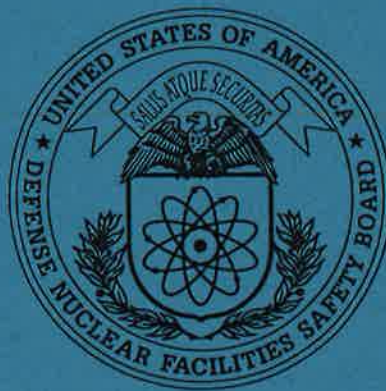


FY 2005
BUDGET REQUEST
TO THE CONGRESS

Defense Nuclear Facilities Safety Board



February 2004

**Defense Nuclear Facilities
Safety Board
FY 2005 Congressional Budget Request**

APPROPRIATION & EXPENSE SUMMARY

(Tabular dollars in thousands.)

OPERATING EXPENSES

	ACTUAL FOR <u>FY 2003</u>	PROJECTED FOR <u>FY 2004</u>	BUDGET REQUEST FOR <u>FY 2005</u>
New Budget Authority	18,876*	19,444**	20,268
Obligations	19,957	20,804	21,386
Outlays	19,605	20,388	20,958

* \$19,000,000 appropriation; \$123,500 rescission.

** \$19,559,000 appropriation; \$115,398 rescission.

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).

**Defense Nuclear Facilities
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PERSONNEL SUMMARY

	<u>FY 2003 ACTUAL</u>	<u>FY 2004 FINANCIAL PLAN</u>	<u>FY 2005 BUDGET REQUEST</u>
Statutory Personnel Ceiling: (FTE's) ^{1/}	150	150	150
FTE Usage ^{2/}	96	100	100
<hr/>			
Board Members & Permanent Employees at End of Fiscal Year	98	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.

**Defense Nuclear Facilities
Safety Board
FY 2005 Congressional Budget Request**

PROPOSED APPROPRIATION LANGUAGE

SALARIES AND EXPENSES

For necessary expenses of the Defense Nuclear Facilities Safety Board in carrying out activities authorized by the Atomic Energy Act of 1954, as amended by Public Law 100-456, section 1441, \$20,268,000 to remain available until expended. [*Energy and Water Development Appropriations Act, 2004*]

**Defense Nuclear Facilities
Safety Board
FY 2005 Congressional Budget Request**

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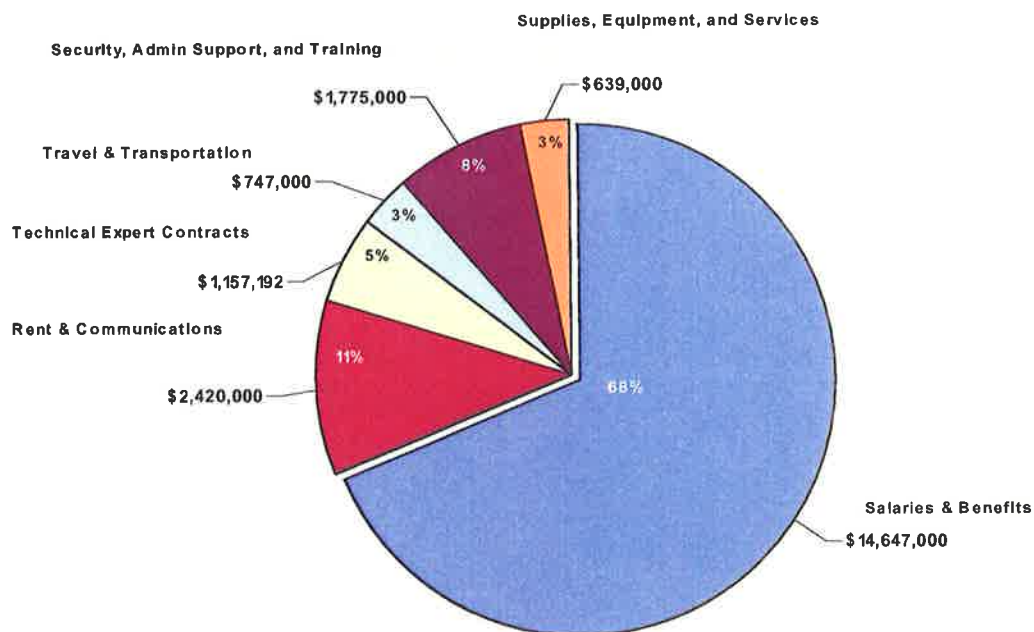
Defense Nuclear Facilities Safety Board FY 2005 Congressional Budget Request

1. EXECUTIVE SUMMARY

The Defense Nuclear Facilities Safety Board's (Board) FY 2005 Performance Based Budget Request is for \$20.268 million in new budget authority and 100 full-time equivalent (FTE) staff years.

As shown on the graph below, the Board's budget is used primarily to pay the salaries and benefits of its employees, with most of the remaining resources dedicated to supporting those employees, thus limiting the Board's ability to absorb unfunded non-discretionary pay increases from other areas of the budget.

FY 2005 Total Projected Obligations = \$21,386,000



The Board was established by Congress in 1988 to provide independent, expert-based safety oversight of the defense nuclear weapons complex operated by the Department of Energy (DOE). This budget request highlights many of the changes that are occurring or are planned for the weapons complex, and the corresponding health and safety oversight challenges that the Board must address to effectively fulfill its statutory oversight mission. The fact that the nuclear weapons program remains a technically challenging and hazardous operation cannot be overemphasized. DOE must maintain readiness of the nuclear arsenal, dismantle surplus weapons, dispose of excess radioactive materials, clean up surplus defense facilities, and construct new facilities – all in a manner that protects the public, the workers, and the environment.

As envisioned by the enabling statute and accompanying report language, the value of the Board's contribution in assuring public health and safety and the continued viability of DOE's nuclear weapons and cleanup missions has been significant. This document contains many examples of where and how the Board has identified health and safety issues and taken deliberate action to help the Secretary of Energy correct the problems. That contribution is based on the technical expertise of five full-time Board Members, the staff, and constant oversight by the Board's field site representatives during the past 14 years. A fundamental tenet of good safety for high-hazard, complex operations, such as the Department's nuclear weapons program, is independent oversight based on solid engineering judgment. The Board supplies that independent, expert-based oversight.

Accomplishing the Board's oversight plans and performance objectives as presented in this budget request are not without challenges. For example, DOE's National Nuclear Security Administration (NNSA) is implementing a strategic plan that is changing the balance and location of nuclear weapons efforts throughout the defense nuclear complex. Tritium extraction for stockpile use, conduct of nuclear experimentation, and preservation of the strategic plutonium pit inventory, will require new defense nuclear operations. As this strategy continues to unfold, some sites (such as the Lawrence Livermore National Laboratory and the Nevada Test Site) will experience significantly increased program activity.

The Board's oversight effort also must keep pace with the significant increase in new defense nuclear facilities in the design and construction phase. DOE has more than 20 new design and construction projects currently underway or planned for the near future. Projects such as the \$6 billion Waste Treatment Plant at the Hanford Site in Richland, Washington make substantial demands on the Board's technical oversight resources in specialty skill areas such as seismic engineering of structures, geotechnical reviews, concrete chemistry, systems engineering, and hazard analysis. Design and construction reviews 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. (See Section 5, page 10, for a list of DOE projects currently underway or planned for the near future.)

During periods of constrained budgetary resources, it is tempting to cut back on the funding dedicated to safety programs. The real question is not what safety programs cost, but what costs are avoided by applying excellent safety principles. Financial losses incurred during recovery from major accidents can be in the billions of dollars. The cost of reacting to multiple safety failures can be disruptive to accomplishing DOE's national security mission on-schedule and within budget. In this context, the independent oversight recommendations by the Board and the subsequent actions by DOE have not only reduced the likelihood of accidents, but also improved formality of operations needed to maintain productivity in defense nuclear facilities.

As a small agency with one program account supporting 100 FTEs and one mission—to protect the health and safety of the public and workers at DOE defense nuclear facilities—the Board constitutes a wise investment toward improving the safety and reliability of the vital nuclear defense activities, at a small fraction of the potential economic and health costs of a nuclear accident.

2. JUSTIFICATION FOR ADDITIONAL FUNDING

The number and complexity of DOE defense nuclear projects and facilities that require the Board's health and safety oversight attention have increased significantly. To continue the Board's oversight capabilities at current levels, an additional \$824 thousand in new budget authority for FY 2005 is requested. These funds will be used to maintain the current authorized personnel ceiling of 100 FTEs and fund technical expert contracts to augment staff capabilities, where it is not practical or desirable to employ permanent staff, in highly specialized and technical disciplines. The budget request also includes funds to contract for independent audit services. These services are required to perform the financial statement preparation and internal controls review mandated by the Accountability of Tax Dollars Act of 2002. Specific requirements for additional funding for contractor and staff expertise are described below:

Oversight of New DOE Design and Construction Projects

As discussed in the Executive Summary, the Board continues to expend considerable resources to review the ongoing design effort as well as the construction activities at new DOE defense nuclear facilities such as the \$6 billion 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. WTP is a complex, high risk program that will require more than 15 years to complete. The Board is required by law to review the design and construction of projects such as WTP to ensure the safety of the public and workers is addressed early in the design process. The WTP is one of more than 20 new DOE design and construction projects currently underway, or planned for the near future. (See Section 5, page 10, for a full discussion of these projects.) Design and construction reviews 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 requires \$400,000 in additional technical contract funds in FY 2005 to obtain highly specialized skills in areas such as

seismic engineering of structures, geotechnical reviews, concrete chemistry, systems engineering, and hazard analysis that are critical to performing the technical oversight reviews of new DOE projects.

Nuclear Weapon Life Extension and Modernization Programs

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

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. To effectively oversee the health and safety issues and maintain the pace of this expanded weapons program, the Board will need to augment its technical staff with subject matter experts and field site representatives, as well as contract for unique specialized technical expertise.

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 (SRS) in South Carolina, 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, completed in December 2003 and provided to the Congress and the Secretary of Energy, reviewed the storage of defense plutonium and defense plutonium materials in connection with the disposition program provided in Section 3182, *Disposition of Weapons-Usable Plutonium at Savannah River Site*, of this Public Law and the Department of Energy's (DOE) amended Record of Decision for fissile materials disposition. In the report, the Board addressed:

- The suitability of KAMS and related support facilities for monitoring and observing any defense plutonium materials stored in KAMS,
- The adequacy of provisions made by DOE for remote monitoring of such defense plutonium materials by way of sensors and for handling of retrieval of such plutonium materials, and
- The adequacy of KAMS should such defense plutonium materials continue to be stored in KAMS after 2019.

Additionally, the report included proposals the Board considered appropriate to enhance safety, reliability, and functionality of KAMS.

Congress directed the Board to perform this study to determine if DOE's plan to use the KAMS facilities provides adequate protection of public and worker health and safety. Prior to the KAMS proposal, the DOE had designed a state-of-the-art facility, the Actinide Packaging and Storage Facility (APSF) at SRS, to store plutonium materials now located throughout the DOE weapons complex. Even though the APSF facility was designed and excavation begun in 2001, the DOE cancelled the facility when the total project cost estimate became excessive (greater than \$400 million), and the Plutonium Immobilization Facility (now cancelled) provided a potential disposition path for some of the material. The Board was tasked to review the KAMS proposal because of its expertise in providing an independent health and safety oversight perspective.

To date, the Board's effort to complete this review and prepare the required report has included more than 2,600 technical staff hours. Twelve on-site reviews to evaluate current plutonium storage conditions, plans for stabilization and packaging for long-term storage, and long-term storage plans at SRS were conducted by the Board's staff. It is estimated that the Board expended approximately \$300,000 to complete this study, an amount not included in the Board's FY 2003 appropriation. Additional funding will be needed to conduct the follow-up implementation work associated with the recommendations in this study.

Tax Accountability Act

Funding is needed to comply with the Accountability of Tax Dollars Act of 2002 requiring preparation and auditing of financial statements. As a small agency, the Board received a waiver from these requirements for FY 2003 but must comply with the Act in FY 2004 and future years. The additional \$40,000 will fund independent auditing services to examine and report on financial statements prepared by the Board's accounting services provider, GSA's Heartland Finance Center.

Fully Fund the Salaries and Benefits Account

Additional funding is needed to help the Board pay for the out year impacts of the 4.1 percent cost-of-living pay increases effective in January 2003 and January 2004, as well as the projected 1.5 percent increase in January 2005. An additional \$424,000 is needed to fund the out year impacts of these increases. Without full funding of these accounts, the Board has no alternative but to reduce staff -- the backbone of our health and safety oversight program. The Board is currently operating with only 94 staff and four full-time Board Members (65 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 by maintaining the currently authorized 100 FTE ceiling. With nearly 70 percent of the Board's budget dedicated to paying for staff salaries and benefits, the financial impact of these cost-of-living pay increases is especially severe, and has a direct impact on the Board's ability to fulfil its mission.

3. SAFETY OVERSIGHT STRATEGY

Maintaining an effective safety oversight program that fulfills the broad mandates of the Board's enabling legislation (see Appendix A) requires a constant reassessment of health and safety conditions throughout DOE's defense nuclear complex. The Board continues to focus its attention on the most hazardous DOE operations and complex-wide health and safety issues, consistent with the Board's safety oversight approach and its strategic plan. Specifically, the Board has prioritized the application of its resources to emphasize nuclear safety review activities at the following sites, plants, and facilities:

- *Pantex Plant (Texas)*—Stewardship and maintenance of the nuclear weapons stockpile including assembly, evaluation, maintenance, and dismantlement of nuclear explosives and the storage of special nuclear material, particularly plutonium pits.
- *Savannah River Site (South Carolina)*—Operation of existing tritium facilities and design and construction of new facilities for the extraction of tritium, storage of special nuclear material, and the stabilization of high-level waste and residual materials from the former production of the Nation's nuclear weapons arsenal, and the disposition of excess plutonium.
- *Nevada Test Site*—Stewardship of the nuclear weapons stockpile, including subcritical experiments, and the capability to deal with damaged nuclear weapons and improvised nuclear devices.
- *Oak Ridge Y-12 National Security Complex (Tennessee)*—Stewardship and maintenance of nuclear weapons components including highly enriched uranium processing; fabrication, assembly, and disassembly of nuclear weapon components and subassemblies; and storage of nuclear materials, including uranium from weapon components.
- *Los Alamos National Laboratory (New Mexico), Lawrence Livermore National Laboratory (California), and Sandia National Laboratories (New Mexico and California)*—Support for stockpile management and stewardship of the nation's nuclear weapons, including research and enhanced surveillance of aging weapons, and the processing of nuclear materials.
- *Hanford Site (Washington)*—Remediation of high-level radioactive waste, stabilization of corroding highly radioactive spent nuclear fuel currently stored in the K-East and K-West Basins, and stabilization of residual material from plutonium production.
- *Rocky Flats Environmental Technology Site (Colorado)*—Stabilization of residuals of plutonium production and deactivation of numerous highly contaminated buildings.

The primary nuclear hazards involved in the above DOE defense nuclear operations include inadvertent nuclear detonation; dispersion of hazardous nuclear material resulting from high explosive violent reactions, explosions, fires, leaks, operator error, and natural phenomenon events; release of radioactive tritium gas; nuclear criticality; and direct exposure to extremely high radiation.

Sources of information used by the Board in formulating its assessments, evaluations, and recommendations to the Secretary of Energy are varied. They include testimony from public hearings and meetings, Congressional inquiries, reports from site representatives, staff issue papers, site visits, Implementation Plans for the Board's recommendations, responses to reporting requirements, and correspondence from workers and union representatives at the DOE sites. The Board's priorities must be flexible to reflect its assessment of the risks and potential effects on the health and safety of the public or workers, resulting in revised technical review assignments for the Board's staff.

On the basis of 14 years of operating experience, the Board has established the following guiding principles for maximizing the effective use of its resources:

- **Ownership of Safety** - The primary responsibility for ensuring protection of the health and safety of the public and workers belongs with DOE line managers and extends in an unbroken chain from the Secretary of Energy to the workers on the floor. Oversight can bolster but never replace the commitment of line management and the workers to integrating proper health and safety practices in work planning and performance.
- **Oversight Role** - As an external "action-forcing" agency, the Board influences the actions of DOE line management only to the extent necessary to ensure adequate protection of the public and worker health and safety. While the Board is empowered to identify current and potential safety problems and offer alternative strategies for addressing each issue, resolving these safety problems remains the sole responsibility of DOE.
- **Meaningful Safety Programs** - Effective safety management demands that safety expectations be clearly defined and tailored to specific hazards at all levels—site, facility, and activity. Broad, complicated instructions are ineffective and often ignored at the working level, whereas a safety program that the workers can understand and is relevant to the work is more likely to be embraced by the workers.
- **Technical Competence** - Technical expertise is required to define and ensure compliance with controls commensurate with the identified hazards. Without sufficient numbers of qualified scientific and technical personnel, DOE cannot act as a knowledgeable and demanding owner/customer who is qualified to require the laboratories and contractors to safely deliver the products and services for which they are being paid.

- **Risk-based Oversight** - 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. Given the size of the DOE defense nuclear complex and the limited oversight resources of the Board, assigning review priorities based on perceived risk levels is a continual process influenced by reports from 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.
- **Effective Transition Planning** - Safety oversight of defense nuclear facilities will be accomplished in full cooperation with other agencies and individual states, in compliance with the Atomic Energy Act of 1954, as amended, and other applicable laws. The Board has worked to ensure a smooth transition from Board oversight to regulation as defense nuclear facilities pass from operations, deactivation, and decommissioning to state and EPA-regulated cleanup, demolition, and environmental restoration activities.

4. STRATEGIC MANAGEMENT OF HUMAN CAPITAL

As clearly recognized by the Congress when evaluating the Board, the ability to effectively carry out an independent, technical oversight program throughout the DOE weapons complex is dependent on the technical capability of the Board Members and staff.

The conferees believe that the DNFSB is a unique Federal agency, in that its mission (is) to oversee the activities of another federal department whose work is highly technical and potentially dangerous, and that to properly carry out its mission, not only the DNFSB members but also its limited staff must be technically competent in all major phases of nuclear safety.¹

Simply stated, the ability of the Board to fulfill its public and worker health and safety mission rests heavily on attracting and retaining top caliber technical staff. From its formation, the Board was free to create a streamlined organization, specifically tailored to meet its specialized scientific and technical mission. The Board has been successful in creating a work environment that emphasizes excellence as the standard for staff performance and rewards the staff accordingly. The pay banding and pay-for-performance programs developed and implemented by the Board have proven to be effective in hiring technical talent, holding employees accountable for their performance, and rewarding outstanding performance on the job.

¹ National Defense Authorization Act for Fiscal Year 1991, Conference Report, H.R. Conf. Rep. No. 923, 101st Cong. 2nd Sess. 767 (1990).

The need for the Board to have outstanding technical talent for its oversight effort becomes even more critical in light of DOE's recent recruitment and retention problems for critical scientific and technical staff.² The Board has assembled a 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 weapons safety, storage of nuclear materials and nuclear criticality safety, and waste management. Excluding first-year participants in the Board's Professional Development Program, 90 percent of the Board's technical and legal staffs, hold advanced scientific and technical degrees, of which 33 percent are at the Ph.D. level. Consequently, the Board performs a vital role in ensuring that health and safety problems are identified and solved.

The challenges in recruiting and retaining a high-quality, diverse workforce can be grouped into three categories: (1) competition from the private sector, (2) fiscal constraints, and (3) the Federal Government not being perceived as an employer of choice. Competition for top engineering professionals is intense. Even with the special hiring and pay authorities granted to the Board, private industry can easily out-bid and out-perk the Board for the top-caliber engineering talent that the Board needs to conduct its health and safety oversight operations.

The Board has also found that the Federal downsizing campaigns of the 1990s, coupled with the perception that the Federal bureaucracy stifles creativity and fails to encourage and reward outstanding work, have created obstacles to the Board's recruiting campaigns. Recruitment and retention of recent college engineering graduates, especially women and minorities, is difficult in the current job market and will become even more challenging with a renewed interest in the commercial nuclear market.

Recruiting and retaining senior technical staff to serve as site representatives will continue to be vital and challenging. The Board maintains an onsite safety oversight presence at priority DOE defense nuclear facilities by assigning experienced technical staff members to full-time duty as site representatives. The site representative program provides a cost effective means for the Board to closely monitor processes and practices, and to identify health and safety concerns promptly. As site representatives frequently interact as the Board's representatives with the public, workers, and federal, state and local officials, it is important that they be of the highest technical capability.

The Board plans to continue its recruitment of engineering and technical students through its Professional Development Program (PDP) to maintain the Board's staff capabilities. The PDP is a three-year program that offers entry-level positions on the Board's technical staff. Through a technical mentor, PDP recruits are provided a series of individually tailored

² DOE Audit Report on "Recruitment and Retention of Scientific and Technical Personnel," DOE/IG-0512, (July 2001)

developmental assignments, formal academic schooling, and a one-year “hands-on” field assignment. This is a highly competitive program to attract the next generation of scientific and technical talent to federal service.

To foster a sustained learning environment, the Board provides opportunities for training and personal development to all of its employees. Based on current research, employees rank training among the top three areas of importance when making career decisions. Therefore, to aid in retaining its technical staff, the Board has maintained a robust training program. In a typical fiscal year, the Board expends approximately \$3,400 per technical employee for training.

Using the excepted service hiring and classification authorities granted to the Board, together with the other hiring and retention authorities (e.g., recruitment and relocation bonuses, retention allowances and the newly enacted student loan repayment program), the Board has gained some success in competing for scientific and technical staff. Other Federal agencies such as the National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), and the National Institutes of Health (NIH) have proven that scientific and technical personnel can be recruited and retained, provided funds are made available to pay for the added salary and benefits.

During FY 2004, the Board intends to hire selected technical experts to maintain the Board’s highly competent technical staff. By the end of FY 2004, the Board expects to hire replacement employees to reach the Board’s FTE allowance of 100 (67 percent of the Board’s statutory ceiling). Anticipated recruiting includes a Presidential appointment to the Board and a senior nuclear weapons engineer. During FY 2005, the Board’s recruiting will maintain the 100 FTE ceiling.

5. FUTURE CHALLENGES FOR THE BOARD’S SAFETY OVERSIGHT

The following discussion addresses some of the key challenges facing the Board in its safety oversight of DOE that will require continuing attention by the Board and its staff. The Board’s budget request for \$20,268,000 and associated performance objectives in Appendix D have been structured to anticipate and meet these workload challenges.

Nuclear Weapon Life Extension Programs. DOE is ramping up its programs to extend the life of weapons in the enduring stockpile. These life extension programs will require more, and increasingly complex, operations to disassemble, refurbish, reassemble, and re-certify nuclear weapons and components than had been done in the recent past when smaller numbers of weapons were disassembled only for inspection. In addition to larger numbers of unit operations, DOE will also be required to develop or restart intricate and potentially hazardous operations to refurbish or re-manufacture individual weapon components. To effectively oversee these operations and at the same time strike a proper balance among national security requirements, schedules, and safety management issues, the Board will need to maintain and at times augment its technical staff with individuals who possess the necessary expertise.

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 unique set of risks for each project and demonstrate clear and deliberate implementation of ISM principles and core functions.

Board 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 numerous 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).

- **Los Alamos National Laboratory** - TA-18 Mission Relocation - to relocate 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, Metallurgical Research Facility Replacement - to replace the current aging and deteriorating facility with a modern facility. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH RISK.
- **Los Alamos National Laboratory** - Decontamination and Volume Reduction System - to provide a facility for examining and repackaging transuranic waste. MODERATE SIGNIFICANCE, LOW COMPLEXITY, MODERATE RISK.
- **Oak Ridge National Laboratory (Melton Valley Transuranic/Alpha Tank Waste Treatment Project)** - to retrieve, treat, and dispose of wastes from the ORNL Melton

Valley Tanks. MODERATE SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE 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)** - 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)** - Immobilized High-Level Waste Interim Storage Facility - to provide storage for glass waste canisters produced at the Waste Treatment Facility. HIGH SIGNIFICANCE, LOW COMPLEXITY, LOW RISK.
- **Hanford Site (Richland Operations Office)** - Spent Nuclear Fuel Dry Storage Project - to provide safe storage for spent nuclear fuel stored in modern, robust containers. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, HIGH RISK.
- **Hanford Site (Richland Operations Office)** - Cesium/Strontium Dry Storage Project - to provide a new facility to store approximately 2000 capsules of cesium and strontium salts containing more than 100 megacuries of radionuclides. The capsules are presently stored in a water-filled basin at Hanford. HIGH SIGNIFICANCE, MODERATE 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** - Special Nuclear Material Component Requalification Facility - to convert an area in 12-86 (currently used for joint test assembly (JTA) operations) for use with various operations necessary to requalify certain special nuclear material for reuse. The most hazardous of the proposed operations will be pit tube replacement. 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 - HLW Salt Processing Facility** - to be used to remove cesium from high-level waste. The cesium stream would go to the Defense Waste Processing Facility. The low-activity stream would go to the Saltstone Production Facility for disposal in grout. HIGH SIGNIFICANCE, HIGH COMPLEXITY, HIGH 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. HIGH 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.
- **Fernald - Silo Project** - to retrieve and dispose of, or store low-level waste from the Fernald Silos. HIGH SIGNIFICANCE, MODERATE COMPLEXITY, LOW RISK.
- **Idaho National Engineering and Environmental Laboratory - (Advanced Mixed Waste Treatment Project)** - to retrieve, treat, and dispose of waste drums from INEEL. MODERATE SIGNIFICANCE, MODERATE COMPLEXITY, MODERATE 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.

Accelerated Cleanup. Following considerable oversight and constructive engagement by the Board, DOE is stabilizing and disposing significant amounts of the hazardous remnants of nuclear weapons production. Substantial progress is being made toward characterizing, stabilizing, and dispositioning many high-hazard nuclear materials, and several associated new facilities are either in design, construction, or initial operation. However, DOE is encountering difficulty in maintaining its momentum in all areas of this important risk reduction effort. The Board will continue to urge DOE to maintain, and in some areas accelerate, its activities associated with these risk reduction activities.

Deactivation of Nuclear Facilities. Along with stabilizing and disposing of hazardous materials, DOE is accelerating its effort to deactivate many contaminated facilities that are no longer needed. The mission to conduct high-risk activities associated with facility deactivation will continue across the DOE defense nuclear complex at an increasing rate in the coming years. These activities involve hands-on hazardous work that requires hazards evaluation, development of work controls and procedures, worker training, and good conduct of operations. The Board's continued attention and increased commitment of resources will be required to ensure that DOE conducts these high-risk activities safely.

DOE Technical Competence and Federal Oversight. Since the end of the Cold War, maintaining the technical competence of federal and contractor personnel essential to DOE's defense nuclear mission has been an increasingly difficult task. While the Board has always placed considerable emphasis on this vital aspect of safety management, skilled employees continue to leave the workforce. The turnover in senior DOE leadership that resulted from the years of Government downsizing and curtailed investments in human capital will necessitate close attention to rebuilding the appropriate technical skills, abilities, and experience. The Board will need to apply significant resources to ensure that DOE recruits and develops the required technical capabilities, and that the new line management emphasizes safety in the conduct of its operations.

DOE Oversight of Its Contractors. DOE is reducing the size of its federal workforce, restructuring its organization to place more responsibility in field elements, and transitioning to a "performance-based" directives system. These changes are fundamentally altering the amount and specificity of DOE's safety oversight of hazardous nuclear operations and result in an increased dependence on contractors to evaluate and ensure their own performance. During this transition, the Board will be required to focus considerable attention on day-to-day hazardous operations and safety issues to ensure that safety performance is not diminished as an unintended consequence of this change.

Nuclear Weapons Knowledge. Another long-term technical competence issue requiring significant attention is the need to maintain a cadre of professionals capable of addressing nuclear weapon assembly and disassembly safety issues. The needed expertise is not available

outside of the national weapon laboratories and is only developed through careful study of and experience working on issues directly affecting the safety of nuclear operations. Maintaining an environment that encourages the brightest minds to continue to devote a portion of their time to developing that expertise remains a challenge. This topic was the focus of the Board's Recommendation 2002-2, *Weapons Laboratory Support of the Defense Nuclear Complex*. The Board and DOE will need to pay close attention to resolving this issue in the future.

Development and Implementation of Safety Controls. Starting in 2003, DOE nuclear facilities were required by the Nuclear Safety Management Rule, 10 CFR, Part 830, to submit safety analyses and controls that comply with or are consistent with specific, uniform expectations. In response, many DOE defense nuclear facilities have developed new analyses and, perhaps more importantly, new safety controls. In many cases, the choice of these new safety controls was constrained because the facility and operating equipment had been built several years or decades ago. As a result, DOE and its contractors have reclassified existing equipment to be safety-related and, in a departure from past practice, have developed a significant number of new safety-related administrative controls to ensure safety. In the coming years, the Board will devote considerable effort to ensuring that these controls are designed, developed, implemented, and maintained in a manner that will ensure their effectiveness to protect the workers, the public, and the environment. The Board has already started to focus on this area by issuing Recommendation 2002-3, *Requirements for the Design, Implementation, and Maintenance of Administrative Controls*.

Activity-Level Integrated Safety Management (ISM). Along with the emphasis on facility-level safety analyses and controls, the Board has been emphasizing the importance of ensuring safety at the individual activity level. For many years, the Board has encouraged DOE to use a concept the Board termed Integrated Safety Management (ISM) to ensure that DOE defense nuclear work is well defined, that hazards are identified and controlled, that work is performed in a careful manner in accordance with the safety controls, and that DOE uses appropriate feedback mechanisms to ensure continuous improvement. The concept of ISM is particularly well suited to ensuring safety at the activity level. The Board will be focusing significant effort in the future to ensure that DOE continues to make progress in this important area.

6. SAFETY OVERSIGHT IN PRACTICE

The Board's Annual Report to Congress (available on the Internet at www.dnfsb.gov) provides detailed information on the Board's performance each year. Representative examples of the Board's contributions to the health and safety of the public and workers, resulting from the practical application of the above safety oversight principles, are discussed in the following paragraphs.

Weapons Laboratory Support of the Defense Nuclear Complex. Within the nuclear weapons complex, inadequate processes for communicating safety information have resulted in unsafe activities and near misses that could have been prevented. In October 2002 at the Y-12 National Security Complex, a piece of metal weighing 150 pounds was unexpectedly ejected

from an item on which a test had previously been conducted. The piece of metal traveled vertically and to the side of machining equipment, finally coming to rest approximately 15 ft from the point of origin. The possibility of this occurrence was known to the design agency, but a memorandum regarding the hazard was only provided to Y-12 management after the event.

Concerned by similar instances of poor communication, the Board has included discussions of the roles and responsibilities of technical personnel in discussions and correspondence with DOE, and in public meetings. The Board has repeatedly suggested that for each weapon system, the responsible weapon laboratory should assign a senior, technically competent weapon expert to serve as the single point of contact for that weapon. Clear and consistent communication of safety-related information is improved by the existence of a single point of contact for each weapon to ensure that all safety-related issues are appropriately prioritized and tracked to resolution.

In October 2002, the Board issued Recommendation 2002-2, *Weapons Laboratory Support of the Defense Nuclear Complex*, urging DOE to take decisive action in this area. In response, the National Nuclear Security Administration instructed the Laboratory Directors to establish the recommended point of contact positions, and assign them the responsibility to integrate and coordinate for the laboratory all information needed to provide technical support to the weapons complex. In parallel, DOE is establishing at each site office responsible for a weapon laboratory the responsibility for tracking and resolving safety-related priority and resource conflicts that cannot be resolved at a lower level. The overall result should ensure a clear and concise process for raising, communicating, and resolving safety-related issues.

Suspect/Counterfeit Parts Issue. In June 2002, Department of Defense investigators notified the DOE that a vendor of heat treating services for aluminum parts supplied potentially improperly heat treated aluminum to firms who supplied aluminum parts to the DOE. Notwithstanding repeated assurances from the DOE QAWG that reviews would be conducted for the presence of potentially nonconforming heat treated aluminum in safety related or mission sensitive applications affecting defense nuclear facilities, DOE failed to adequately assess whether such parts were installed until the Board brought the matter to the attention of the Secretary of Energy. The Board also observed that DOE had repeated several of the missteps that occurred in response to the similar notification of quality issues affecting semiconductor devices in 1996. As a result of the Board's efforts, DOE has fundamentally restructured their quality assurance programs.

The Board's staff continues to provide oversight and technical assistance to DOE in order to identify and prevent the introduction of suspect/counterfeit parts into safety related or mission sensitive applications affecting defense nuclear facilities. The Board's oversight and timely intervention in dealing with suspect/counterfeit parts has been pivotal in energizing the establishment of DOE quality assurance programs vital to ensuring public health and safety at DOE's defense nuclear facilities.

Hanford Waste Treatment Plant Design. In FY 2003, the Board expended considerable resources reviewing the design for the Waste Treatment Plant (WTP) at the Hanford Site. In November 2002 the Board notified DOE of several recently discovered

potential safety issues. The following provides a summary of the issues and the actions taken to address the Board's concerns:

- Hydrogen hazards within the WTP were not sufficiently understood. At the request of the Board, a research program has been established to develop the necessary information required to design an adequate hazard control strategy.
- The WTP cesium ion exchange process was not using preventive design features that could eliminate potential hazards resulting from the use of organic ion exchange resins when they are exposed to loss of cooling situations. After the Board raised this concern, an emergency elution capability will be included in the design.
- Unverified design assumptions critical to safety were not being adequately tracked and resolved. On the recommendation of the Board, DOE's prime contractor developed the database tools to track unverified assumptions, and processes to link research and technology development, engineering, and safety in order to ensure that all safety-related design assumptions are technically sound.
- DOE's contractor was not successfully capturing all of the critical design features being relied upon for safety. The Board recommended the contractor revise its processes for design evaluation to ensure the capture of safety-related design features.
- The Board identified that during a loss-of-cooling accident, significantly higher temperatures could result, and hydrogen generation rates would increase exponentially. In response to the Board's finding, DOE began to evaluate the impact of this scenario on safety-related design features.
- The Board found that design basis event and severity level calculations lacked technical quality. In response to the Board's finding, DOE's contractor has since revised its procedures for checking design calculations and been able to increase their quality to acceptable levels.

The Board also maintains oversight of WTP construction. When out-of-specification concrete was placed for the facility basemat, the Board questioned the effect this could have on the structural integrity of the building under all design loading conditions. In response to the Board's inquiry, WTP developed a systematic approach to understanding and correcting the areas of weak concrete.

Software Quality Assurance. The design and operation of many of DOE's defense nuclear facilities relies on analysis and operational support developed using computer codes. During the past few years, the Board and DOE have identified problems caused by inadequate software design, implementation, testing, configuration management, and training. These problems could lead DOE and its contractors to rely on computer-generated safety information that is erroneous. Therefore, in late 2002, the Board issued Recommendation 2002-1, *Quality Assurance for Safety-Related Software*, proposing significant changes to DOE processes and practices for software quality assurance (SQA). These changes included clearly assigning

responsibilities and authorities for SQA, issuing revised directives for software development and use, and recommending software packages for use in safety system analysis and design.

Since the recommendation was issued, the Board has worked with DOE to develop and implement a plan to resolve these SQA problems. One major positive step was the creation of an Office of Quality Assurance Programs reporting to the Assistant Secretary for Environment, Safety and Health. This office is leading the DOE effort to determine which industry best practices should be applied to safety software, to establish qualification standards for personnel whose duties involve SQA, and to develop criteria for reviewing the SQA practices at defense nuclear facilities.

In addition to working with DOE to develop the implementation plan for this recommendation, the Board has continued to review the implementation of software procedures and practices at defense nuclear facilities. During FY 2003, these reviews included:

- The Savannah River Site, focusing on the new Tritium Extraction Facility.
- The Pantex Plant, examining recently implemented software used to assist personnel in controlling the movement of high explosives and nuclear material between facilities onsite.
- The Hanford Site, evaluating the design and analysis, as well as the control and safety systems, for the new Waste Treatment Plant.
- Los Alamos National Laboratory, reviewing the implementation of the software engineering practices for the criticality control systems at the Los Alamos Critical Experiments Facility (LACEF).

Each of these reviews resulted in positive actions by the DOE to resolve immediate problems, as well as corrective actions designed to minimize the number and impact of future software related problems.

7. DIRECT SERVICE DELIVERY TO CITIZENS

The Board continues to be sensitive to the need for citizen involvement. To that end, the Board has used open public meetings and hearings, as well as its Website (www.dnfsb.gov), to increase public awareness, communicate the Board's activities, and solicit citizen comments and issues.

The Board has also continued its practice of meeting with state and local officials, labor leaders, DOE's facility workers, citizen advisory boards, public interest groups, and area residents to exchange information and inform interested parties of the Board's work. Board Members have conducted public meetings and hearings in the vicinity of DOE's defense nuclear facilities, most recently near the LLNL Site in California. To date, a total of 36 public meetings have been conducted at or near DOE sites and 52 in Washington, D.C. The records of these meetings are made available to the public.

In compliance with Section 508 of the Rehabilitation Act, the Board's Website is accessible for individuals with disabilities and offers convenient public access to the Board's oversight work. The Board continues to offer downloadable public documents and is increasing its capability to provide Webcasts of public meetings to ensure broader citizen access to the efforts of the Board.

8. CONCLUSION

Nuclear weapons have been and will continue to be an essential part of the nation's defense strategy. However, the end of the cold war has caused a shift in how DOE maintains and supports these weapons. Consequently, the importance of the Board's mission of ensuring and improving the safety of operations at DOE's defense nuclear facilities has become increasingly more important. The Board accomplishes this vital mission by providing independent, expert advice to the Secretary of Energy, identifying the nature and consequences of any significant potential threats to public health and safety, and elevating such issues to the highest levels of authority.

The five full-time Board Members, together with a small but highly competent staff, provide a cost-effective organizational arrangement for achieving the added safety assurance that the public seeks and rightfully expects. The Board's budget request of \$20,268,000 to be used for staff salaries and necessary supporting expenses, such as travel to DOE's defense nuclear facilities and maintaining our onsite presence with site representatives, will provide the funding needed to conduct the health and safety review actions planned by the Board for Fiscal Year 2005. This amount 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.

STATUTORY MISSION OF THE BOARD

Congress established the Defense Nuclear Facilities Safety Board (Board) in Public Law 100-456 of September 29, 1988. Created as an independent establishment within the Executive Branch, the Board is made up of five Members appointed from civilian life by the President, by and with the advice and consent of the Senate. The Board's enabling statute requires that the Board Members be respected experts in the field of nuclear safety with demonstrated competence and knowledge relevant to the independent investigation and oversight functions of the Board. The Senate confirmed the first five Board Members on October 19, 1989. The statutory mission of the Board includes the following major functions:

- **Review and Evaluation of Standards.** The Board shall review and evaluate the content and implementation of the standards relating to the design, construction, operation, and decommissioning of defense nuclear facilities of the Department of Energy (DOE), including all applicable DOE Orders, regulations, and requirements at each Department of Energy defense nuclear facility. The Board shall recommend to the Secretary of Energy those specific measures that should be adopted to ensure that public health and safety are adequately protected. The Board shall include in its recommendations necessary changes in the content and implementation of such standards, as well as matters on which additional data or additional research is needed.
- **Investigations.** The Board shall investigate any event or practice at a Department of Energy defense nuclear facility which the Board determines has adversely affected, or may adversely affect, public health and safety.
- **Analysis of Design and Operational Data.** The Board shall have access to and may systematically analyze design and operational data, including safety analysis reports, from any Department of Energy defense nuclear facility.
- **Review of Facility Design and Construction.** The Board shall review the design of a new Department of Energy defense nuclear facility before construction of such facility begins and shall recommend to the Secretary of Energy, within a reasonable time, such modifications of the design as the Board considers necessary to ensure adequate protection of public health and safety. During the construction of any such facility, the Board shall periodically review and monitor the construction and shall submit to the Secretary of Energy, within a reasonable time, such recommendations relating to the construction of that facility as the Board considers necessary to ensure adequate protection of public health and safety. An action of the Board, or a failure to act, under this paragraph may not delay or prevent the Secretary of Energy from carrying out the construction of such a facility.

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

OBJECT CLASS SUMMARY

Actual obligations for FY 2003, projected obligations for the remainder of FY 2004, and the Board's Budget Request for FY 2005 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 2005 expenditure request includes funding of \$14,647,283 to support the projected salary and benefit costs for 100 FTEs. The funding for salaries and benefits represents 69 percent of the Board's FY 2005 estimated obligations. In calculating the projected salary and benefits needs of the Board, the following Federal pay adjustment and benefits factors for Executive Branch employees are used:

- Pay increase of 4.1 percent beginning in January 2004 as approved in the Consolidated Appropriations Act, 2004 (P.L. 108-199).
- Proposed pay increase of 1.5 percent beginning in January 2005.
- Employee benefits of 26 percent of salaries, or \$29,483 per FTE in FY 2005.

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 has and will continue to be critical to the successful accomplishment of the Board's mission. The Board has assembled a small 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 weapons safety, storage of nuclear materials and nuclear criticality safety, and waste management. Excluding first-year participants in the Board's Professional Development Program, 90% of the Board's technical and legal staffs, hold advanced scientific and technical degrees, of which 33% are at the Ph.D. level. 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 receive 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. Full-time site representatives are stationed at the following 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 Y-12 Complex to monitor safety and health conditions at Y-12 and other defense nuclear facilities in the area; 5) Los Alamos National Laboratory (LANL) to advise the Board on overall safety and health conditions at LANL, and to participate on Board reviews and evaluations related to the design, construction,

operation, and decommissioning of LANL defense nuclear facilities. During FY 2003, the Board evaluated the decreasing risks to the public and the environment as DOE completes facility deactivation efforts and determined that it was appropriate to discontinue full time site representative coverage at the Rocky Flats Environmental Technology Site (RFETS). The Board, however, still maintains a field office and has a cognizant engineer assigned to review activities at the site. This maintenance of Board oversight presence through periodic visits to RFETS assures that DOE maintains public and worker safety standards during the course of the deactivation.

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

Travel. The Board requests \$642,000 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. Board Members, technical staff and the Board's outside technical experts made approximately 150 team visits through the end of FY 2003 to major defense nuclear sites in support of its high priority public health and safety 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 increase in travel 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 inquiry.

Transportation of Things. The Board has included \$105,000 in its FY 2005 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 \$2,265,624 to reimburse the General Services Administration (GSA) for projected office rental costs. This overhead expense represents approximately 11 percent of the Board's FY 2005 Budget Request.

Communications and Utilities. The FY 2005 Budget Request includes \$154,500 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.

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 the Congress 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, due to budgetary constraints, the Board is operating with a ceiling of 100 FTEs, with 98 full-time staff and Board Members employed as of January 31, 2004. While the Board strives to maintain a highly skilled staff, it is not practical or desirable to maintain permanent staff in all possible disciplines. Therefore, it is important to have the funds available to immediately contract for this expertise when needed. For example, following review of construction plans for the High Level Waste Treatment Facility at Hanford, the Board concluded that concrete reinforcement issues had not been adequately addressed by DOE. The Board obtained specialized contractor expertise in the area of concrete reinforcement and loading to augment its internal review capability and avoid any adverse 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 which reflects funding levels for this support is included in Appendix C. The FY 2005 Budget Request includes \$1,157,192 in this account for technical support contracts to assist the Board in its health and safety reviews.

Other Services. The budget request includes \$1,567,000 to fund a wide range of recurring administrative support needs of the Board in FY 2005 such as physical security, 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 \$275,000 for reimbursable support agreements with other federal agencies to provide services such as accounting, payroll, health unit, EAP services, Library of Congress FedLink, and investigations for security clearances.

Supplies and Materials. The Board requests \$295,000 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 Board will continue to replace equipment that has reached the end of its life cycle and expend funds for technologies that provide a greater outreach to the public. The FY 2005 Budget Request includes \$250,000 to replace outdated computer workstations, laptops, and field equipment. Also, the Board will purchase upgraded firewall protection, improved communications equipment and other office equipment such as printers, copiers and graphic presentation equipment.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

FY 2005 CONGRESSIONAL BUDGET REQUEST - 02/02/2004

BUDGET ACCOUNT	COST ELEMENT	FY 2003 OBLIGATIONS (ACTUAL)	FY 2004 PROJECTED FINANCIAL PLAN	FY 2005 PROJECTED BUDGET REQUEST
PERSONNEL SALARIES -- (11)	\$ 10,213,389	\$ 11,097,000	\$ 11,699,000	\$ 11,699,000
PERSONNEL BENEFITS -- (12)	\$ 2,594,376	\$ 2,863,742	\$ 2,948,283	\$ 2,948,283
TRAVEL -- (21)	\$ 691,979	\$ 642,000	\$ 642,000	\$ 642,000
TRANSPORTATION OF THINGS -- (22)	\$ 141,311	\$ 160,000	\$ 105,000	\$ 105,000
RENTAL PAYMENTS TO GSA -- (23.1)	\$ 2,313,106	\$ 2,252,735	\$ 2,265,624	\$ 2,265,624
COMMUNICATIONS & UTILITIES (23.3)	\$ 251,154	\$ 154,500	\$ 154,500	\$ 154,500
PRINTING & REPRODUCTION -- (24)	\$ 28,541	\$ 27,000	\$ 27,000	\$ 27,000
CONSULTING SERVICES -- (25.1)	\$ 1,226,913	\$ 1,200,000	\$ 1,157,192	\$ 1,157,192
OTHER SERVICES -- (25.2)	\$ 1,566,185	\$ 1,567,000	\$ 1,567,000	\$ 1,567,000
GOVERNMENT SERVICES -- (25.3)	\$ 300,917	\$ 275,000	\$ 275,000	\$ 275,000
SUPPLIES & MATERIALS -- (26)	\$ 336,956	\$ 295,000	\$ 295,000	\$ 295,000
CAPITAL ASSETS -- (31)	\$ 292,061	\$ 270,000	\$ 250,000	\$ 250,000
*** TOTAL OBLIGATIONS ***	\$ 19,956,888	\$ 20,803,977	\$ 21,385,599	\$ 21,385,599
NEW BUDGET AUTHORITY	\$ 18,876,500 *	\$ 19,443,602 **	\$ 20,268,000	\$ 20,268,000
UNOBLIGATED BALANCE - PREV. FY	\$ 2,929,924	\$ 2,477,974	\$ 1,117,599	\$ 1,117,599
RECOVERY OF PRIOR YR OBLIGATIONS	\$ 628,438	\$ -	\$ -	\$ -
TOTAL BUDGETARY RESOURCES	\$ 22,434,862	\$ 21,921,576	\$ 21,385,599	\$ 21,385,599
EST. UNOBLIGATED BAL. - CUR. FY	\$ 2,477,974	\$ 1,117,599	\$ 0	\$ 0
APPROPRIATION	\$ 18,876,500	\$ 19,443,602	\$ 20,268,000	\$ 20,268,000
OUTLAYS	\$ 19,605,132	\$ 20,388,000	\$ 20,804,000	\$ 20,804,000
STAFF & BOARD MEMBERS (FTE'S)	95	100	100	100

*\$19,000,000 appropriation; \$123,500 rescission

**\$19,559,000 appropriation; \$115,398 proposed rescission pending FY 04 Omnibus Bill

TECHNICAL SUPPORT CONTRACTS SUMMARY

A list of major technical support contracts, with a brief description of each contractor's areas of expertise, is included in this Appendix. The FY 2005 Budget Request includes \$1,157,192 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 01/20/04)

<u>CONTRACTOR</u>	<u>CONTRACT EXPIRATION DATE</u>	<u>DESCRIPTION OF WORK</u>
Dr. Harold Agnew	12/15/04	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 weapons systems.
Mr. Richard Collier	09/30/04	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 J. DiNunno	10/13/04	Provide technical assistance in reviewing, evaluating, and advising the Board on various issues related to Integrated Safety Management (ISM) programs at various defense nuclear facilities.
Dr. Kevin J. Folliard	10/10/04	Provide expertise related to structural performance 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	06/30/04	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. Herbert Kouts	12/31/04	Provides a variety of technical expertise on a wide range of subjects associated with safety at DOE's defense nuclear facilities, including: safety management, criticality, DOE's stabilization, storage and disposition of nuclear materials, nuclear reactor physics, various issues related to nuclear facilities safety engineering, evaluation of DOE's implementation of Board recommendations and integrated safety management and protection of workers and the public in support of the Board's oversight authority.
Dr. Joseph A. Leary	12/31/04	Provide technical support to the Board, specifically involving review of operations and nuclear technology at facilities involved in processing and handling of nuclear materials. Examples of recent work include: evaluation of technologies to stabilize plutonium residues, plutonium storage safety issues, and Rocky Flats plutonium stabilization activities.
Dr. James L. Liverman	06/30/04	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, and other radiological and environmental health and safety issues, implementation of Recommendation 2000-2, and reviewing the development of DOE's quality assurance improvement plan.
Management Support Technology, Incorporated	02/28/04	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.

CONTRACTOR

CONTRACT EXPIRATION DATE

DESCRIPTION OF WORK

Mr. Lary M. McGrew

01/31/04

Provide expertise related to the strategic 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.

Paul C. Rizzo Associates, Inc.

12/31/04

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

12/31/04

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.

09/30/04

Provide technical editing services of Board documents that include, but are not limited to technical reports, trip reports, the Board's Reports to Congress, and formal Board Recommendations to DOE. These services include analyzing manuscripts in terms of its objective, style, and manner of presentation and recommending revisions as appropriate.

ANNUAL PERFORMANCE BUDGETING OBJECTIVES FOR FY 2005

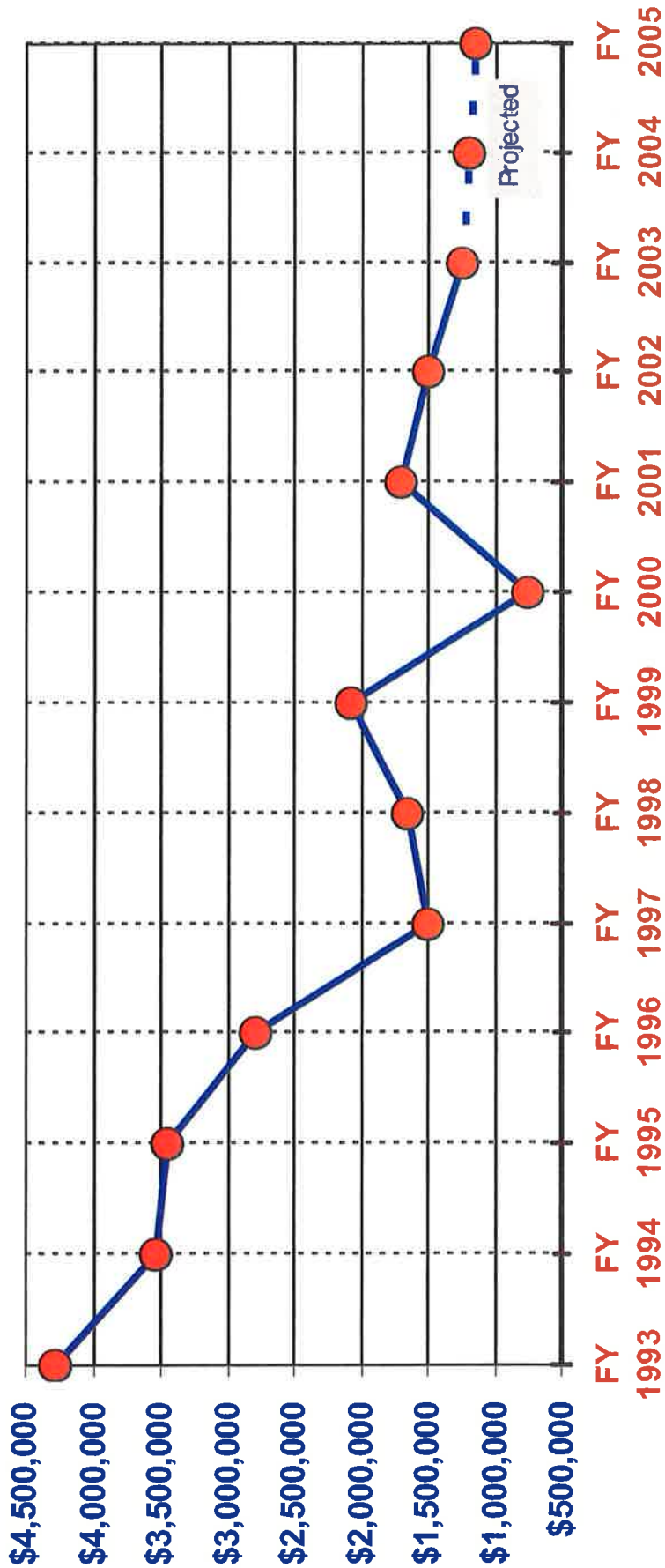
The Defense Nuclear Facilities Safety Board (Board) is an independent Executive Branch agency charged by statute with a broad mission of providing technical health and safety oversight of the Department of Energy's (DOE) defense nuclear facilities and activities.

During 2003, the Board revised its Strategic Plan to better communicate its approach to safety oversight of DOE's defense nuclear activities. This revision was prompted in large part by the significant increases in new design and construction projects DOE has scheduled during the next decade. The Board's Strategic Plan presents the four major performance goals, summarized below, from which annual performance objectives are derived.

1. **Nuclear Weapon's 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 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.

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) 2004 and FY 2005 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.

Defense Nuclear Facilities Safety Board Technical Contracts
Obligations By Fiscal Year



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 Objectives for FY 2005 identifies annual performance objectives that consist of reviews to be conducted in support of the Board's strategic plan, plus the identification of candidate areas for these reviews. An outcome measure for each objective is described as part of the discussion of each annual performance goal. Qualitative 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 of DOE and its defense nuclear contractors, Board correspondence, staff reports, DOE and contractor public testimony, and other sources. Past reporting (see the Board's Annual Reports) of Board-identified issues and associated DOE responses demonstrates that the Board has had a clear and positive impact on the safety of DOE defense nuclear activities.

Because of the variability of DOE's plans and schedules, some candidate areas identified in the Board's Annual Performance Objectives 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 Appendix D 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 2004 and FY 2005. To place this planning information in context, the performance goals are followed by examples of the Board's accomplishments during the years FY 1999 through FY 2003, as required by OMB's guidance on Performance Objectives.

APPENDIX D

Because the Board's Performance Goals were modified with the recent Strategic Plan revision, the Board's historic accomplishments have been regrouped consistent with these new performance goals. The primary mission of the Board remains unchanged, and so these historic accomplishments map directly into the revised performance objectives.

The examples provided in this appendix do not represent the entire scope of progress made on the FY 2003 Performance Goals. A comprehensive assessment of progress during Calendar Year (CY) 2002 appears in the Board's Thirteenth Annual Report. The Fourteenth Annual Report, due for publication in early 2004, will cover accomplishments during CY 2003.

PERFORMANCE GOAL 1: NUCLEAR WEAPONS OPERATIONS

DOE operations that directly support the nuclear stockpile and defense nuclear research are conducted in a manner that ensures adequate protection of 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.

Performance Goal 1

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

FY 2005 Performance 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 and implementation 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 and the W84).
- Nuclear explosive operations at Pantex (e.g., the B83, special purpose facilities, and onsite transportation).
- Cross-cutting functional areas at the Pantex Plant, Y-12 National Security Complex, or SRS tritium facilities (legacy material disposition, nuclear criticality safety, fire protection, nuclear explosive safety).
- 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) and microwave casting).
- Ongoing start-up of enriched uranium operations, hydrogen fluoride systems, and other similar processing activities at the Y-12 National Security Complex.
- Work-planning process (e.g., activity-specific hazard analysis, controls identification, and implementation of safety controls).
- Plutonium pit manufacturing and certification at LANL.
- Preparations to dispose of damaged nuclear weapons or improvised nuclear devices at NTS.
- DOE/contractor operational readiness reviews or other readiness determinations.
- Age-related changes in nuclear weapons components for weapon systems in the enduring stockpile.
- Preparations for storage of Tritium Producing Burnable Absorber Rods at SRS.
- Compliance with the review process for facility and procedure changes that could impact nuclear safety at the Y-12 National Security Complex, the Pantex Plant, and SRS.

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 or Y-12 National Security Complex that start in FY 2005.

Performance Goal 1

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

FY 2004 Performance 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 and implementation 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 (e.g., safety analysis reports developed in response to 10 CFR 830).
- Weapon-specific safety analyses and controls identification and implementation for nuclear weapon activities (the W88, W78, B61, W87, and the B83).
- Conduct of nuclear explosive operations at Pantex (e.g. weapon programs, special purpose facilities and onsite transportation).
- Cross-cutting functional areas at the Pantex Plant, Y-12 National Security Complex, or SRS tritium facilities (nuclear criticality safety, fire protection, nuclear explosive safety).
- 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) and microwave casting).
- Ongoing start-up of enriched uranium operations, hydrogen fluoride systems, and other similar processing activities at the Y-12 National Security Complex.
- Work-planning process (e.g., activity-specific hazard analysis, controls identification, and implementation of safety controls).
- Plutonium pit manufacturing and certification at LANL.
- Preparations to dispose of damaged nuclear weapons or improvised nuclear devices at NTS.
- DOE/contractor operational readiness reviews or other readiness determinations.
- Age-related changes in nuclear weapons components for weapon systems in the enduring stockpile.
- Restart of the Sandia Pulsed Reactor Facility at SNL.
- Compliance with the review process for facility and procedure changes that could impact nuclear safety at the National Laboratories (LANL, LLNL, SNL).

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 or Y-12 National Security Complex that start in FY 2004.

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 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.

Safety Controls for Specific Nuclear Explosive Operations. The Board and its staff conducted numerous assessments of the safety of specific nuclear explosive activities and documented safety analyses at the Pantex Plant during FY 2003. These reviews, which included the W62 dismantlement and surveillance programs, the LINAC\CT\X-ray Bay, the Special Nuclear Materials Facility, the Separation Test Facility, and Transportation and Staging activities, identified safety-related issues such as the adequacy of safety analyses and controls, the flowdown of controls into operating-level procedures, and the training of supervisory personnel. As a result of the Board's involvement, DOE has taken positive actions to improve the safety of these operations and the adequacy of the supporting safety bases.

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.

Y-12 Restart/Startup Readiness Improvements. A Board letter dated October 3, 2002, identified concerns with conduct of operations, training, and deficiencies in readiness preparations for wet chemistry startup in Building 9212. The NNSA response concurred with this assessment. During the final contractor readiness review in December 2002, marked improvements in conduct of operations, operator training and level of knowledge, equipment performance, and clarity of operating procedures were noted by the review team. In June 2003, the NNSA readiness review for the program to sample and repackage enriched uranium button materials at the Y-12 warehouse (Building 9720-5) found the contractor's execution of process and operations procedures to be satisfactory. The facility personnel were knowledgeable of the operation, hazards, and equipment used in the operation. The Board will continue to impress upon DOE that satisfactory preparations prior to the restart of hazardous activities are imperative to ensure the safety of the workers and public.

Criticality Safety at Y-12. In a November 13, 2002, letter, 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 committed to reduce the amount of stored nuclear materials and to standardize fissile material storage containers. The quantity of different storage containers used at Y-12 has subsequently been reduced, but much work remains to decrease the number further and improve safe operations.

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,

Examples of FY 2003 Accomplishments

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. Activities have been initiated to apply the SS-21 process to the remaining weapons programs. 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 obtained.

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.

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 (17) 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. In a letter dated August 6, 2002, 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

Examples of FY 2003 Accomplishments

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 an USQ process is being developed.

<p>Performance Goal 1</p>	<p><u>Nuclear Weapon Operations.</u> 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.</p>
<p>Examples of FY 2002 Accomplishments</p>	
<p>Maintenance Improvement Program at Y-12. In 2001, Y-12 responded to Board concerns that overdue and deferred maintenance was undermining the effectiveness and reliability of safety systems by implementing a maintenance improvement program. In continuing to pursue this issue, 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.</p> <p>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.</p> <p>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 <i>Chemical Safety Management Program</i>, 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.</p> <p>Recommendation 99-1. Continuing to respond to Board Recommendation 99-1, <i>Safe Storage of Fissionable Material called "Pits,"</i> 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.</p> <p>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. As a result, all active nuclear explosive operating procedures are being revised to be easier to follow and more accurate, place keeping within procedures has been enhanced, a new emphasis has been placed on procedural adherence by plant management, and procedural adherence occurrences now receive more attention from both NNSA and Pantex Plant management.</p> <p>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.</p> <p>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 piece-meal, 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, <i>Life Cycle Asset Management</i>, 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.</p> <p>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.</p>	

Performance Goal 1

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

Examples of FY 2001 Accomplishments

Startup of a new Dismantlement Activity at Y-12. The Board identified a number of potentially significant safety issues with the design of a new weapon (secondary) dismantlement process. In response to the Board's concerns, DOE and its contractor redesigned the process to resolve the safety issues.

Restart of the Reduction Process at Y-12. The Board highlighted safety issues related to the design of the reduction process and noted the lack of resolution of safety issues since the failed attempt in November 1999 to restart the reduction process. In response, Y-12 developed an adequate technical basis for the reduction process and successfully restarted the operation in April 2001.

Maintenance at Y-12. The Board identified the need to improve the maintenance work control program at Y-12 and noted a large backlog of overdue or deferred maintenance that could undermine the effectiveness and reliability of safety systems. Y-12 responded by reinstating a requirement for periodic inspections of safety-related equipment and began to implement a maintenance improvement plan.

Material Storage Facilities at Y-12. The Board expressed concern about the degrading physical condition of facilities at Y-12 used to store nuclear material. The Board emphasized its concern that the facilities and containers that store these nuclear materials should provide adequate protection and ensure the health and safety of the workers, the public, and the environment. As a result, material stored in a decrepit building has been transferred to better storage facilities and fire hazards have been substantially reduced.

Recommendation 99-1. In response to Board Recommendation 99-1, *Safe Storage of Fissionable Material called "Pits."* urging DOE to improve the storage environment for plutonium pits, DOE achieved its goal of repackaging 200 pits per month in April 2001. The number of pits repackaged into an inert environment in FY 2001 was more than double that of FY 2000 resulting in the safer storage of plutonium pits.

Lightning Protection at Pantex. During 2001, DOE proposed to relax certain lightning protection controls at Pantex, over the objections of both the design agencies and DOE's Nuclear Explosive Safety Study Group. The Board intervened to emphasize the need for DOE to maintain technically justified controls for all nuclear explosive operations. As a result, DOE retained the controls and the Pantex lightning protection program continues to provide a reduced lightning threat environment with regard to nuclear explosive operations.

Fire Protection at Pantex. The Board concluded that the potential hazards from a fire at Pantex had not been comprehensively and consistently addressed. In response, DOE accelerated replacement of the deteriorating plant-wide fire alarm system and improved the fire hazards analyses that assess the fire risks in the bays and cells.

Nuclear Explosive Program Activities. The Board has been urging DOE to improve the safety of weapons-related work at the Pantex Plant since it issued Recommendation 98-2, *Integrated 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 2001, DOE completed the start-up of the Seamless Safety for the 21st Century (SS-21) W76 Disassembly & Inspection Program. This program is now significantly safer and more robust than all of the weapons programs to which the SS-21 process has not yet been fully applied.

Lightning Detection and Warning at LANL. The Board has identified several issues regarding the site-wide requirements for electrical, instrumentation, control, lightning protection and fire protection systems at LANL. In response, DOE revised the LANL Work Smart Standards and implemented several programs to address the Board's issues. In particular, LANL has now documented the adequacy of the lightning protection systems and completed an assessment of the lightning warning detection and alarm system.

Examples of FY 2001 Accomplishments

Readiness to Dispose of a Damaged Nuclear Weapon at NTS. The Board highlighted to DOE safety-related program and infrastructure problems that may complicate DOE's mission to safely dispose of a damaged nuclear weapon or improvised nuclear device. In response, and with the Board's assistance, DOE has upgraded its capabilities to conduct these activities safely, including improving G-tunnel and developing its safety basis and conducting a number of exercises that clearly identified further issues to be addressed.

Safety Management at NTS. DOE efforts at the Nevada Test Site in response to Recommendation 95-2 have significantly improved the safety and DOE's oversight of activities at the Nevada Test Site. As a result of Board interactions, work planning, authorization, and control have improved and the DOE facility representative program is developing into an asset for DOE and its contractors.

LANL Special Recovery Line. The Board noted that the Special Recovery Line (SRL) represents the only disposition path for a subset of relatively vulnerable pits currently stored at the Pantex Plant. A lack of funding for SRL had nearly resulted in operations being placed into a cold standby mode. The Board suggested that it would be prudent to stabilize funding for SRL to maintain the ability to dispose of vulnerable pits at Pantex should an acute problem arise there. NNSA has now agreed to maintain the availability of SRL pending the identification of a disposition path for the pits in question.

Fire Protection at LLNL. The Board identified that a building fire alarm system is inadequately designed and maintained to ensure power and control for the room smoke detectors and fire dampers. In response, LLNL acknowledged that the problem increased the probability of malfunction of equipment important to safety and implemented compensatory measures to increase reliability of the fire alarm system. LLNL is also expediting replacement of old system with a new safety-class system.

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 2000 Accomplishments

Pit Storage and Repackaging. Currently, the vast majority of plutonium pits at the Pantex Plant are in inadequate storage configurations. In response to the Board's Recommendation 99-1, *Safe Storage of Fissionable Material called "Pits,"* DOE has started a major effort to repackage all pits into improved storage containers and execute a surveillance plan to ensure that pits in storage remain in a safe environment.

Y-12 Plant Safety Basis. As a result of staff reviews and several letters from the Board, personnel at the Y-12 Plant have revised the implementation plan for upgrades to the safety bases for their nuclear facilities. This upgrade program will lead to better identification of hazards and necessary controls for prevention and mitigation of potential accidents. This effort will also lead to implementation of the intent of an Integrated Safety Management (ISM) program at the related facilities in a more effective manner.

W62 Disassembly and Inspection Restart. As a result of the Board's and its staff's focused involvement in the reauthorization of Disassembly and Inspection (D&I) operations for the W62 nuclear warhead, DOE improved safety of the operation by upgrading the tooling and procedures used for the job. This effort, which was prompted by the Board's Recommendation 98-2, *Integrated Safety Management at the Pantex Plant,* also resulted in a substantial improvement in the technical rigor and thoroughness of the Nuclear Explosive Safety Study Revalidation process. In addition, the experience that DOE and its contractors gained during this effort resulted in an improved process for hazards analysis at Pantex for other nuclear explosive operations, and the execution of that process improved noticeably as a result of the progress made during the W62 D&I restart activities.

Canned Subassemblies. Comparing safety analyses from the Pantex Plant and Y-12 Plant, the Board's staff noted that the analyses at Pantex did not consider the potential damage resulting from exposure of canned subassemblies (CSAs – the fusion portion of a nuclear weapon) to fires. Further research by the staff on the properties of the materials making up some CSAs indicated a significant hazard at Pantex that was not considered by the site or the Design Agency. Working with safety basis and other engineering personnel from all three sites, the staff assisted in the development of a predictive model of behavior for these components. Controls were subsequently enhanced to ensure that the CSAs were protected.

LANL Authorization Basis (AB) Documents. The Board noted significant deficiencies in the quality of some AB documents at LANL, and urged DOE and the laboratory to take decisive corrective actions. As a result of highlighting these issues, LANL, under strong guidance from Los Alamos Area Office (LAAO), performed a thorough self-assessment of the quality of AB documentation. LANL found that the documentation for most of the facilities reviewed had significant deficiencies. LANL, under guidance from LAAO, agreed contractually to upgrade the quality of the documentation involved. LANL has also reorganized to improve its ability to assure the quality of ABs.

LANL Response to Cerro Grande Fire and Potential for Flooding. After firefighters began to control the Cerro Grande fire, the Board conducted onsite reviews of the status of defense nuclear facilities and LANL's facility recovery plans. The defense nuclear facilities incurred little or no significant damage, and facility recovery plans were found to be thorough. The Board also reviewed the potential for flooding as a result of the loss of the ability of soil to absorb water. LANL responded swiftly to the threat of flooding with flood control and mitigation measures. The Board, however, identified important areas where DOE needed to be more thoroughly engaged in reviewing the adequacy and appropriateness of measures being taken immediately and in the future to address flooding concerns.

LLNL Safety Basis Improvement. Extensive Board and staff reviews of LLNL's authorization basis for defense nuclear facilities have focused the Oakland Operations Office's attention towards nuclear safety and enhanced technical competence and the degree of involvement in the safety basis at LLNL. In response to the Board's reviews, there has been a substantial and continuing improvement of the LLNL Safety Basis program, including improvements in technical competence, training, and quality of safety basis documents.

Examples of FY 2000 Accomplishments

Readiness to Dispose of a Damaged Nuclear Weapon at the Nevada Test Site. The Board highlighted to DOE that safety-related program and infrastructure problems that may complicate DOE's mission to safely dispose of a damaged nuclear weapon or improvised nuclear device. In response, DOE has developed a project to upgrade its capabilities to conduct these activities safely. DOE has conducted a number of exercises that clearly identified issues needing to be addressed. The drills and exercises have already improved DOE's proficiency in this important mission area. Under the Board's continued oversight, DOE is now prioritizing its infrastructure upgrade needs.

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 1999 Accomplishments

DOE Standard on Hazards Analysis Reports. In early 1999, in response to a Board Recommendation, DOE developed and published a standard on conducting and documenting hazards analyses for nuclear explosive operations. This important directive sets DOE's fundamental expectations and provides guidance on how to establish and document the safety basis that ensures hazardous activities involving nuclear explosives can be completed safely.

Lightning Protection at Pantex. The Board and its staff continued efforts during the last year to help DOE address the potential hazards from lightning to nuclear explosive operations at Pantex. This year, the DOE lightning protection project team (which was established in response to a Board reporting requirement) completed a comprehensive investigation and report detailing the threat of lightning to nuclear explosives, analyzing potential controls and mitigators, and summarizing the actions DOE considers necessary to protect nuclear explosive operations at Pantex from lightning threats. During this same time, DOE has identified and installed many additional lightning protective measures at the plant.

Chemical Safety. Based on evaluations from its staff, the Board concluded that efforts to improve chemical safety at the Oak Ridge Y-12 Plant were not keeping pace with other defense nuclear sites or the Secretary of Energy's published expectations. After the Board communicated its concern, DOE stepped up efforts to complete a chemical management program at Oak Ridge Y-12, including a renewed commitment to characterize chemical inventories for emergency planning purposes and to dispose of excess chemicals.

Safety Controls for Specific Nuclear Explosive Operations. The Board and its staff conducted numerous assessments of the safety of specific nuclear explosive activities at the Pantex Plant in the last year. These reviews, which included the W56 dismantlement, the W87 Life Extension Program, and the W62 surveillance program, identified safety-related issues such as the adequacy of safety analyses and controls, the flowdown of controls into operating-level procedures, and the readiness of activities to operate safely. As a result of the Board's involvement, DOE has taken positive action to improve the safety of all of these operations.

Integrated Safety Management at Pantex. In early FY 1999, the Board issued Recommendation 98-2, *Integrated Safety Management at the Pantex Plant*, urging DOE to take fundamental actions to improve the safety of all weapons-related work at the Pantex Plant. Principle among the Board's specific recommendations was that DOE simplify and expedite its process for re-engineering processes at Pantex such that the attendant safety improvements could be put in place sooner. DOE accepted Recommendation 98-2 and made specific commitments to improve safety management at Pantex including accelerating efforts to establish weapon-specific safety basis for all on-going activities at Pantex.

Enriched Uranium Restart at Y-12. The Board and its staff evaluated DOE efforts to resume enriched uranium operations at the Oak Ridge Y-12 Plant. In the last year, the Board identified to DOE several safety issues with the Phase A2 resumption project including design problems, safety analysis problems, and problems with implementation of safety controls. The Board and DOE worked cooperatively to resolve these issues such that Phase A2 operations could resume safely to support high priority national defense related missions.

B332 Restart. After a Board letter in December 1997 identifying weaknesses in work planning, authorization and control in Building 332, Plutonium Facility, the Board interacted with Lawrence Livermore National Laboratory and the Department of Energy throughout Building 332's Resumption of Operations in 1998 and 1999 to encourage and assist with the improvements. As a result, Building 332 implemented a process to plan, authorize and control work with special nuclear material safely. With the Board's encouragement the process has been applied to the other facilities in the Superblock, i.e., Tritium Facility and Hardened Engineering Test Building. The Laboratory is revising site implementing guidance on planning, authorizing and control work to address a laboratory-wide systemic problem.

Examples of FY 1999 Accomplishments

Integrated Safety Management at LLNL. As a result of the Board's effort to improve safety management at DOE defense nuclear facilities (Recommendation 95-2), LLNL developed a set of Work Smart Standards (a set of requirements and standards for hazards specifically applicable to LLNL), is making significant progress with developing a description of its integrated safety management system, and is developing site-wide standards/guidance to implement an integrated safety management system. Through direct Board interaction, Board letters, and Board staff visits and reviews, the Board has provided assistance with developing the Work Smart Standards and to the Laboratory's efforts to develop policy and guidance to implement integrated safety management.

Y2K at LLNL. Based on staff reviews at Lawrence Livermore National Laboratory and other sites, the Board determined the DOE had provided inadequate direction to the operators of its defense nuclear facilities with regard to evaluating safety-related systems for year 2000 compliance. The Board communicated its concern to DOE in a letter requesting that DOE report on the status of safety-related equipment evaluations at all defense nuclear facilities. In April 1999, DOE issued detailed guidance on the evaluation of safety-related systems, requiring those systems be treated in a manner similar to mission-essential systems.

Los Alamos National Laboratory Pajarito Laboratory. The Board and its staff identified deficiencies with the safety basis for activities conducted at the Pajarito Laboratory (also known as TA-18). The Board assisted DOE and the lab in defining a path to improve the safety basis including urging that DOE focus on Basis for Interim Operations to upgrade the safety controls at Pajarito Laboratory as soon as possible.

Damaged Nuclear Weapons. The Board has recently focused attention on the issue that DOE's capability to safely perform the work necessary to dispose of damaged nuclear devices (DNDs) at defense nuclear facilities is rapidly disappearing. In the past, maintenance of the facilities and personnel necessary to support this mission depended on nuclear test operations. However, the personnel and facility infrastructure required to support testing operations are dwindling over time. Planning DND operations so that they can be executed safely represents challenges that DOE is not addressing. DOE has agreed with the Board's conclusions and is starting to increase its efforts to address this issue.

**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.

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 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) and Los Alamos National Laboratory (LANL) (Recommendation 94-1/2000-1), including followup on findings and recommendations from the study of the adequacy of plutonium storage at SRS as required by Public Law 107-314, Section 3183, *Study of Facilities for Storage of Plutonium Materials at Savannah River Site*.
- Stabilization and disposal of plutonium-bearing residues at LANL (Recommendation 94-1/2000-1).
- Design of modifications to existing SRS facilities to increase long-term plutonium storage capacity and provide long-term restabilization/repackaging capability.
- Design of modifications to existing SRS facilities to support potential plutonium disposition activities.
- Monitoring and surveillance activities in support of long-term storage of plutonium.
- Neptunium solution stabilization operations at the SRS (Recommendation 94-1/2000-1).
- Characterization, stabilization, and packaging of uranium-233 (^{233}U) at Y-12 (Recommendation 97-1).
- 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).
- Testing and operation of high-level waste retrieval and transfer systems at the Hanford Site.
- Operation of the Melton Valley transuranic/alpha waste treatment facility at Oak Ridge National Laboratory (ORNL).
- Safety of spent nuclear fuel basin sludge retrieval, treatment, and storage at the Hanford Site (Recommendation 94-1/2000-1).
- Safety of initial contact-handled and remote-handled transuranic waste operations at the Waste Isolation Pilot Plan (WIPP).
- Safety of processing and packaging of cesium and strontium capsules for dry storage at the Hanford Site.
- Complex-wide legacy nuclear material issues, including evaluation of materials not addressed by Recommendations 94-1 and 2000-1 and utilization of stabilization capabilities.
- Design of ORNL's system for processing ^{233}U (i.e., ^{229}Th extraction) for potential medical applications.
- Decommissioning activities in Building 371 at Rocky Flats Environmental Technology Site (RFETS).
- SRS deactivation activities, including F-Canyon and M-Area facilities.
- Hanford Site decommissioning activities (e.g., planning for decommissioning the Plutonium Finishing Plant, U-Plant, and K-Basins).
- Decommissioning at the Miamisburg Closure Project.
- Decommissioning at the Fernald Closure Project, including operation of the Silos Project facilities.
- Deactivation and decommissioning of the Heavy Element Facility (Building 251) at Lawrence Livermore National Laboratory.

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 2004 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) and Los Alamos National Laboratory (LANL) (Recommendation 94-1/2000-1), including completion of a study of the adequacy of plutonium storage at SRS as required by Public Law 107-314, Section 3183, *Study of Facilities for Storage of Plutonium Materials at Savannah River Site*, and followup on the study's findings.
- Stabilization and disposal of plutonium-bearing residues at LANL (Recommendation 94-1/2000-1).
- Resolution of safety issues and startup of the plutonium-238 scrap recovery line at LANL.
- Design of modifications to existing SRS facilities to increase long-term plutonium storage capacity and provide long-term restabilization/repackaging capability.
- Design of modifications to existing SRS facilities to support potential plutonium disposition activities.
- Monitoring and surveillance activities in support of long-term storage of plutonium.
- Preparations for neptunium solution stabilization at the SRS (Recommendation 94-1/2000-1) and preparations to store the stabilized material at the Y-12 National Security Complex (Y-12).
- Characterization, stabilization, and packaging of uranium-233 (^{233}U) at Y-12 (Recommendation 97-1).
- 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).
- Testing and operation of high-level waste retrieval and transfer systems at the Hanford Site.
- High-level waste storage tank integrity at SRS and the Hanford Site.
- Startup and initial operations of the Melton Valley transuranic/alpha waste treatment facility at Oak Ridge National Laboratory (ORNL).
- Safety of spent nuclear fuel and sludge retrieval, treatment, and storage at the Hanford Site (Recommendation 94-1/2000-1).
- Preparations for remote-handled transuranic waste operations at the Waste Isolation Pilot Plan (WIPP), and safety of full-throughput contact-handled waste disposal at WIPP.
- Design and construction of a dry storage facility for cesium and strontium capsules at the Hanford Site.
- Safety of contact-handled transuranic waste retrieval at the Hanford Site.
- Startup and initial operation of the Advanced Mixed Waste Treatment Facility at Idaho National Engineering and Environmental Laboratory (INEEL).
- Design of High-Activity Treatment Facility for transuranic waste at the Savannah River Site.
- Complex-wide legacy nuclear material issues, including evaluation of materials not addressed by Recommendations 94-1 and 2000-1 and utilization of stabilization capabilities.
- Design of ORNL's system for processing ^{233}U (i.e., ^{229}Th extraction) for potential medical applications.
- Decommissioning activities in Building 371 at Rocky Flats Environmental Technology Site (RFETS).
- Demolition of Building 776 at RFETS.
- SRS deactivation activities, including F-Canyon and M-Area facilities.
- Hanford Site decommissioning activities (e.g., planning at the Plutonium Finishing Plant).
- Decommissioning at the Miamisburg Closure Project.
- Decommissioning at the Fernald Closure Project, including the design and startup of Silos Project facilities.
- Deactivation and decommissioning of the Heavy Element Facility (Building 251) at Lawrence Livermore National Laboratory.

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.

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

Examples of FY 2003 Accomplishments

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.

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.

Examples of FY 2002 Accomplishments

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.

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 2001 Accomplishments

High-Level Waste Management at the Savannah River Site. In response to the leakage of high-level waste (HLW) from a storage tank at the Savannah River Site (SRS), combined with inadequate corrective action from DOE and its contractor, the Board issued Recommendation 2001-1, *High-Level Waste Management at the Savannah River Site*. This recommendation, issued March 23, 2001, urged DOE to remove waste from the leaking tank and to undertake several initiatives to improve the overall safety and operability of the HLW system at SRS.

High-Level Waste Tank Integrity. The Board has continued to press DOE to improve programs that protect and verify the integrity of the high-level waste storage tanks at Hanford and Savannah River. As a result, during FY 2001, DOE made several improvements to its tank integrity program at Hanford, including adding corrosion inhibitors to tanks with off-specification chemistry and implementing improved requirements for monitoring tank chemistry and operating the annulus ventilation systems which help prevent corrosion of the primary tank wall.

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 deteriorate with age. DOE has since taken action to mitigate some of the most immediate concerns, but much of the material has yet to be addressed. In January 2001, in response to issues raised by the Board, DOE provided an updated implementation plan for completing stabilization of the remaining materials. The Board did not fully accept this plan, and, in a letter to DOE dated March 23, 2001, identified the need to further expedite stabilization activities at the Savannah River Site and Los Alamos National Laboratory. DOE is now making progress towards successful resolution of the Board's remaining issues.

Plutonium Stabilization and Packaging. During FY 2001, Rocky Flats, Hanford, and Lawrence Livermore National Laboratory each began packaging plutonium into high-integrity long-term storage containers. This represented the culmination of several years of preparations, and fulfills a commitment made by DOE in response to the Board's Recommendations 94-1 and 2000-1 regarding the stabilization of legacy nuclear materials. Also during FY 2001, Hanford began stabilization of the plutonium solutions stored at the Plutonium Finishing Plant, in response to Recommendations 94-1 and 2000-1.

Uranium-233 Stabilization. In response to Board Recommendation 97-1, *Uranium-233 Safe Storage*, DOE successfully completed readiness preparations for the uranium-233 inspection program at Oak Ridge National Laboratory. This program is needed to characterize materials that have been stored for more than 20 years with little surveillance. Safety issues identified by the Board during the preparations for the inspections have been resolved by DOE, and the Board expects that DOE will perform the first canister inspections in September 2001.

Hanford Spent Nuclear Fuel Project. During FY 2001, a major milestone in the implementation of Recommendation 94-1 was reached with the start-up of stabilization of spent fuel from the Hanford K-West Basin. The safe start-up of this activity followed several years of intensive preparations by DOE, and extensive oversight by the Board which led to the identification and correction of numerous safety issues before operations commenced.

Decommissioning Activity at Miamisburg Environmental Management Project. During FY 2001, the Board's staff reviewed worker training and the implementation of the occurrence reporting and Unreviewed Safety Question processes used during decommissioning work at MEMP. The staff found deficiencies in training and weaknesses in the implementation of these processes. Subsequently, the contractor made revisions to its programs and implemented a computer-based training records system.

Building 9206 at Oak Ridge. For several years, the Board has pressed DOE to pursue risk reduction and deactivation activities at the Y-12 National Security Complex Building 9206. In early FY 2001, shortly after an onsite review, the Board sent a letter to DOE noting that three accomplishments in support of deactivation and risk reduction had been achieved, but that the hazards of most concern to the Board had not been markedly alleviated. During a follow-up review in May 2001, the Board's staff noted that significant steps had been taken to raise the priority of hazard reduction and that more aggressive efforts were being considered, including reclassifying some materials as waste for direct disposal. The Board found it encouraging that a recently issued revision to the baseline plan for the facility presents

Examples of FY 2001 Accomplishments

an accelerated option that completes deactivation in six years, and that efforts to stabilize pyrophoric material were proceeding toward an Operational Readiness Review before the end of FY 2001.

Hanford Site Deactivation Activities. During FY 2001, the Board's staff continued to review deactivation and decommissioning efforts at Hanford. Comments regarding safety were given to the contractor; subsequently, changes were made and improvements were evident. The Board also evaluated the site-wide approach to excess facility disposition at Hanford, and provided suggestions to improve the processes used to manage such work in a letter to DOE in August 2001. A significant event that occurred in FY 2001 as a result of Board effort was the start-up of facility characterization activities at the defunct Bulk Reduction Building (224-T).

Rocky Flats Environmental Technology Site. The Board's staff observed deactivation and decommissioning work activities in the field, reviewed various planning and authorization basis documents, and engaged RFETS management personnel on various technical issues. The Board's staff evaluated actions taken by RFETS following bioassay results that indicated the intake of radioactive material by ten individuals who were involved with work in Building 771. In addition, the staff evaluated the contractor's Price Anderson "root cause analysis" report and identified that this report did not clearly address deficiencies associated with the basic functions and principles of Integrated Safety Management. Contractor management indicated that they would review the report and corrective actions in light of the staff's observations. Furthermore, subsequent to this occurrence, the Board's staff began a review of the sensitivity of bioassay analysis, sample frequency, and work place indicators.

The Board's staff also provided comments to RFETS regarding work planning and control problems. Subsequent to these interactions, the Board has noted improvements as a result of the promulgation of guidance, revised documents, and increased management attention.

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 2000 Accomplishments

Improved Remediation Schedules for Legacy Materials. On January 4, 2000, the Board issued Recommendation 2000-1 to ensure that the stabilization of legacy materials continues in a manner that reflects the risks posed by the materials. Additionally, the Board recommended that funding shortfalls preventing timely stabilization of materials be identified and reported as required by law. On June 8, 2000, DOE submitted a revised implementation plan intended to satisfy both Recommendation 94-1 and 2000-1. According to the plan the vast majority of remaining material will be stabilized within the next several years. Outstanding issues relating to material stabilization were communicated to DOE in a letter from the Board dated July 14, 2000.

In accordance with the Implementation Plan for Board Recommendation 94-1 and the US District Court of Idaho Court Order, all spent nuclear fuel was removed from the unlined basins at the Idaho National Engineering and Environmental Laboratory CPP-603 Fuel Receiving and Storage Building to a newer fuel storage facility (CPP-666) by April 28, 2000. Transfer of the fuel reduces the risk of leakage of radioactive materials from deteriorating spent fuel in unlined basins and is the first step towards drying and encapsulation of the spent fuel in dry storage facilities for the longer-term.

Standards for Safe Storage of Fissile Materials. In July 2000, DOE issued a standard for stabilization and packaging of uranium-233 metals and oxides for safe long-term storage. This standard was developed in response to Board Recommendation 97-1, with the Board working closely with DOE during its development to ensure that it contained appropriate requirements for safely storing this highly radioactive isotope. The Board also continued to assist DOE in refining a similar standard for safe packaging and storage of plutonium, which had been finalized and issued in response to Board Recommendation 94-1. In early 2000, after extensive review and discussions with DOE, the Board agreed to modifications to the plutonium standard that would make it easier to implement without compromising safety.

Engineered Safety Controls. In several reviews of new operations at the Savannah River Site, the Board identified inadequacies in the use of engineered controls to prevent potential accidents. As a result, improved controls were implemented for high-level waste retrieval activities. The Board is pursuing similar improvements in the design of the equipment for pretreatment and vitrification of highly radioactive americium/curium solutions at Savannah River. The Board is continuing to press DOE to address the root cause of these problems, and to reaffirm the importance of avoiding an undue reliance on administrative controls and non-safety-grade equipment.

Implementation of Radioactive Waste Management Order. In response to Board Recommendation 94-2, DOE has revised and reissued its radioactive waste management order, Order 435.1, to provide more comprehensive and effective requirements. The Board discovered this year that DOE had informed the operating contractor at Rocky Flats that several key provisions of the order did not apply to Rocky Flats on the grounds that it was not considered an operating facility. The Board acted immediately to correct this problem, ultimately issuing formal correspondence that led DOE to reverse this inappropriate interpretation before it spread to other sites.

Safe Storage of High-Level Waste. In June 2000, the Board's staff completed a review of high-level waste tank systems at the Hanford Site. Several significant issues were identified related to preserving the integrity of the storage tanks, notably the need to promptly correct the chemistry in tanks that had become depleted of corrosion inhibitors and the need to ensure the operability of ventilation systems required to prevent moisture from forming between the walls.

Efforts to Improve Decommissioning Work at the Hanford 233-S Facility. The Board's staff has monitored the planning and accomplishment of decommissioning work at the Hanford 233-S Plutonium Concentration Facility. Board correspondence and staff comments to DOE and its contractor regarding this facility have focused on work planning and implementation deficiencies. Safety deficiencies involving the work site and Process Hood glove bags noted by the staff have been discussed with project personnel, and corrective actions were taken to resolve some concerns. The staff has noted that efforts are being made to improve work planning and implementation. For

Examples of FY 2000 Accomplishments

example, the contractor held a workshop to review the radiological work planning process and provide recommendations for improvement, and a contractor project manager requested that a team of contractor and DOE health physicists inspect glove bags used in Process Hood decommissioning work.

Upgraded Work Controls for Decommissioning at Rocky Flats. The Board has followed dismantlement work activities for gloveboxes and other equipment in Building 771 (the former Plutonium Recovery Facility) at the Rocky Flats Environmental Technology Site (RFETS) and has issued correspondence noting problems with work planning and control. The staff reviewed the implementation of the RFETS Integrated Work Control Program (IWCP) and provided comments to RFETS personnel. The contractor revised the IWCP manual and has taken steps to improve the implementation of the program. This action has contributed to addressing the staff's observations of deficient implementation of the hazard analysis process for deactivation and decommissioning activities in facilities such as Building 771.

Upgraded Safety Controls for Decommissioning Work at Rocky Flats. The Board's staff has followed RFETS' efforts to apply engineered controls for size reduction of gloveboxes and other equipment in response to comments provided by the Board. These controls will help remove or greatly reduce the radioactive airborne environment. The staff has continued to communicate the need to mitigate or eliminate hazards by the use of engineered controls, and RFETS personnel are actively pursuing a phased approach of design, testing, and implementation of engineered controls in support of their site closure work.

New and Revised Procedures for Decommissioning Work at the Miamisburg Environmental Management Project. The Board's staff reviewed and provided comments regarding a draft technical basis document, new and revised implementing procedures, and plans for determining readiness for decommissioning work involving special tritiated compounds at the Miamisburg Environmental Management Project (MEMP). These comments contributed to improving the documents. Various work control documents have been reviewed, and staff comments have been provided to DOE-MEMP and the contractor. Staff-to-staff discussion is expected to help better identify and resolve deficiencies.

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 1999 Accomplishments

Improved Remediation Schedules for Legacy Materials. In December 1998, after numerous formal and direct interactions with the Board and its staff, DOE issued an up-to-date plan and schedule for addressing the numerous health and safety risks posed by the highest priority legacy materials stored throughout the DOE nuclear weapons complex, originally identified by the Board in Recommendation 94-1. However, the Board identified several deficiencies in the new plan, and soon thereafter discovered that site-level planning did not support several significant commitments. The Board has engaged DOE on these issues, and will see that they are resolved expeditiously.

Operational Problems at Savannah River Site. In the spring of 1999, the Board's continuing review of operational data for DOE defense nuclear facilities revealed a negative trend in control of work and operations at the Savannah River Site. The Board issued a letter to DOE in May 1999 identifying this problem to DOE, stating that a broader look at the underlying causes and a systematic understanding of those causes would be required to correct weaknesses in performance. In response, DOE has undertaken corrective actions to reverse this trend and ensure a sustained, highly satisfactory level of performance.

Completion of Recommendation 94-3 at Rocky Flats. The Board issued Recommendation 94-3, *Rocky Flats Plutonium Storage*, to ensure that the large quantity of plutonium at the Rocky Flats Environmental Technology Site would be safely stored. The Board recommended that DOE take a systematic approach to evaluating the suitability of Building 371 for the proposed new mission of storing the site's entire plutonium inventory, and prepare a program plan for building upgrades and improvements consistent with the building's mission. As a result of the Board's recommendation, upgrades to the building's structure, systems, and components, as well as the safety basis, were completed during Fiscal Year 1999. The Board closed this recommendation and now considers the building adequate for its current storage mission.

Characterization and Safety of Hanford High-Level Waste Tanks. The Board and its staff have continued to press DOE to resolve the health and safety issues presented by the 177 high-level waste tanks at Hanford. In 1999, the Board worked closely with DOE to develop a strategy for resolving the remaining safety-related uncertainties in the characterization of the wastes, and to ensure that DOE developed a sound strategy for mitigating flammable gas retention problems in Tank 241-SY-101. Because of these efforts, Board Recommendation 93-5, dealing with Hanford high-level waste characterization, is expected to be closed shortly, and the Board expects that DOE will be able to resolve the Tank 241-SY-101 problem in FY 2000.

Upgraded Safety Controls for Decommissioning at Rocky Flats. Decommissioning activities are being conducted in several buildings at the Rocky Flats Environmental Technology Site (RFETS). The Board identified that safety controls for protection of workers did not provide the desired level of protection because of an inappropriate reliance on personal protective equipment (e.g., respirators) rather than engineered controls to eliminate or mitigate hazards. Furthermore, when engineered controls were used (e.g., air movers), they were not adequately analyzed to ensure that they produced the desired result. In response to these concerns, a multi-disciplinary team was chartered at RFETS to develop more rigorous engineered controls and analyze performance of the controls. Enhanced worker protection controls are now being applied to demolition of contaminated equipment at the site. RFETS is also investigating the use of remote equipment for size reduction of contaminated equipment.

Activity Level ISM of Hanford Decommissioning Work. The Board's staff reviewed planning and implementation of decommissioning work being done by the Hanford Environmental Restoration Contractor. The staff found that the work control procedures and practices need improvement to meet the intent of Integrated Safety Management. 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 of needed improvement have been communicated directly to DOE.

Examples of FY 1999 Accomplishments

Radiation Protection Measures for Metal Tritides during Decommissioning. During FY 1999, the Board's staff evaluated radiation protection program measures for decommissioning work in areas at the Miamisburg Environmental Management Project (MEMP) that are suspected of being contaminated with tritium compounds such as metal tritides. As a result of staff visits and subsequent information exchanges, the MEMP contractor prepared a corrective action plan to address deficiencies in the radiation protection program, and work is proceeding to resolve these issues before major decommissioning work begins in mid-September 1999. These technical issues also apply to other defense nuclear facilities, so the Board has requested that DOE articulate a technical position on this matter to ensure that appropriate measures are implemented across the defense nuclear facilities complex. As a result of this action, DOE-EM informed DOE Field Offices of the issue, drafted a technical position regarding control levels for airborne radioactivity, and has committed to developing an updated technical approach.

**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.

This Performance Goal is new in FY 2004. Although the Board has reviewed the designs of new and modified DOE defense nuclear facilities since its inception, the pace of such activity within DOE this year and projected in the near term has led the Board to place increased emphasis on this goal. The representative accomplishments pertaining to this Performance Goal for FY 1999 - 2002 have been sorted for inclusion in this section of Appendix D.

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 2005 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. Candidates for review include:

- Review the design of potential modifications to existing Savannah River Site (SRS) processing facilities to support plutonium disposition activities.
- Evaluate the design of modifications to existing SRS facilities to support potential plutonium disposition activities.
- Review the design of modifications to existing SRS facilities to increase long-term plutonium storage capacity and provide long-term restabilization/repackaging capability.
- Review the design of the treatment facility for high-level waste liquids and salts at SRS, and system improvements to ensure safe management of SRS high-level waste (Recommendation 2001-1).
- Review the design of Oak Ridge National Laboratory's system for processing ^{233}U (i.e., ^{229}Th extraction) for potential medical applications.
- Continue design and construction reviews of the Waste Treatment Plant at the Hanford Site and the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex. Topics to review may include: pretreatment feed evaporation, ultra-filtration, and ion exchange systems, vitrification facilities off-gas and off-gas control systems, hydrogen mitigation and pulse jet mixing design bases, and construction quality.

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 2004 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. Candidates for review include:

- Review the design of modifications to existing Savannah River Site (SRS) facilities to support potential plutonium disposition activities.
- Assess the implementation of quality assurance requirements during Tritium Extraction Facility construction and procurement of safety significant facility equipment and systems.
- Review the design of modifications to existing SRS facilities to increase long-term plutonium storage capacity and provide long-term restabilization/repackaging capability.
- Evaluate the design of treatment facilities for high-level waste liquids and salts at SRS, and system improvements to ensure safe management of SRS high-level waste (Recommendation 2001-1).
- Design and construction of a dry storage facility for cesium and strontium capsules at the Hanford Site.
- Review the design of High-Activity Treatment Facility for transuranic waste at SRS.
- Evaluate the adequacy of DOE's Title II design of the final proposed Pit Disassembly and Conversion Facility at SRS.
- Continue design and construction reviews of the Waste Treatment Plant at the Hanford Site and the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex. Topics to review may include: pretreatment feed evaporation, ultra-filtration, and ion exchange systems, vitrification facilities off-gas and off-gas control systems, hydrogen mitigation and pulse jet mixing design bases, and construction quality.

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 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 5 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.

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.

Examples of FY 2003 Accomplishments

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 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

Examples of FY 2002 Accomplishments

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.

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 2001 Accomplishments

LANL Classified Experiment. As a result of the Board efforts, DOE and LANL have reached an agreement on a defensible design basis for the confinement vessels to be used for these experiments. The Board has also worked to ensure that an acceptable approach for developing the overall authorization basis for these experiments is institutionalized in the directive system for application to future experiments at LANL.

Design and Construction at LANL. The Board had previously emphasized the need to identify and analyze hazards and develop controls to protect the public, workers, and the environment early in the design process for hazardous projects. Delays had been encountered in an important project because design criteria were not developed early in design. As a result of the Board's efforts, these issues have now been resolved and LANL is making progress to replace this important safety system.

Project Management/Engineering. During reviews at Los Alamos National Laboratory and Y-12, the Board and its staff identified a lack of qualified, highly experienced federal project managers capable of managing design and construction of major nuclear projects. The staff also found that DOE's local project engineering review process was inadequate to identify issues concerning quality assurance and potential safety implications. The Board asked NNSA to evaluate these concerns and develop a corrective plan to address this important human resource need to ensure that safety is integrated in the design and construction of DOE nuclear projects.

Design of Tritium Extraction Facility. The Tritium Extraction Facility, currently under construction at SRS, will replenish the tritium reserves for the nation's nuclear weapon stockpile. The Board identified needed improvements in design, including the potential impact of water on electrical/electronic components, the need for additional high range gamma monitors, and the need to improve structural response to potential earthquakes. In response, DOE modified the design criteria, completed enhanced seismic response calculations, and provided improvements in its program for ensuring quality construction.

Hanford Spent Nuclear Fuel Project. Results of the ongoing review of the Hanford Spent Nuclear Fuel Project (SNFP) by the Board's staff were documented in DNFSB/TECH-30, *Safety Review of the Hanford Spent Nuclear Fuel Project During the Design and Construction Phase*, issued in February 2001. This report described safety issues identified by the Board's staff and their resolution. Lessons learned were identified for application to future activities in the K-East Basin.

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 2000 Accomplishments

Pantex Fire Protection. The Board and its staff highlighted to DOE senior management that the fire detection system at Pantex was failing because the commercial vendor had stopped producing spare parts. The review also identified that the fire suppression capability of the cells in one Building lagged behind that in other nuclear explosive operating facilities because they did not have ultra-violet detectors to initiate suppression. As a result of the Board's actions, a major part of the supplemental appropriation from DOE to Pantex will be used to install a UV detection system to activate the deluge system in the cells, greatly improving the fire safety of explosive operations in the area. Additionally, DOE has started plans (in response to Recommendation 98-2) to accelerate replacement of the fire detection system with a non-proprietary system supported by many different commercial vendors.

LLNL Electrical and I&C. Based on reviews by the Board's staff of LLNL's electrical, instrumentation, and control systems, the Board concluded that the safety-class emergency power system at LLNL's plutonium facility (Building 332) was neither designed nor maintained to safety-class standards. The staff report also noted potential areas for improvement, particularly LLNL's Work Smart Standards for safety-related instrumentation and control systems and lightning protection for Building 332. In response, LLNL took prompt actions to address the Board's issues such as correcting improper seismic mounts for safety-critical electrical components and switchgear.

LANL Classified Experiment. Board interactions with LANL have led to the formation of a group of experts to thoroughly review a classified experiment with potentially significant safety consequences and are significantly improving the quality of safety controls. The expert panel has been conscientiously evaluating the complicated activity and has identified numerous improvements that LANL has implemented (or is working on) that substantially improve the safety of this experiment and the design and safety basis for similar experiments potentially conducted in the future.

Tritium Extraction Facility. Review of the preliminary design package for the Tritium Extraction Facility (TEF) project by the Board and its staff disclosed that the preliminary design did not appear to have fully implemented the hierarchy of safety controls consistent with the site's manuals of practice, and that additional consideration of this matter was merited in developing the final TEF design. For example, there appeared to be an over-reliance on administrative controls being used instead of engineered design features to provide safety functions. DOE accepted the Board's suggestions and agreed to incorporate them in the final design.

Hanford Spent Nuclear Fuel Project. Reviews of the Hanford Spent Nuclear Fuel Project by the Board's staff identified safety issues related to safety-related ventilation systems and electrical systems at the Cold Vacuum Drying Facility. DOE addressed these issues, including addition of a diesel generator to supply safety significant power to the exhaust fans for the ventilation system, further enhancing the safety of the facility.

Pit Disassembly and Conversion Facility. The Board and its staff conducted a series of review meetings on the design of the Pit Disassembly and Conversion Facility (PDCF) that identified to DOE a need for additional boreholes in the geotechnical specification to improve safety; DOE added a requirement for these boreholes to the specification. In addition, the Board noted that sand filters provide better inherent resistance to severe accidents than do high efficiency particulate air (HEPA) filters. In response, DOE committed to conduct a comprehensive study to compare the safety and cost benefits of the sand filter option with the HEPA filtration option.

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 1999 Accomplishments

The Board conducted a series of design review meetings with DOE and its contractor for the Tritium Extraction Facility (TEF) at SRS, which resulted in the Board's identifying a number of issues. The preliminary facility design did not appear to have fully implemented a hierarchy of safety controls consistent with what is considered good safety practice. The Board also identified additional design features that would enhance safety by improving the reliability of the controls and providing additional defense in depth without a significant impact on the cost and schedule for the project. These issues were communicated to DOE during reviews.

At the Board's urging, the Hanford Spent Nuclear Fuel Project (SNFP) contracted for new containers for storing spent nuclear fuel. The containers are to be code stamped to the requirements of Section III of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, thus providing enhanced reliability for safely storing spent nuclear fuel.

The Board's reviews identified several incidents that indicate a breakdown in weld quality assurance associated with design and construction projects at DOE sites, including the Hanford Site, the Y-12 Plant, and INEEL. Such a breakdown in weld quality assurance could have allowed components with defective welds to be put into service in systems where weld failure could adversely affect the health and safety of workers and the public, or result in contamination of the environment. The Board issued a letter requesting DOE to identify steps it will take to resolve this problem.

PERFORMANCE GOAL 4: NUCLEAR 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.

Performance Goal 4

Nuclear 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 2005 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. 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.

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 at several NNSA sites.
- Activity-level ISM for non-10 CFR 830 activities.
- Validation of at least one ISM review by the DOE Office of Oversight.
- Implementation of line oversight of ISM per DOE P 450.5 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 this effort will have required a series of public meetings and 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 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 2004 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 25 DOE directives that may impact public and worker health and safety will require review, of which 2 or 3 are likely to require significant Board and staff interaction to ensure satisfactory resolution of potential issues. The Board also expects to be heavily involved in the efforts of the National Nuclear Security Administration (NNSA) to establish its own directive system. It is estimated that 20 NNSA directives will also require review. As a result of these reviews, new or modified health and safety directives will be issued in an enhanced form, resulting in improved safety through standardized requirements and guidance that provide for adequate protection of the workers and the public.

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

- Activity-level ISM implementation at sites with performance indicators judged to have higher than expected rates of abnormal occurrences related to worker protection.
- Activity-level ISM at several NNSA sites.
- Validation of at least one ISM review by the DOE Office of Oversight.
- Implementation of line oversight of ISM per DOE P 450.5 at one EM site and one NNSA site.
- Implementation of DOE's *Quality Assurance Improvement Plan*.
- Implementation or 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 continue its initiative to identify the potential issues associated with DOE's and NNSA's new policies on line oversight and contractor assurance. The Board anticipates that this effort will require a series of public meetings and 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 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 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

Examples of FY 2003 Accomplishments

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.

Nuclear Criticality Safety Program. The Board continued to stress the need for stable funding for future nuclear criticality safety program elements, particularly when funding available in FY 2003 was cut from programmed levels. Throughout 2003, the Board conducted a comprehensive review of the results obtained through DOE's implementation of the Board's Recommendation 97-2, *Continuation of Criticality Safety at Defense Nuclear Facilities*. As a result, in August 2003, the Board determined that nuclear criticality safety has improved across the complex and closed the recommendation, levying an annual reporting requirement on DOE that will allow the Board to maintain the required level of oversight on this key area.

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.

Examples of FY 2003 Accomplishments

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 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.

Nuclear Criticality Safety at the Pit Disassembly and Conversion Facility (PDCF). The Board conducted a series of reviews on the design of the controls for nuclear criticality safety for the proposed PDCF. The design included a unique safety control system involving numerous measurements of weight and radiation signatures throughout the process. The Board urged DOE to take advantage of the expertise available in DOE's Nuclear Criticality Safety Support Group, which is composed of senior criticality specialists. Their review highlighted significant potential issues based on their experiences with the development and operation of similar critical mass control systems. These issues are now being addressed.

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.

Examples of FY 2003 Accomplishments

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, although DOE has again proposed rescinding the funds in FY 2004.

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 needed improvement. As a result of the Board's efforts, DOE is working to institutionalize these reviews and to ensure that the federal and contractor workforce is adequately trained and qualified so that the vital safety systems remain reliable and operational in the future.

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. 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 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 the latter part of 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 and the Board is conducting a series of reviews at Y-12, Pantex, Hanford, and the Lawrence Livermore National Laboratory to evaluate the quality and effectiveness of the 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 continued 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 Facility. Throughout 2002, the staff conducted onsite reviews of selected facilities at LANL, SRS, and ORNL and observed improving trends

Examples of FY 2002 Accomplishments

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.

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*. In a letter dated January 31, 2002, the Board noted that many constructive steps had been taken to establish a disciplined process for responding to DOE independent oversight findings. However, additional effort was warranted in the establishment of Functions, Responsibilities, and Authorities documents in a number of DOE organizational elements. As a result of the Board's concerns, DOE program offices are revising their FRA documents to ensure safety roles and responsibilities are clearly defined.

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.

Examples of FY 2002 Accomplishments

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

Performance Goal 4

Nuclear 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 2001 Accomplishments

Environment, Safety, and Health Directives. The Board and its staff provided substantive comments to DOE during the review process for 24 directives associated with, but not limited to, integrated safety management, nuclear explosive operations, system engineer program, and line management functions, responsibilities and authorities. At year's end, both staffs were completing resolution of issues on several remaining directives to improve the content, clarity, and consistency in safety requirements and guidance.

Nuclear Safety Rule. The "Nuclear Safety Rule" (10 CFR 830, *Nuclear Safety Management*) was issued in November 2000 after extensive review and comment by the Board. A set of associated implementation guides issued by DOE shortly thereafter incorporated significant improvements suggested by the Board in the selection of TSRs and the identification of safety systems. These changes provide improved guidance to DOE contractors aimed at enhancing the safety of defense nuclear facilities through better identification and maintenance of safety controls.

Safety of Nuclear Explosive Operations. The Board and its staff made significant contributions to the format and content of two DOE Orders associated with the safety of operations involving nuclear explosives: DOE Order 452.1B, *Nuclear Explosive and Weapon Surety Program*; and DOE Order 452.2B, *Safety of Nuclear Explosive Operations*. Both these Orders were issued in August 2001.

Safety Management Functions, Responsibilities, and Authorities Manual. The Board reviewed a draft revision to DOE Manual 411.1-1B, *Safety Management Functions, Responsibilities, and Authorities Manual*, and provided specific suggestions for improvements that were accepted by DOE. These improvements strengthened the role of the DOE Office of Environment, Safety, and Health (EH). For example, the Board urged that EH be given the responsibility for reviewing and approving the use of alternative methodologies for safety analyses by DOE contractors vs. using the "safe harbor" approaches provided in the newly issued 10 CFR 830, *Nuclear Safety Management*.

Contractor System Engineers. The Board provided significant comments to draft Change 4 to DOE Order 420.1A, *Facility Safety*, which is being revised to define requirements for contractor System Engineers in response to Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*. The Board identified needed improvements, including a more rigorous set of System Engineer qualification requirements, appropriate revision to site contractor procedures to permanently integrate the System Engineer program into the site infrastructure, and a clearer description of the System Engineer's accountability for ensuring that vital safety systems will perform as intended when called upon.

Special Tritium Compounds. The Board's April 29, 1999 letter requested information regarding DOE's approach for a radiation protection program for work involving special tritium compounds (STCs) such as metal tritides and organically bound tritium. During the last two years, DOE has conducted technical evaluations, drafted guidance, and developed a documented approach that provides an adequate basis for protecting workers, the public, and the environment from exposure to STCs. A more formal and institutionalized radiation protection approach is expected to be made through an amendment to 10 CFR Part 835, *Occupational Radiation Protection Rule* and the issuance of DOE guidance documents.

Safety Management Personnel. The Board and its staff continued to assess the competence of key safety personnel at defense nuclear facilities. During a review at LLNL, the staff observed that substantial improvements had been made to the Nuclear Material Technology Program staff who are actively involved in planning and controlling nuclear activities at the facility. At Y-12, the Board's Site Representative, working in concert with a DOE Facility Representative, identified deficiencies in Y-12's program for certification of fissile material handlers and in controlling the actions of workers who had not completed their qualifications/certifications. In February 2001, Y-12 reinstated proper controls over these workers, and as of June 2001, approximately 150 fissile material handlers have been properly reclassified and have completed their certifications.

Examples of FY 2001 Accomplishments

Federal Technical Capability Program. The Board continued to focus DOE's attention on the technical competence of federal workers. In June 2001, the Board's staff conducted a review of the institutionalization of the Federal Technical Capability Program at the Albuquerque Operations Office (ALO), the Kirtland Area Office, and the Los Alamos Area Office and found that the technical qualification program continued to languish, as previously reported in the DOE Independent Assessment of April 2000. Senior ALO managers subsequently committed to devoting greater attention to the qualifications of their technical staff.

System Engineers. The Board and its staff have urged DOE to develop formal training and qualification requirements for both federal and contractor system engineers in response to Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*. As a result, DOE has drafted a significant modification to DOE Order 420.1, *Facility Safety*, defining responsibilities and training requirements for contractor system engineers. On the Federal side, the Board and its staff continued to engage DOE in assessing the need and developing criteria for subject matter experts for vital safety systems.

Nuclear Criticality Safety Program. In FY 2001, DOE reported the completion of its implementation plan for Recommendation 97-2, *Nuclear Criticality Safety*, and took action to demonstrate a long-term commitment to maintain a strong nuclear criticality safety program. In February 2001, the Board issued DNFSB/Tech-29, *Criticality Safety at Department of Energy Defense Nuclear Facilities*, documenting reviews of the nuclear criticality safety program at four DOE sites, and highlighting the importance of strong field office oversight of criticality safety programs. The report also identified a number of areas for improvement in the development and maintenance of criticality controls. DOE acknowledged the Board's observations, and is taking action to implement the suggested improvements.

Critical Safety Engineer Qualifications. The Board has played a key role in ensuring comprehensive, high quality standards for training and qualification programs for criticality safety engineers. This year, the Board continued to engage DOE to ensure that at least one qualified DOE criticality safety engineers is assigned to each DOE site, as committed in DOE's Implementation Plan for Recommendation 97-2, *Nuclear Criticality Safety*.

Application of Error Analysis to Authorization Basis Documents. Several DOE contractors argued that the methodology for identification of safety-class and safety-significant structures, systems and components, as set forth in DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, was overly conservative and espoused an alternative methodology. The Board discouraged use of this alternate methodology in a November 1, 2000 letter, followed by a formal reporting requirement dated April 10, 2001. DOE agreed with the Board's position and prohibited use of this alternate methodology, pending further studies.

Quality Assurance. Board interactions and correspondence with DOE, including three public meetings and the issuance of Board report DNFSB/TECH-31, *Engineering Quality Into Safety Systems*, indicate that DOE's QA Program is not being executed with the rigor required. In response, DOE performed self-assessments of the QA programs throughout the complex and began developing corrective action plans to address identified weaknesses.

Software Quality Assurance. In January 2000, the Board's DNFSB/TECH-25, *Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities*, raised issues with the process of developing and maintaining the computer software used for validating and applying design, analytical, and control software. In October 2000, DOE provided a corrective action plan which partially addressed those issues. The Board's two public meetings stressed the importance of software QA and explored approaches used by DoD, NASA, and the chemical and nuclear power industries. DOE is revising their corrective action plans in the context of a broader Quality Assurance improvement plan.

Integrated Hazards Analysis Reviews. Board reviews at several DOE sites indicated that requirements for hazards analyses have not been sufficiently integrated to ensure identification and implementation of adequate controls over the process. Consequently, hazard analyses performed for safety analysis reports, emergency response plans, environmental impact assessments, and fire safety plans may not be adequate. Board letters dated January 1, March 29, and April 30, 2001 identified additional hazards that had been overlooked, improvements needed, and additional controls to improve operational safety.

Examples of FY 2001 Accomplishments

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 initial reviews of priority facilities and conducted detailed pilot reviews of confinement ventilation systems at two facilities.

Performance Goal 4

Nuclear 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 2000 Accomplishments

Environment, Safety, and Health Directives. The Board and its staff provided substantive comments to DOE during the review process for 44 directives associated with, but not limited to, integrated safety management, chemical safety, nuclear explosive operations, and technical personnel training and qualification. At year's end, both staffs were completing resolution of issues on several remaining directives to improve the content, clarity, and consistency in safety guidance:

- The Board and its staff provided comments to DOE during the review process on the draft *Chemical Management Handbook*. The preliminary draft was unacceptable, lacking proper integration with integrated safety management concepts. As a result of suggestions from the Board's staff, the rewritten handbook incorporates integrated safety management, the applicable DOE standards, and other government agency regulations to allow ease of contractor use.
- Following the issuance of DOE-DP-STD-3016-99, *Limited Standard, Hazard Analysis Reports for Nuclear Explosive Operations*, the Board's staff interacted directly with the Pantex contractor in preparing an Authorization Basis Manual that described in more detail the format and content of the Hazard Analysis Report, as well as the analytical process, in preparation for nuclear explosive operations. This will significantly improve the quality of the authorization basis for nuclear explosive operations including clear identification of the necessary safety controls.
- During 2000, DOE G 450.4-1, *Integrated Safety Management Guide* was revised to incorporate a major new section dealing with how to maintain a site's Integrated Safety Management system following initial implementation. Significant involvement of the Board and its staff was key to the development of the approach as well as the revision to DOE G 450.4-1. This new guidance will help to ensure the sites' ISM systems are maintained current and continue to improve.

Technical Competence. The Board continued to focus DOE's attention on the technical competence of federal workers as an essential safety element for defense nuclear facilities. Through a revised Implementation Plan for Board Recommendation 93-3, *Improving DOE Technical Capability in Defense Nuclear Facilities Programs*, a DOE formed panel of senior line managers continued to implement a corporate program to recruit, develop, deploy, and retain technical capability at defense nuclear facilities. Many changes in DOE's mission and infrastructure have occurred since the Board issued Recommendation 93-3. The Board believes that DOE's efforts in response to this recommendation have resulted in excellent programs and processes that will be invaluable in the training and qualification of the next generation of the DOE federal workforce. On November 9, 1999, the Board closed Recommendation 93-3:

- The Board and its staff continued to engage DOE in regard to the development of formal training and qualification for federal and contractor criticality safety personnel resulting in the upgrade of DOE Order 420.1, *Facility Safety*, emphasizing this important aspect of criticality safety. Also, in response to Board staff concerns about the floor presence of criticality engineers, DOE directed that criticality engineers increase the number of hours spent observing work on the floor, and report these hours to headquarters and program offices responsible for the site.
- The Board and its staff continued to interact directly with cognizant DOE representatives to ensure a satisfactory path to closure of Board Recommendation 97-2, *Continuation of Criticality Safety at Defense Nuclear Facilities*, especially with regard to the development of an adequate curriculum and the criticality safety training of sufficient numbers of contractor and federal employees.
- Working closely with the Board and its staff, DOE has upgraded DOE Order 360.1A, *Federal Employee Training*, and DOE-STD-1063-2000, *Facility Representatives*, as elements of the revised Implementation Plan for Board Recommendation 93-3, *Improving DOE Technical Capability in Defense Nuclear Facilities Programs*. DOE further institutionalized its technical personnel processes with the issuance of DOE M 426.1-1, *Federal Technical Capability Manual*.
- The Board emphasized the vital importance that a technically-competent workforce plays in ensuring public and worker health and safety.

Examples of FY 2000 Accomplishments

Fire Protection. The Board prepared and issued DNFSB/TECH-27, *Fire Protection at Defense Nuclear Facilities*, setting forth principles and good practices for enhancing the reliability of DOE's complex-wide fire protection program.

Y2K Issues. The Board's staff review of DOE's Y2K Program identified issues related to the evaluation of the safety related systems for year 2000 compliance. Programmatic issues at Los Alamos and Lawrence Livermore National Laboratories remained until the Fall of 1999 and required subsequent staff followup in late 1999. Following the improvement in DOE's Y2K program, there were no significant failures of safety-related systems at the calendar year turnover.

Integrated Safety Management. The Board continued to emphasize the need for Integrated Safety Management across the defense nuclear complex. Representative actions include:

- In response to numerous letters from the Board associated with Integrated Safety Management, DOE upgraded its Lessons Learned process, including issuing new guidance documents and development of a centralized web-based Lesson Learned database. DOE also issued a set of ISM performance indicators to provide senior DOE managers with measures of the effectiveness of ISM at their sites.
- In response to Board Recommendation 98-1, *Resolution of DOE Internal Oversight Findings*, DOE implemented a formal process for dealing with safety issues identified by DOE's internal independent oversight organization. This resulted in a clearly defined, systematic, and comprehensive process for addressing and resolving these safety issues.
- The Board's staff continued to critique all ISM verifications at defense nuclear facilities. These verification reviews are the processes DOE uses to evaluate the status of ISM implementation and are key to the DOE Field Managers' determinations that their sites have implemented ISM. Additional criteria for determining ISM implementation were issued by the Deputy Secretary in October 1999. The Board worked closely with DOE in defining these criteria and in evaluating DOE's efforts to implement ISM at all sites.

Performance Goal 4

Nuclear 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 1999 Accomplishments

Environment, Safety, and Health Directives. The Board and its staff provided substantive comments to DOE during the review process for three health and safety directives associated with deactivation and decommissioning. After successfully resolving the Board's comments, DOE updated one of these directives. At year's end, both staffs were completing resolution of issues in the two remaining directives to improve content, clarity, and consistency of the guidance.

The Board's staff provided comments on thirteen draft implementation guides associated with 10 CFR 835, *Occupational Radiation Protection*, DOE-STD-1098-99, *Radiological Control Standard*, and two handbooks associated with the DOE radiological protection program. The staff then worked with the DOE staff to resolve the identified areas of needed improvement. By year's end, DOE had issued all thirteen implementation guides and both handbooks, and had sent the standard to the DOE Technical Standards Program for publication. These actions resulted in clarifying and strengthening DOE's guidance for this important safety management function.

The Board provided comments to DOE on a new guide on management of Quality Assurance, a new qualification standard for individuals engaged in criticality safety studies, and a new handbook addressing design considerations, all three of which are explicitly associated with integrated safety management. Through significant interaction between the Board's staff and their DOE counterparts, significant improvements in the content and clarity of the directives were achieved.

Technical Competence. The Board continued to focus DOE's attention on the technical competence of federal workers as an essential safety element for defense nuclear facilities. Through a revised Implementation Plan for Board Recommendation 93-3, *Improving DOE Technical Capability in Defense Nuclear Facilities Programs*, DOE formed a panel of senior line managers to implement a corporate program to recruit, develop, deploy, and retain technical capability at defense nuclear facilities. The panel members self-assessed the Technical Qualification Programs at their respective sites, and took the necessary actions to upgrade their plans and procedures. The panel also identified 686 critical technical positions and took administrative actions to preserve nearly all of these positions against downsizing efforts.

Significant accomplishments were made by DOE as a result of implementing Board Recommendation 97-2, *Criticality Safety*. Training and qualification programs for both DOE and contractor criticality engineers were established including high quality qualification standards. The operation of the Los Alamos National Laboratory critical facility was revamped for training of criticality safety engineers and for the development of intermediate range neutron energy data for critical assemblies. These activities provide vital information for understanding and characterizing the unique hazards and for developing proper safety controls related to nuclear criticality. Additionally, a website was developed for dissemination of archived data on the past 40 years of criticality experiments which will provide great benefit to the nuclear safety community.

Integrated Safety Management. Reviews by the Board and its staff identified shortcomings in the Hanford Spent Nuclear Fuel Project that included the continued lack of sound project management, despite several high level management changes; poor implementation of quality assurance requirements; and an inability to identify and resolve emerging technical issues in a timely manner. Continued Board and staff pressure through correspondence and face-to-face meetings has led to some progress on these concerns, but continuing attention is needed.

Several key indicators for gauging progress in implementing ISM have been identified from the Board's reviews: Incorporation of ISM-related Department of Energy Acquisition Regulation (DEAR) clauses into contracts, establishment of a mutually agreed-upon requirements base as the foundation for the ISM program, development of an ISM System description that describes how the contractor will integrate the system into work practices, performance of a DOE ISM verification review, and establishment of an authorization agreement. Each of these areas received Board attention in FY 1999, not only at the 10 priority facilities called out in the Recommendation 95-2 DOE Implementation

Examples of FY 1999 Accomplishments

Plan but also in the 43 facilities designated in the Board's December 1997 letter as "follow-on" facilities. During the FY 1999, DOE worked to fully implement ISM at the Recommendation 95-2 priority facilities. The Board monitored and advised on the development of DEAR Clause-required ISM descriptions, which describe how the contractor will integrate ISM into work practices. To date, all sites with priority or follow-on facilities have had their ISM descriptions approved by DOE, except Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and the Pantex Plant, which are scheduled for approval by the end of the year. The Board also urged DOE to continue its efforts to define and operate to explicit control measures at the priority facilities, and enlarge its efforts to include all high and moderate hazard defense nuclear facilities. In his March 1999 memorandum on Safety-Accountability and Performance, the Secretary of Energy committed to having ISM completely in place for all DOE facilities by September 2000.

In response to the Board's March 20, 1998 reporting requirement on the DOE's Feedback and Improvement Program, DOE committed to upgrading the DOE Lessons Learned process, including developing guidance on improving the complex-wide feedback and improvement programs. In addition, DOE published a revised DOE acquisition regulation that will hold a contractor's fee at risk in the event of poor safety performance. The Secretary of Energy's March 3, 1999, memorandum on Safety-Accountability and Performance tasked the newly established DOE Safety Council with developing performance standards that will be used to hold federal personnel accountable for effective and timely ISM implementation. The Board worked closely with DOE in this effort.

The Board issued Recommendation 98-1 to address the internal independent oversight element of the feedback and improvement program that the Board felt was not being adequately addressed in DOE's feedback and improvement initiatives. The Board determined that DOE's independent assessments of safety management in the field were treated largely as advisories and follow-up actions became discretionary to lower levels of DOE line management. DOE accepted this Recommendation and provided an acceptable Implementation Plan, which addresses DOE's need for a clearly defined, systematic, and comprehensive process to address and resolve safety issues identified by internal independent oversight.

