lack of integration of the directives. The directives

Examples of FY 2003 Accomplishments

included DOE Guides for implementation of 10 CFR 830, and DOE Orders 151.1A, 420.1, and 451.1A. As a direct result of the Board's activities, DOE issued a handbook entitled *Integration of Multiple Hazard Analysis Requirements and Activities*, which has helped several DOE contractors to perform their activities in a safer, more integrated, and significantly more cost effective manner. Several contractors realigned their organizational structure to benefit from the Board's findings and achieved improved operational safety.

Safety Analysis Methodology. As part of its ongoing review of the adequacy of health and safety directives, the Board noted a number of weaknesses with respect to the implementation of the methodology associated with the performance of safety analyses at several defense nuclear facilities. Consequently, the Board issued a series of letters to the Secretary of Energy outlining these concerns. As a result, the Department committed to increased attention and vigilance in its acceptance and oversight of documented safety analyses.

Design Requirements and Guidance for Facilities. The Board had previously noted that the design requirements for nuclear facilities in DOE Order 420.1, *Facility Safety*, and its associated guidance documents were not being implemented at LANL and requested a report describing the status of implementation of the DOE Order and applicable guidance at all NNSA sites having defense nuclear facilities. Such requirements and guidance are important for properly selecting discipline-specific industry codes and standards for safety-class and safety-significant structures, systems and components. As a result, NNSA has now developed complete crosswalks between the codes and standards in the implementation guide and those in the appropriate contractor documents such as design manuals, design criteria, and procedures, and is having contractors update their internal requirements and guidance documents.

National Nuclear Security Administration Training and Qualification. In a letter dated June 5, 2003, the Board noted concerns with Federal oversight of training and qualification at the Pantex Plant. Most notably, required reviews of contractor training and qualification programs were not being performed. In July, the Board broadened their concern to all National Nuclear Security Administration (NNSA) sites, citing the concern that failure to verify the adequacy of training and qualification programs would raise questions regarding the reliability of the significant number of administrative control programs within the NNSA system. In response, NNSA has initiated a review at all field sites. Necessary corrective actions will be implemented in FY 2004.

Functions Responsibilities and Authorities (FRA) Documents. The Board continued to follow DOE activities in the closure process associated with Recommendation 98-1, *Resolution of Issues Identified by DOE Internal Oversight*. DOE is also obligated under DOE Manual 411.1, *Safety Management Functions Responsibilities and Authorities (FRA) Manual* to annually update the FRA Manual to reflect changes in organizational responsibilities and authorities. Despite significant effort on the part of the Board, DOE remains without a credible FRA Manual at the corporate level, and without sub-tier FRAs in a number of DOE organizational elements. The Board will continue to work with the DOE program offices throughout FY 2004 to revise their FRA documents to ensure safety roles and responsibilities are clearly defined.

Contractor System Engineers. The Board worked with DOE to develop formal training and qualification requirements for contractor system engineers in response to Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*. The Board conducted progress reviews of the programs at the Y-12 National Security Complex, the Pantex Plant, the Hanford Site (Fluor Hanford, CH2M Hill, and Pacific Northwest National Laboratory), and Lawrence Livermore National Laboratory (LLNL), finding that the effectiveness of site contractors' systems engineer programs varied significantly. Only the contractors for Y-12 and the Hanford tank farms had maturing, well-founded, and robust programs. The contractors' systems engineer programs at the remaining sites suffered from a number of shortcomings and were much less effective. The Board will continue to engage with DOE as the contractors' system engineer programs are implemented.

Federal Technical Oversight of Safety Systems. While maintaining DOE's implementation of Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, the Board found that the DOE subject matter expert (SME)/systems engineer programs were weak at all four sites reviewed. Although each DOE site office

Examples of FY 2003 Accomplishments

had established an SME organization, few site offices had a fully staffed and implemented program. DOE SMEs have not yet had a meaningful presence in the field, and the intended benefits from these programs in terms of contractor oversight have yet to be realized fully. While DOE has developed an adequate path forward to provide qualified federal personnel, no site reviewed had fully achieved that objective. The Board will continue to urge DOE to apply more senior management attention and resources to staff and qualify technical personnel for these systems engineering organizations.

Site Specific Safety Reviews. The Board conducted a number of site-specific safety reviews in the DOE complex. In particular, the Board conducted reviews associated with the adequacy of the development and implementation of the documented safety analyses (DSAs) performed as a result of the requirements specified in 10 CFR 830, *Nuclear Safety Management*. The Board performed detailed safety reviews at the following facilities: Savannah River Site (SRS) and Hanford tank farms, Lawrence Livermore National Laboratory (LLNL) plutonium facility, Waste Isolation Pilot Plant (WIPP) remote handled transuranic waste operations, and at the Nevada Test Site (NTS) device assembly facility, radioactive waste management complex and U1a underground facility. During the course of these reviews, the Board identified a number of important safety issues that required resolution by DOE. For example, the SRS review identified the need for additional rigor in the protection of important assumptions and selection of appropriate controls. At LLNL, the Board's review identified the need for additional analysis to ensure the appropriate safety classification of important equipment and also the need for DOE to exercise increased vigilance in ensuring that all the necessary conditions of approval are being met with respect to safety evaluation reports. At NTS, the Board found that NNSA and its primary support contractor did not have adequate staff or nuclear safety management programs to support the operation of nuclear facilities. DOE and NNSA are taking corrective actions for all of these findings.

Administrative Controls. In late 2002, the Board noted that many administrative controls currently serve in safety-related applications, but may not have been developed with the same rigor as an engineered control. As a result, these administrative controls may not always have the same level of reliability as would be expected from an analogous safety-related engineered feature. Therefore, the Board issued Recommendation 2002-3, *Requirements for the Design, Implementation, and Maintenance of Administrative Controls*. In response, DOE developed an Implementation Plan that committed to strengthen the guidance and expectations associated with the development of administrative controls and to review the existing set of administrative controls to ensure that these revised expectations are being met. This plan will be implemented throughout FY 2004-5.

Software Quality Assurance at the Pantex Plant. The Pantex Plant contractor attempted to reduce errors associated with several administrative control programs by using computer-based systems. Due to inadequate software quality assurance (SQA) practices, there has been a continuing series of problems with the installed Move Right software package, resulting in errors in material control and accountability. Similar problems were noted in the development of the site's Interactive Electronic Procedures. The Board highlighted these issues to DOE, and significant corrective actions are in progress for both of these software products. Additionally, Pantex procedures for improved SQA are being developed.

Hoisting and Rigging Safety. The Board has noted that reportable hoisting and rigging events continue to occur throughout the defense nuclear complex. As a result, the Board has developed a special initiative to review the adequacy of hoisting and rigging operations at selected DOE facilities. During this fiscal year, the Board completed reviews at the Savannah River Site and the Pantex Plant. Significant feedback for improvement was provided to the respective facilities. As a result of the success of this initiative, additional reviews are planned for the coming fiscal year.

Fire Safety at LANL. In a January 2003 letter to the Secretary of Energy, the Board expressed concern over the safety impacts of rescinding \$75M of Cerro Grande funds on fire protection projects, as proposed by DOE. The funds were subsequently reinstated for these critical projects for FY 2003.

Examples of FY 2003 Accomplishments

Unreviewed Safety Question (USQ) Procedures. The USQ process required by 10 CFR 830.203 is the mechanism for ensuring that the substantial investment in the safety bases for defense nuclear facilities isn't invalidated by undocumented and/or unauthorized changes. In FY 2003, the Board reviewed seven USQ procedures and identified substantial areas of noncompliance with the governing requirements. Responding to discussions of the issues raised, DOE required substantial revisions of the procedures, and required the contractors to include guidance in the procedures submitted for approval that had previously been relegated to documents that were not subject to DOE approval.

Performance Goal 4

Nuclear Safety Programs and Analysis. DOE develops, maintains, and implements regulations, requirements, and guidance; and establishes and implements safety programs at defense nuclear facilities as necessary to ensure adequate protection of health and safety of the workers and the public.

Examples of FY 2002 Accomplishments

As part of its ongoing review of new and revised DOE directives, the Board and its staff evaluated and provided constructive critiques of 19 directives associated with, but not limited to, hazards from natural phenomena, quality assurance, facility representative program, and DOE's emergency management program. At year's end, both staffs were in the process of resolving issues on 23 pending directives to improve the content, clarity, and consistency in safety requirements and guidance. Examples include:

- **Natural Phenomena Hazards.** Members of the Board's staff worked closely with DOE to revise criteria for design and evaluation of DOE facilities' ability to withstand hazards arising from natural phenomena such as earthquakes, severe storms, and floods (Revision of DOE-STD-1020-94). This effort was completed in January 2002, culminating in an updated standard meeting the requirements of current model building codes such as IBC 2000 and current industry standards. Three related standards (DOE-STD-1021-93, -1022-94 and -1023-95) were reviewed and reaffirmed, addressing performance categorization guidelines for systems, structures, and components; site characterization criteria; and criteria for assessment of natural phenomena hazards.
- **Software Quality Assurance.** Considerable staff resources were expended during FY 2002 in reviewing a new draft DOE Order, O-203.X, *Software Quality Assurance*. The Board's staff submitted formal comments to DOE in December 2001. The resolution of the staff's comments, as well as those from internal-DOE reviewers, is still pending.
- **Facility Representative Program.** The Board's staff reviewed the qualification standard for DOE Facility Representatives (TRNG-0019, *Facility Representative Functional Area Qualification Standard*). As a result of the staff's efforts, as well as those of DOE participants, this key standard was issued expeditiously in April 2002.
- **Emergency Management.** During 2002, the Board's staff provided comments on DOE's draft order on emergency management, DOE O 151.1B, *Comprehensive Emergency Management System*. In addition, the staff reviewed and commented on revisions to an associated DOE Manual addressing programs for coping with: (1) onsite emergencies involving hazardous materials at fixed facilities, and (2) offsite emergencies associated with transportation of hazardous materials in DOE's possession. These revisions, which are key to strengthening DOE's emergency response posture as a result of the events of September 11, 2001, were still pending at the end of FY 2002. The Board will continue to urge DOE to strengthen the emergency management directives to ensure that a fully responsive department-wide emergency management program is in place.

Contractor System Engineers. The Board worked with DOE to develop formal training and qualification requirements for contractor system engineers in response to Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*. As a result, DOE revised its directives to require the contractors to implement a formal system engineering program. The sites have begun to implement these programs.

Federal Technical Oversight of Safety Systems. In Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, the Board urged DOE to identify federal expertise needed to ensure effective oversight of contractor safety systems. In response, DOE's performed an analysis that identified 31 additional personnel were needed for this important function, and that critical technical skills gaps existed in the areas of mechanical engineering, fire protection, electrical engineering, instrumentation and control, and nuclear criticality. Also, DOE determined that the majority of the skill gaps resided in the Office of River Protection, Los Alamos Area Office, Oakland Area Office, and the Y-12 Area Office. The Board and its staff will continue to engage DOE as they recruit, train and qualify federal employees for oversight of the vital safety systems.

Nuclear Criticality Safety Program. The Board continued to stress the need for stable funding for future criticality safety program elements, dedicated emphasis on maintenance of criticality safety engineering training, and the need to minimize the gap in criticality services during the relocation of the Los Alamos Criticality Test

Examples of FY 2002 Accomplishments

Facility. Throughout 2002, the staff conducted onsite reviews of selected facilities at LANL, SRS, and ORNL and observed improving trends in criticality safety as a result of the Board's efforts under Recommendation 97-2, *Continuation of Criticality Safety at Defense Nuclear Facilities*.

Human Factors Engineering. The staff conducted site-specific reviews and collected complex-wide information related to the use of human factors engineering principles in the evaluation of the appropriateness and effectiveness of administrative controls. In particular, reviews conducted at the Pantex and LLNL Sites in November 2001 and February 2002, respectively, focused on the development, implementation, and verification of selected administrative controls. Further, another safety review at the Y-12 facility in April 2002 indicated a high reliance on administrative controls in lieu of engineered fire protection features. In letters dated January 15, 2002 and May 13, 2002, the Board communicated a number of specific concerns related to the use of administrative controls. As a result of the Board's effort, DOE now recognizes the safety issues, and is working to resolve them.

Contractor Training and Qualification. The Board's staff reviewed the safety basis and supporting programs of the Waste Examination Facility (WEF) at the Nevada Test Site (NTS) in January 2002 and its readiness to begin operations as a Hazard Category 3 (HC-3) nuclear facility. The staff noted that many administrative support programs, such as the training and qualification program, were not adequately developed nor implemented to meet the requirements of nuclear facilities as addressed in *10 Code of Federal Regulations (CFR) Part 830, Nuclear Safety Management*. The training and qualifications did not have the additional rigor necessary for an HC-3 nuclear facility. Training was not adequate for facility operators or outside maintenance support to perform surveillance requirements or pre-operational checks. The Board letter of March 7, 2002, transmitted these observations. DOE's efforts to address the issues is ongoing.

Site-Specific Safety Issue Reviews. At the Hanford Site, a review of the maintenance program at the Spent Nuclear Fuel Project program identified weaknesses which threatened to delay the schedule for removing the fuel from the reactor basins. Similarly, at Y-12, reviews of the maintenance program identified programmatic weaknesses which significantly impaired the effectiveness of the program. As a result of these reviews, DOE and the contractor improved activities which have strengthened both programs. At SRS, a review of the hazards associated with the storage of depleted uranium resulted in a Board reporting requirement and DOE initiatives to consolidate and disposition several metric tons of this hazardous material at the site for safer long term storage.

Recommendation 2000-2. Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, addressed the degrading condition of safety systems, calling upon DOE to assess the condition of vital safety systems, designate technically competent system engineers, codify this program in the DOE Directives System, and ensure that DOE possesses the requisite technical expertise to monitor and oversee these systems. In response, DOE completed detailed reviews of vital safety systems that identified equipment degradation as well as programs (such as the drawing control) that needing improvement. DOE is taking steps to address these deficiencies. As a result of the Board's efforts, DOE has taken positive steps to ensure the condition of vital safety systems is understood and controlled.

Unreviewed Safety Question Procedures. The Unreviewed Safety Question (USQ) process required by 10 CFR 830.203 is the mechanism for ensuring that the substantial investment in the safety bases for defense nuclear facilities isn't invalidated by undocumented and/or unauthorized changes. This year, the Board initiated a complex-wide review of the USQ process and implementing procedures at Pantex, LLNL, LANL, and SRS. As a result of these interactions, substantial improvements were made to the Pantex Plant's procedure to bring it into compliance with 10 CFR 830.203. In addition, contractor personnel agreed to incorporate specific improvements into future revisions of the LLNL, LANL and SRS procedures.

Integrated Safety Management (ISM) Annual Review Process. The Board's staff continued to monitor the implementation and effectiveness of ISM at defense nuclear facilities. The Board noted that considerable progress had been made in the implementation of ISM, but that continued DOE efforts were necessary to maintain ISM systems to ensure continuous improvement across the complex. The Board communicated specific concerns with

Examples of FY 2002 Accomplishments

the annual ISM review process in letters. In response, DOE held a conference to explore methods for strengthening the annual ISM review process and to share lessons learned.

Financial Tables

OBJECT CLASS SUMMARY

Actual obligations for FY 2005, projected obligations for FY 2006, and the Board's Budget Request for FY 2007 are presented by object class accounts in Exhibit A. The Board proposes to utilize the budget resources requested in the following manner:

Salaries and Benefits. The FY 2007 expenditure request includes funding of \$15,595,970 to support the projected salary and benefit costs for 100 FTEs. The rationale and justification for the additional salaries and benefits costs are explained in detail in the executive summary on page 9. The funding for salaries and benefits represents 69 percent of the Board's FY 2007 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:

- Actual pay increase of 3.1 percent beginning in January 2006
- Budgeted pay increase of 2.3 percent beginning in January 2007
- Employee benefits of 30 percent of salaries, or \$36,434 per FTE in FY 2007

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. Essentially all of the technical staff hold technical Masters' 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 maintains its on-site safety oversight of defense nuclear facilities by assigning experienced technical staff members to full-time duty at priority DOE sites. Currently, ten full-time site representatives are stationed at six DOE sites: 1) Pantex Plant to oversee nuclear weapons activities, including the weapons stockpile stewardship and weapons disassembly programs; 2) Hanford Site to monitor waste characterization and stabilization and facility deactivation; 3) Savannah River Site to monitor the DOE's efforts to deactivate facilities, stabilize waste materials, and store and process tritium; 4) Oak Ridge's Y-12 National security Complex to

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

2007 CONGRESSIONAL BUDGET REQUEST -- 2-6-06

BUDGET ACCOUNT	COST ELEMENT	2005 OBLIGATIONS (Actual)	FY 2006 FINANCIAL PLAN	FY 2007 PROJECTED BUDGET REQUEST
PERSONNEL SALARIES -- (11)		\$10,652,082	\$11,378,791	\$ 11,952,524
PERSONNEL BENEFITS -- (12)		\$ 3,258,200	\$ 3,409,826	\$ 3,643,446
TRAVEL -- (21)		\$ 614,950	\$ 713,000	\$ 703,000
TRANSPORTATION OF THINGS -- (22)		\$ 203,658	\$ 200,000	\$ 200,000
RENTAL PAYMENTS TO GSA -- (23.1)		\$ 1,942,634	\$ 2,500,000	\$ 2,513,000
COMMUNICATIONS & UTILITIES (23.3)		\$ 160,526	\$ 165,600	\$ 172,500
PRINTING & REPRODUCTION -- (24)		\$ 29,416	\$ 27,000	\$ 27,000
CONSULTING SERVICES -- (25.1)		\$ 1,017,994	\$ 1,000,000	\$ 900,000
OTHER SERVICES -- (25.2)		\$ 1,655,326	\$ 1,597,030	\$ 1,363,000
GOVERNMENT SERVICES -- (25.3)		\$ 300,994	\$ 676,614	\$ 702,000
SUPPLIES & MATERIALS -- (26)		\$ 231,367	\$ 290,000	\$ 305,000
CAPITAL ASSETS -- (31)		\$ 175,440	\$ 400,000	\$ 250,000
*** TOTAL OBLIGATIONS ***		\$20,242,585	\$22,357,861	\$ 22,731,470
NEW BUDGET AUTHORITY		\$20,105,856 *	\$21,811,680 **	\$ 22,260,000
UNOBLIGATED BALANCE - PREV. FY		\$ 982,341	\$ 1,217,882	\$ 671,701
RECOVERY OF PRIOR YR OBLIGATIONS		\$ 372,271	\$ -	\$ -
TOTAL BUDGETARY RESOURCES		\$21,460,467	\$23,029,562	\$ 22,931,701
EST. UNOBLIGATED BAL. - CUR. FY		\$ 1,217,882	\$ 671,701	\$ 200,231
APPROPRIATION		\$20,105,856	\$21,811,680	\$ 22,260,000
OUTLAYS		\$19,703,598	\$21,910,704	\$ 22,276,841
STAFF & BOARD MEMBERS (FTE'S)		91	100	100

* \$20,268,000 appropriation; \$162,144 rescission

**\$22,032,000 appropriation; \$220,320 rescission

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

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 firsthand 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. The Board requests \$703,000 to support the official travel of the Board Members and staff. Extensive travel is necessary to the various DOE defense nuclear facilities located throughout the United States in order for the 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 2005, Board Members, technical staff and the Board's outside technical experts made 199 team visits to major defense nuclear sites in support of its high priority public health and safety oversight mission.

The Board is also authorized to station staff members at DOE sites or facilities during critical construction and testing periods. The Board has assigned technical staff teams to round-the-clock monitoring of major start-up, 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 the 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 start-up of new DOE defense nuclear facilities, such as the Hanford 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. The Board has included \$200,000 in its FY 2007 Budget Request for the shipment of household goods for employees relocating to the Washington, DC area or to become site representatives at DOE facilities.

Rental Payments to GSA. The Board requests funds totaling \$2,513,000 to reimburse the General Services Administration (GSA) for projected office rental costs. This overhead expense represents approximately 11 percent of the Board's FY 2007 Budget Request. As explained in the discussion on the expiration of the Board's office space lease (page 10), GSA has negotiated a new lease for the Board effective in March 2006. While the new lease arrangements and final pricing are

in the final stages of negotiations between GSA and the building owner, GSA has estimated that the Board's rental payment to GSA will be \$2.513 million for FY 2007.

Communications and Utilities. The FY 2007 Budget Request includes \$172,500 for projected communications support costs. Funds in this account will be used for telephone services, Internet access charges, postage costs, special messenger services, and equipment rentals. 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. The budget request includes \$27,000 for reimbursing the U.S. Government Printing Office for publication of the required legal notices in the *Federal Register*. Routine printing and copying charges, including the Board's *Annual Report to Congress*, *Performance Accountability Report (PAR)*, and technical reports, are also included in this account.

Consulting Services. Although the Board's enabling legislation authorized the hiring of up to 150 FTEs, the Board is operating with a ceiling of 100 FTEs and due to staff attrition, employed only 85 full-time staff as of September 30, 2005. 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 High Level Waste Treatment Facility at Hanford. This includes the review of seismic analysis, structural loading, and construction plans to ensure the safety of this \$10 billion project. The Board obtains specialized contractor expertise in a variety of technical disciplines to augment its internal review capability and avoid any unnecessary impact on DOE's construction schedule.

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

A list of major technical support contracts, with a brief description of each contractor's areas of expertise, and a chart that reflects funding levels for this support are included on pages 76 through 79. The FY 2007 Budget Request includes \$900,000 in this account for technical support contracts to assist the Board in its health and safety reviews. This represents a 13% decrease from 2005 actual obligations and a 10% decrease from the FY 2006 Congressional Budget Request for outside technical expertise.

Other Services. The budget request includes \$1,363,000 to fund a wide range of recurring administrative support needs of the Board in FY 2007 such as an independent audit of the Board's financial statements, physical and cyber security, employee training, information technology support, court reporting, records storage and retrieval, and drug-free workplace testing and support.

Government Services. The Board's budget request includes \$702,000 for reimbursable support agreements with other Federal agencies to provide services such as: physical security, accounting, payroll, 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. This represents a \$131,000 increase from FY 2005 obligations, primarily as a result of a 42% projected increase in security charges from the Department of Homeland Security.

Supplies and Materials. The Board requests \$305,000 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.

Equipment. The FY 2007 Budget Request includes \$250,000 to replace outdated office equipment such as printers, copiers and graphic presentation equipment. Since maintenance contracts on outdated equipment are very costly, upgraded equipment is purchased "bundled" with maintenance contracts at little or no additional cost. This procurement strategy improves the efficiency of operations, reduces overall costs, and eliminates down time.

TECHNICAL SUPPORT CONTRACTS SUMMARY

A list of major technical support contracts, with a brief description of each contractor's areas of expertise, follows. The FY 2007 Budget Request includes \$900,000 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 2/06/06)

<u>CONTRACTOR</u>	<u>CONTRACT EXPIRATION DATE</u>	<u>DESCRIPTION OF WORK</u>
Dr. Harold Agnew	12/15/06	Provide technical expertise related to assembly, disassembly and testing of nuclear weapons. These services include assisting the Board in oversight activities at facilities charged with disassembly, safe handling, and storage of nuclear weapon systems.
Mr. Richard Collier	09/30/06	Provide expertise related to lightning safety issues at DOE's defense nuclear facilities. These services include assisting the Board in review, analysis and modeling of lightning protection systems. Examples of work include analysis of the risk presented by lightning in explosive areas and in and around large structures.
Mr. Joseph DiNunno	10/13/06	Provide technical assistance in reviewing, evaluating, and advising the Board on various issues related to Integrated Safety Management (ISM) programs at defense nuclear facilities.
Dr. Kevin J. Folliard	10/10/06	Provide expertise related to performance of structures during normal and extreme loading events, natural phenomenon events, and application of national consensus codes and standards. These efforts are primarily focused on concrete chemistry in construction designs.
Dr. James Jirsa	06/30/06	Provide technical support to the Board, specifically in review and evaluation of concrete structures. These efforts include review of construction designs for structural performance during normal and extreme loading events, natural phenomenon events, and application of national consensus codes and standards.

<u>CONTRACTOR</u>	<u>CONTRACT EXPIRATION DATE</u>	<u>DESCRIPTION OF WORK</u>
Dr. James L. Liverman	06/30/06	Provide technical support to the Board in the general subject area of Integrated Safety Management (ISM), quality assurance and radiation protection, specifically involving review and evaluation of amendments to 10 CFR 835 Rule, radiological protection standards, other radiological and environmental health and safety issues, and reviewing the development of DOE's quality assurance improvement plan.
Management Support Technology, Incorporated	02/28/06	Provides technical support to the Board, specifically involving the evaluation of directives and procedures governing operation and maintenance of defense nuclear facilities. In addition, provides technical support evaluating the implementation of Integrated Safety Management for ongoing operations and maintenance, and also preparations for startup or restart of defense nuclear facilities. Recent work involved reviewing readiness preparations for startup of defense nuclear facilities at the Pantex Plant, the Y-12 Security Complex, and the Hanford Site, as well as DOE's implementation of Integrated Safety Management.
Mr. Lary M. McGrew	01/31/07	Provide expertise related to safety issues associated with those facilities involved in the assembly, disassembly, and testing of nuclear weapons systems. Specifically, advise the Board from direct experience in conventional and nuclear explosive technology and safety, nuclear materials handling and storage, criticality safety, and nuclear weapons assembly, storage and testing. Recent work has included, for example, review of the W79 and W56 dismantlement processes and the W78 and W88 assembly and disassembly and inspections at the Pantex Plant.

<u>CONTRACTOR</u>	<u>CONTRACT EXPIRATION DATE</u>	<u>DESCRIPTION OF WORK</u>
Paul C. Rizzo Associates, Inc.	12/31/06	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	12/31/06	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.
Briere Associates, Inc.	09/30/06	Provide technical editing services of Board documents that include, but are not limited to, technical reports, issue reports, the Board's Reports to Congress, and formal Recommendations to DOE. These services include analyzing manuscripts in terms of its objective, style, and manner of presentation and recommending revisions as appropriate.

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

