TWELFTH ANNUAL REPORT

TO CONGRESS

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

FEBRUARY 2002

John T. Conway, Chairman
A.J. Eggenberger, Vice Chairman
Joseph J. DiNunno
John E. Mansfield

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

625 Indiana Avenue, NW, Suite 700, Washington, D.C. 20004-2901
(202) 694-7000

February 19, 2002

To the Congress of the United States:

The Defense Nuclear Facilities Safety Board (Board) is pleased to submit to Congress its Twelfth Annual Report. The Board is an independent executive branch agency responsible for providing advice and recommendations to the Secretary of Energy, and to the President if necessary, regarding public health and safety issues at Department of Energy (DOE) defense nuclear facilities.

As required by statute, the Board's report summarizes activities during calendar year 2001, assesses improvements in the safety of DOE defense nuclear facilities, and identifies remaining safety problems.

Respectfully submitted,*

John T. Conway
Chairman

A. J. Eggenberger
Vice-Chairman

Joseph J. DiNunno
Member

John E. Mansfield
Member

* Although not a signatory to this report, Board Member Jessie Hill Roberson contributed substantially to the Board's achievements during 2001. Ms. Roberson was appointed by the President to serve as Assistant Secretary of Environmental Management. She assumed her new duties on July 18, 2001.

PREFACE

Congress created the Defense Nuclear Facilities Safety Board (Board) as an independent agency within the Executive Branch (42 U.S.C. § 2286, *et seq*.) to identify the nature and consequences of significant potential threats to public health and safety at the Department of Energy's (DOE) defense nuclear facilities, to elevate such issues to the highest levels of authority, and to inform the public.

The Board is required to review and evaluate the content and implementation of health and safety standards, including DOE's Orders, rules, and other safety requirements, practices, and events relating to system design, construction, operation, and decommissioning of DOE's defense nuclear facilities. The Board makes recommendations to the Secretary of Energy that the Board believes are necessary to ensure adequate protection of public health and safety. The Board must consider the technical and economic feasibility of implementing the recommended measures. The Secretary may accept in whole or in part or reject the recommendations. If the Secretary rejects a recommendation in whole or in part for any reason, the Board does not withdraw or modify the recommendation, and the Secretary maintains the rejection, the Secretary must publish his or her decision and reasoning in the *Federal Register* and must formally notify both Houses of Congress. The Secretary must report to the President and Congress if implementation of a recommendation is impracticable because of budgetary considerations. Upon determining that an imminent or severe threat to public health or safety exists, the Board must transmit its recommendations to the President, and the Secretaries of Energy and Defense.

The Board may conduct investigations, issue subpoenas, hold public hearings, gather information, conduct studies, establish reporting requirements for DOE, and take other actions in furtherance of its review of health and safety issues at defense nuclear facilities.

The Board is required by law to submit an annual report to the Committees on Armed Services and Appropriations of the Senate and to the Speaker of the House of Representatives. This report is to include all recommendations made by the Board during the preceding year, and an assessment of (1) the improvements in the safety of DOE defense nuclear facilities during the period covered by the report; (2) the improvements in the safety of DOE defense nuclear facilities resulting from actions taken by the Board or taken on the basis of the activities of the Board; and (3) the outstanding safety problems, if any, of DOE defense nuclear facilities.

EXECUTIVE SUMMARY

The nuclear weapons program of the Department of Energy (DOE) remains a complex and hazardous operation. Missions include maintenance of the national nuclear arsenal; dismantlement of surplus weapons; stabilization, storage, disposition, and disposal of surplus nuclear materials and toxic and contaminated waste; and cleanup of surplus facilities and sites. Some of these missions are carried out with aging facilities; others demand the construction of new facilities. The constant vigilance of the Defense Nuclear Facilities Safety Board (Board) is required to ensure that all of these activities are carried out by DOE in a manner that protects the public, workers, and the environment.

During this past year, actions by the Board resulted in significant safety improvements. These improvements are described in this Annual Report along the lines of the Board's three strategic areas of concentration:

- Safe management and stewardship of the nation's nuclear stockpile and nuclear weapons components;
- Safe disposition of the hazardous remnants of nuclear weapons production; and
- Complex-wide health and safety issues.

The most significant safety improvements during 2001 follow.

SAFE MANAGEMENT AND STEWARDSHIP OF THE NATION'S NUCLEAR STOCKPILE AND NUCLEAR WEAPONS COMPONENTS

- The National Nuclear Security Administration (NNSA)[1] responded to the Board's Recommendation 99-1 by repackaging 200 plutonium pits per month into an improved storage environment, and repackaging a total of more than 3,000 pits by the end of 2001.
- Actions by the Board led to improvements in contractor management of safety by the NNSA Y-12 Area Office (YAO) for new operations and hazardous activities at Y-12.
- NNSA made incremental but substantial progress toward improving the safety of nuclear explosive operations in accordance with Recommendation 98-2 by completing the

[1] NNSA was created by Congress as a semi-autonomous agency within the DOE to operate DOE's nuclear weapons facilities (106 P.L. 65, 113 Stat. 512, Oct. 5, 1999).

Step 1 of the Seamless Safety for the 21st Century (SS-21) process for the W88 campaign.[2]

- The Board's continued oversight resulted in improved work planning and safety maintenance at the Pantex Plant.

- As a direct result of the Board's review of nuclear material packaging and storage at the Pantex Plant, NNSA took action to improve the safety of these operations.

- As a result of the Board's concerns with the quality of the authorization basis for command disablement operations at Pantex, the design agency established a technically justifiable safety basis for conducting these potentially dangerous operations.

- Responding to a suggestion made by the Board, NNSA agreed to maintain the availability of the Special Recovery Line at the Los Alamos National Laboratory (LANL) for disposition of uniquely hazardous plutonium pits stored at the Pantex Plant.

- In response to the Board's efforts, NNSA established more robust, engineered safety controls on nuclear explosive operations to reduce the threat of fires.

- As a result of the Board's intervention, NNSA rejected a proposal to eliminate important lightning protection features at Pantex.

- At the Board's urging, DOE accelerated the design and acquisition of the Enhanced Transportation Cart at Pantex for use in moving weapons within the site.

- In response to the Board's concerns with the quality of the safety basis for nuclear explosive painting operations at Pantex, NNSA rejected its contractor's initial safety basis document covering that operation.

- In response to the Board's concern that safety controls for the Joint Actinide Shock Physics Experimental Research (JASPER) facility at the Nevada Test Site (NTS) were not adequate, Lawrence Livermore National Laboratory (LLNL) upgraded these controls.

- DOE responded to the Board's concerns about hazardous chemicals at Y-12 by cataloging and significantly reducing its inventory of such chemicals.

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[2] The fundamental objective of the SS-21 initiative at the Pantex Plant is to eliminate hazards in assembly, disassembly, and testing of nuclear explosives through process and tooling design enhancements.

- DOE's Y-12 Area Office responded to the Board's concern about the office's technical capabilities by hiring several new technical personnel.

- To address safety issues raised by the Board concerning the design of a new process for dismantlement of nuclear weapons, Y-12 redesigned the process to enhance safety.

- In response to the Board's concern with the poor condition of many nuclear storage facilities at Y-12, NNSA made substantial improvements and took steps to prevent a recurrence of this problem.

- Y-12 prepared a thorough and detailed 10-year corrective action plan to address fire protection deficiencies emphasized by the Board.

- In response to deficiencies in emergency management at LLNL noted by the Board, NNSA committed to strengthening this important aspect of defense in depth.

- LLNL responded to safety deficiencies pointed out by the Board in the fire alarm system for the LLNL plutonium facility by implementing compensatory measures to increase the system's reliability and expediting its replacement.

- DOE responded to the Board's initiative to ensure robust confinement vessels for hazardous experiments at LANL by developing a defensible design basis for the confinement of these experiments.

- NNSA responded to the Board's questions concerning the handling of damaged nuclear weapons by upgrading its capabilities at NTS to conduct these activities safely.

- In response to the Board's comments on the design of the Tritium Extraction Facility under construction at the Savannah River Site (SRS), DOE modified the design criteria, completed enhanced calculation of seismic response, and provided improvements in quality assurance.

SAFE DISPOSITION OF THE HAZARDOUS REMNANTS OF NUCLEAR WEAPONS PRODUCTION

- As a result of an unacceptable DOE response to a leaking high-level waste tank at SRS, the Board issued Recommendation 2001-1 (see Appendix A), urging DOE to remove waste from the leaking tank and improve safety and operational flexibility in the tank farms.

- The Board pressed DOE to complete implementation of Recommendations 94-1 and 2000-1, with the objective of stabilizing the remaining nuclear materials that pose the highest risk. The following activities were carried out in continuing response to the Board's Recommendation 94-1:

  - at the Rocky Flats Environmental Technology Site (RFETS), tons of plutonium-bearing residues were packaged in stable configurations, ready for shipment to the Waste Isolation Pilot Plant, and all plutonium-bearing solutions were eliminated from Building 771.

  - at the Hanford Site, a more efficient process for stabilizing plutonium solutions was started up, direct disposal of lean plutonium solutions began; plutonium alloy turnings that had been stored in oil were characterized and stabilized; and the retrieval, treatment, and packaging of deteriorating fuel from the K-West spent fuel basin continued.

  - at SRS, dissolution of RFETS scrub alloy and Mark-42 compacts was completed, dissolution of damaged and deteriorating targets and spent nuclear fuel continued, disposition of the remaining plutonium-bearing residues continued, and stabilization of the plutonium solutions stored in H-Canyon began.

  - new stabilization and packaging systems for plutonium metal and oxides were started up at Hanford, RFETS, and LLNL.

- In response to action by the Board, DOE improved safety systems and contamination controls for plutonium stabilization at Hanford, SRS, and RFETS, and strengthened controls on construction near the Hanford K-East Basin.

- In response to Recommendation 97-1, DOE initiated inspections of highly radioactive uranium-233 materials at Oak Ridge National Laboratory (ORNL). The inspection program incorporates numerous safety improvements identified by the Board.

- The Board reviewed preliminary design and safety basis documents for SRS's project for blending-down highly enriched uranium and pointed out areas for improvement in the functional classification of equipment and calculation of radiological dose.

- The Board identified issues at SRS requiring prompt resolution to demonstrate the safety and feasibility of a plan for disposition of stored americium/curium solutions. DOE subsequently demonstrated that this disposal option can be carried out safely.

- DOE adopted conservative seismic design criteria for the proposed Pit Disassembly and Conversion Facility (PDCF) at SRS, responding to earlier comments by the

Board. Also consistent with the Board's comments, DOE will perform a full-facility criticality safety analysis.

- In response to the Board's action, DOE improved the electrical systems needed for safety at the SRS L-Area Experimental Facility.

- The Board reviewed DOE's selection of an alternative salt treatment process for the SRS high-level waste system and suggested that another technology be pursued in parallel through pilot-scale operation.

- DOE improved the program to ensure the integrity of waste tanks at Hanford, responding to earlier comments from the Board.

- In response to a letter from the Board on safety systems for high-level waste evaporator operations at SRS, DOE implemented compensatory measures and is evaluating further upgrades.

- Actions by the Board led DOE to undertake improvements in the safety of the Melton Valley Waste Treatment and Packaging Facility under construction at ORNL.

- Responding to the Board's persistent interest and inquiries, DOE is now working to reduce hazards in Building 9206 at Y-12. This facility contains a large inventory of highly enriched uranium.

- The Board's identification of deficiencies associated with the storage of plutonium-contaminated waste in a wooden enclosure outside the Plutonium Concentration Facility (233-S) at Hanford led to a series of corrective actions by DOE.

- DOE characterized hazards in the Hanford Bulk Reduction Building (224-T) as a direct result of the Board's interest.

- In response to findings of the Board, DOE improved and clarified work planning requirements for deactivation and decommissioning activities at RFETS.

- In continuance of an action that started in 1999 with encouragement from the Board, two generations of containment chambers for reducing equipment size were deployed during 2001 in Buildings 776 and 771 at RFETS, essentially eliminating reliance on personnel respiratory protection equipment.

- In response to a letter from the Board, DOE corrected weaknesses in the fire protection program for the Tension Support Structures used for storing radioactive material at the Fernald Environmental Management Project.

COMPLEX-WIDE HEALTH AND SAFETY ISSUES

- The Board's comments on three Implementation Guides for DOE's revised nuclear safety rule, 10 CFR Part 830, *Nuclear Safety Management*, led DOE to improve its guidance on the identification and maintenance of safety controls.

- In response to the Board's actions, DOE clarified and strengthened two Orders on the safety of nuclear explosive operations: DOE Order 452.1B, *Nuclear Explosive and Weapon Surety Program*; and DOE Order 452.2B, *Safety of Nuclear Explosive Operations*.

- Actions by the Board led DOE to define safety roles and responsibilities more clearly by revising DOE Manual 411.1-1B, *Safety Management Functions, Responsibilities, and Authorities Manual*.

- In response to Recommendation 2000-2, DOE revised Order 420.1A, *Facility Safety*, to define requirements for contractor system engineers, positions critical to the maintenance and reliability of vital safety systems.

- As a result of the Board's ongoing assessments, DOE strengthened the technical capability of LLNL's Nuclear Material Technology Program staff.

- After the Board identified deficiencies in Y-12's program for certification of fissile material handlers, DOE reinstated proper controls over these workers; by June 2001 approximately 150 fissile material handlers had been properly reclassified and had completed certification training.

- During reviews at LANL and Y-12, the Board identified a lack of qualified, highly experienced federal project managers capable of managing the design and construction of major nuclear projects. NNSA is developing a corrective action plan.

- The Board issued technical report DNFSB/TECH-29, *Criticality Safety at Department of Energy Defense Nuclear Facilities*, which identified areas needing improvement in criticality controls. DOE is taking action to implement the suggested improvements.

- DOE has made progress toward ensuring that at least one qualified DOE criticality safety engineer is assigned to each DOE site, a commitment in DOE's Implementation Plan for Recommendation 97-2.

- The Board discouraged use of a proposed methodology for identification of safety-class and safety-significant structures, systems, and components for lack of technical justification. DOE agreed with the Board's position and prohibited use of this methodology.

- The Board determined that DOE's quality assurance (QA) program was not being executed with the necessary rigor. In response, DOE assessed QA programs throughout the complex and is taking corrective action.

- The Board issued technical report DNFSB/TECH-25, *Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities*, which questioned DOE's process for developing and maintaining safety-related computer software. DOE is developing a corrective action plan.

- At the Hanford Site, the Board's reviews of activity-level implementation of Integrated Safety Management (ISM) of spent fuel handling in the K-Basins resulted in improved worker safety.

- In response to the Board's Recommendation 2000-2 on maintenance of vital safety systems, DOE completed initial reviews of such systems at priority facilities, and by the end of the year had conducted detailed pilot reviews of confinement ventilation systems at four facilities.

- The Board requested that DOE apply technical report DNFSB/TECH-30, *Safety Review of the Hanford Spent Nuclear Fuel Project*, to ongoing projects throughout the defense nuclear complex.

OUTSTANDING SAFETY PROBLEMS OF DEFENSE NUCLEAR FACILITIES

- **Maintain the direction and momentum of the Integrated Safety Management program**. In 1995, the Board issued Recommendation 95-2, *Safety Management*, urging DOE to integrate work planning and safety planning more effectively. The methodology that evolved from this recommendation and from DOE's Implementation Plan is termed "Integrated Safety Management." The term "integrated" is used to indicate that all aspects of safety and work planning and performance are integrated into a single process under the responsibility of line management. ISM is a structured, comprehensive, common-sense approach to performing work safely. Through ISM, the Board has encouraged DOE to identify and implement measures to protect the public, workers, and the environment from a wide range of hazards: nuclear, chemical, and physical. The identification of hazards and development of protective measures should be carried out in an integrated way.

  In 2001, DOE achieved a major goal in its commitment to ISM by verifying through comprehensive assessments that the basic elements of ISM had been implemented at defense nuclear facilities, and that Authorization Agreements setting forth operational terms and conditions had been established for all high-hazard defense nuclear facilities. This was a commendable achievement. However, it was recognized at the time that full implementation

of ISM was not yet a reality complex-wide. The verification reviews identified areas for improvement through follow-on actions. The Board noted at the end of the year that many of these actions have still not been taken, and urged DOE to strengthen its programs for ensuring that ISM continues to improve.

- **Maintain as serviceable and effective the protective features of defense nuclear facilities**. Most facilities of interest to the Board were constructed many years ago and are deteriorating as they age. The Board's 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 2001, DOE completed initial reviews of priority facilities and conducted detailed pilot reviews of confinement ventilation systems at two facilities.

- **Stabilize and confine nuclear materials and waste stored in degrading conditions**. The shutdown of many defense nuclear facilities has led to numerous problems in storage conditions of residual nuclear materials. Much of the nuclear material in these facilities has not been stabilized and packaged for long-term storage or prepared for ultimate disposition. In Recommendations 94-1, 95-1, 96-1, 97-1, 99-1, and 2000-1, the Board urged DOE to correct numerous storage problems resulting from the shutdown of many defense nuclear facilities. During 2001 progress was made toward addressing these problems, including the continuation of ongoing stabilization of fissionable material, the commencement of several new stabilization activities, and the formulation of a comprehensive nuclear material stabilization plan—with the significant exception of a plan for addressing the inventory of remnant materials at LANL. On March 23, 2001, the Board issued Recommendation 2001-1, *High-Level Waste Management at the Savannah River Site*, urging DOE to remove waste from a leaking high-level waste tank and to take several other actions to improve safety and operational flexibility in the tank farms. In addition to pressing for continued progress in risk reduction, key goals for the coming year include development of an acceptable plan for stabilizing the materials at LANL and identifying necessary improvements in the management of SRS's system for storing high-level waste.

- **Apply the Seamless Safety for the 21st Century (SS-21) process to all warhead systems to improve the safety of processes and controls for nuclear weapon assembly, disassembly, and inspection**. The fundamental objective of the SS-21 initiative at the Pantex Plant is to eliminate hazards in assembly, disassembly, and testing of nuclear explosives through process and tooling design enhancements. The Board's reviews of the nuclear explosive program at Pantex revealed safety issues in areas 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. These issues have been particularly troublesome in programs to which the SS-21 process had not been fully applied.

In contrast, the final tooling, processing, facility layout, and control suite that ultimately resulted from the W76 SS-21 project are substantially improved and safer than the versions they replaced. Although the W76 SS-21 program involved numerous delays in implementation, the final results are outstanding. The Board has urged DOE to duplicate and apply these results to similar warhead systems, thus substantially reducing the time and resources required to achieve the same objectives for other systems and amortizing the resources already expended on the W76. However, DOE continues to struggle with the expedited application of the SS-21 process to other warhead systems, and actions to improve and simplify the application of this process continue to lag. The Board is working with DOE to revise once again the Implementation Plan for the Board's Recommendation 98-2, attempting to break the pattern of limited resources and serial progress to speed the application of real safety improvements on the production floor.

- **Strengthen DOE's technical competence**. Congress expected the Board "to raise the technical expertise of the Department substantially." [See S. Rep. No. 232, 100th Cong., 1st Sess., 10 (1987)]. The Board has encouraged DOE to develop and maintain a corporate program to recruit, develop, deploy, and retain technically capable personnel at defense nuclear facilities. DOE has made some improvements through its implementation of Recommendation 93-3, *Improving DOE Technical Capability in Defense Nuclear Facilities Programs*. During 2001, DOE improved the quality of the Facility Representative program. Outside of this accomplishment, progress has been minimal at best. The technical workforce at DOE may be severely depleted over the next few years by retirements, yet DOE is failing to take steps necessary to acquire and train young talent. A study submitted by DOE to the Office of Management and Budget indicated that the average age of DOE employees is 48; only 9 percent are under the age of 35, and only 6 percent of technical employees are under the age of 35. DOE has not adequately used the excepted service hiring authority it has been granted by Congress to attract bright young engineers and scientists to the federal workforce. Unless these policies are reversed, DOE may find itself within a very few years at the mercy of its contractors, and be unable to do anything more than provide funds for critical national security missions.

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1. INTRODUCTION

1.1 BACKGROUND

The Defense Nuclear Facilities Safety Board (Board) is an independent federal agency established by Congress in 1989. Simply stated, the Board's mandate under the Atomic Energy Act is safety oversight of the civilian nuclear weapons complex operated by the Department of Energy (DOE). The nuclear weapons program remains a complex and hazardous operation. DOE must maintain in readiness a nuclear arsenal, dismantle surplus weapons, dispose of excess radioactive materials, clean up surplus facilities, and construct new facilities for many purposes. All of these functions must be carried out in a manner that protects the public, the workers, and the environment.

Congress expected the Board to be an independent, expert agency capable of understanding the complexity of nuclear weapons facilities and operations. For that reason, Members of the Board are required by statute to be experts in the field of nuclear safety. The Board has, in turn, assembled a permanent staff with broad nuclear industry experience and competence in all major aspects of nuclear safety: nuclear, mechanical, electrical, chemical, and structural engineering, as well as physics and metallurgy. Currently, 92 percent of the Board's technical staff hold advanced degrees, of which 30 percent are at the Ph.D. level.

The Board has established site offices at six high-priority defense nuclear sites: the Pantex Plant in Texas, the Los Alamos site in New Mexico (added in 2001), the Y-12 National Security Complex in Tennessee, the Savannah River Site in South Carolina, the Hanford Site in Washington State, and the Rocky Flats Environmental Technology Site in Colorado. These site offices are staffed with ten of the Board's technical staff and provide the Board with continuous on-site oversight capability.

During the 12 years of the Board's operation, its priorities have evolved with changes in the nuclear weapons program. The Board uses its Strategic Plan under the Government Performance and Results Act (GPRA) to ensure that its limited resources remain focused on the most significant safety challenges, keeping pace with shifts in those challenges from year to year. All of the Board's safety activities are closely tied to goals and objectives embodied in this plan.

This Annual Report summarizes the Board's work during calendar year 2001. Sections 2, 3, and 4 describe progress in the three major areas of the Board's operations: safe management and stewardship of nuclear weapons, safe disposition of hazardous nuclear materials and facilities, and complex-wide safety issues. Section 5 addresses the Board's interactions with the public. Appendices A through E provide additional material, including the formal recommendation issued by the Board during 2001 (Appendix A), titles of the Board's three technical reports issued during 2001 (Appendix B), a list of the Board's major correspondence issued during 2001 (Appendix C), a summary of

administrative activities (Appendix D), and a list of abbreviations and acronyms used in this report (Appendix E).

1.2 GOALS AND OBJECTIVES OF THE BOARD'S STRATEGIC PLAN

The Board organizes its safety work by merging the broad health and safety mandate of its statute with the requirements of the GPRA. The Board's Strategic Plan identifies the serious hazards associated with the handling of nuclear weapons, weapon materials, and cleanup of aging and surplus facilities. These hazards include the following:

- Tons of fissionable material, in various forms, housed in 50-year-old buildings and structures;
- Thousands of nuclear weapons being dismantled, inspected, or modified;
- Tons of plutonium, including components from dismantled nuclear weapons;
- The nation's strategic inventory of tritium gas, including thousands of individual tritium containers removed from nuclear weapons;
- Thousands of tons of deteriorating spent nuclear fuel in water-filled storage basins; and
- More than 100 million gallons of high-level radioactive waste awaiting treatment.

The Board's Strategic Plan sets forth its statutory mission, divided logically along the lines established by three general goals:

- *Safe stewardship of the nuclear weapons stockpile and components*—Nuclear weapons stockpile support and defense nuclear research activities continue to be planned and executed safely at DOE's defense nuclear facilities.
- *Safe disposition of hazardous remnants of weapons production*—Hazardous remnants of nuclear weapons production are appropriately characterized, stabilized, and stored, and legacy facilities are decommissioned in a manner that protects workers and the public.
- *Complex-wide health and safety issues*—Integrated Safety Management continues to evolve through feedback and improvement and is implemented in all life-cycle phases—design and construction, startup, operation, and decommissioning.

2. SAFE MANAGEMENT AND STEWARDSHIP OF NUCLEAR WEAPONS STOCKPILE AND COMPONENTS

2.1 SAFE CONDUCT OF STOCKPILE MANAGEMENT

Stockpile management is the term used to describe the industrial aspects of maintaining DOE's nuclear weapons stockpile and complex. Examples of the Board's activities to improve safety in stockpile management are discussed in the following subsections.

2.1.1 Pantex Plant

The Pantex Plant, located near Amarillo, Texas, serves a central role in stockpile management. Operations at the site include the assembly, disassembly, dismantlement, and surveillance of nuclear weapons,[3] as well as interim storage of plutonium removed from retired weapons. Because of its importance, Pantex was the first site at which the Board placed a resident Site Representative in 1992, and two positions have been staffed there continuously since 1993.

In 2001 the Board concentrated its attention at Pantex on operational safety, fire protection, lightning protection, and storage of special nuclear materials. On the first topic, the Board urged DOE to simplify and expedite its process for reengineering nuclear explosive processes at Pantex consistent with Recommendation 98-2, *Safety Management at the Pantex Plant*. During 2000, DOE had completed the Seamless Safety for the 21st Century (SS-21) process for the W76 Disassembly & Inspection Program, for the first time implementing the improved tooling and procedures developed as part of the SS-21 program on an enduring stockpile system. Overall, however, DOE has not yet demonstrated the ability to accelerate SS-21 and has not completed the redesign of any other weapon system in the 3 years since the Board issued its Recommendation. Instead, DOE has focused its attention on site-wide safety programs and has chosen to attempt only partial implementation of SS-21.

DOE also completed the first phase (termed Step 1) of its SS-21 efforts for the W88 Assembly and Disassembly & Inspection Program and the W78 Disassembly & Inspection and Repair Program. The Board continued to identify shortcomings in the hazard analyses and selection of controls associated with these two programs. After completion of the Step 1 developmental process, DOE acknowledged that the only real solution was to expedite completion of the full SS-21 process for both programs. At the Board's urging, DOE also accelerated the design and acquisition of the Enhanced Transportation

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[3] The terms "disassembly" and "dismantlement" are not synonymous. Disassembly refers to the activities associated with taking apart a weapon for purposes of inspecting or testing its components, while dismantlement is a permanent action to render the weapon no longer usable.

Cart for use in moving weapons within the Pantex site; its application to the first weapon program is now scheduled to occur early next year.

With respect to fire protection, the Board concluded that the potential hazards from a fire at Pantex had not been comprehensively and consistently addressed. In response, DOE improved fire hazards analyses, accelerated replacement of the deteriorating plant-wide fire alarm system, revised Technical Safety Requirements, and restored ultraviolet detectors as initiating devices for the fire protection system.

DOE proposed relaxing certain lightning protection controls at Pantex, despite objections from 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 lightning protection controls.

The Board also continued to press DOE to make safety improvements in the packaging and storage of special nuclear materials at Pantex. In response to the Board's Recommendation 99-1, DOE achieved and has sustained a goal of repackaging 200 pits per month into robust containers with inert internal environments. The Board also reviewed the Approved Container Program at Pantex. The corrective actions being implemented as a direct result of that review should result in significant improvements in the safety of nuclear material storage at Pantex.

The Board challenged the quality of the authorization basis for command disablement (CD) testing of certain weapons at Pantex, and became concerned when the Pantex contractor submitted a request to the National Nuclear Security Administration (NNSA) to bypass a readiness assessment prior to a CD test. The design agency, Los Alamos National Laboratory (LANL), acknowledged the deficiencies in the authorization basis and revised it using a combination of new calculations and information not provided in the original basis. The Board's site representatives objected to the contractor's request, leading NNSA and the contractor to conduct readiness assessments that identified a procedural inadequacy and other issues that were resolved prior to a successful CD test.

A series of worker safety incidents associated with facility or equipment maintenance and repair led to a safety concern with respect to work planning at Pantex. Initial actions by the contractor to correct the problem were focused too narrowly on work planning activities by subcontractors. The lack of an integrated approach to overall work planning was noted in several weekly reports by the Board's site representatives. Subsequent corrective actions resulted in improvements in the procedures used for work planning and ensured the accountability of the contractor for all activities at Pantex.

Weekly reports by the Board's site representatives also indicated that the Pantex contractor's original safety basis submissions for nuclear explosive painting operations were inadequate. Based in part on this information, NNSA declined to approve the Paint Bay Basis for Interim Operation, and

requested that its contractor develop a safety basis that depicts more realistically the risk associated with Paint Bay operations and addresses several other of the Board's safety concerns.

2.1.2 Y-12 National Security Complex

Secondary components and weapon cases for nuclear weapons are fabricated at the Y-12 National Security Complex, located in Oak Ridge, Tennessee. The Y-12 mission also includes surveillance, inspection, and testing of certain weapon components. Since September 1994, when DOE shut down all Y-12 nuclear production activities so that various safety problems could be remedied, actions at the site have been focused on sequentially restarting operations. Operations have been restarted for Receipt, Storage, and Shipment; Depleted Uranium Operations; Quality Evaluation; the Disassembly and Assembly Facility; and selected processes in Enriched Uranium Operations (EUO). Actions are now under way to begin a new dismantlement campaign and to restart several additional EUO processes.

The Board focused much of its attention and resources on this site during 2001. The Board's work at Y-12 can be divided into two areas: DOE's safety management of the site, and the safety of site operations and facilities.

In the former of these areas, the Board urged DOE's Y-12 Area Office (YAO) to (1) demand a higher level of performance from its contractor, and (2) strengthen its technical staffing. Positive results were achieved: YAO's review of an operations restart showed it to be a more demanding customer, and several new Facility Representatives and additional technical personnel were hired by YAO in 2001. After the Board's Y-12 site representative pointed out that the Y-12 contractor was planning to eliminate important training requirements for fissile material handlers, NNSA reconsidered and retained the training requirements.

The Board's efforts to improve safety were concentrated in chemical safety, dismantlement operations, highly enriched uranium operations, nuclear material storage, and fire protection:

- Problems with the management of chemicals at Y-12 were highlighted in extensive correspondence from the Board. DOE responded to the Board's warnings by cataloging and significantly reducing the inventory of excess chemicals at Y-12.

- The Board identified a number of potentially significant safety issues associated with a new process for dismantling nuclear weapons. In response to the Board's concerns, DOE made changes in the process that substantially improved safety.

- The Board highlighted the need to improve formality of operations of highly enriched uranium processing to address long-standing problems. The Board also highlighted the need to reengineer and redesign specific highly enriched uranium processing equipment, such as the

uranium reduction vessel and process equipment for hydro-fluoridation and solvent extraction. Some improvements were made in both areas, and these efforts continued into 2002.

- Responding to correspondence from the Board and its staff concerning deteriorating nuclear storage facilities, DOE developed a 10-year plan for consolidating nuclear material and managing its storage. The contractor removed all of the most physically degraded material from one building and initiated removal of material from another building. The contractor has also begun to integrate long-range facility planning with overall storage planning.

- In response to issues highlighted by the Board, DOE prepared a thorough and detailed 10-year corrective action plan for the Y-12 fire protection program. Most of the short-term actions identified in the plan have been completed.

2.1.3 Savannah River Site Tritium Production

The Tritium Extraction Facility (TEF), currently under construction at the Savannah River Site (SRS), will be used to extract tritium from target rods irradiated in a commercial light water reactor. The extracted tritium is to be used to replenish tritium reserves for the nation's nuclear weapon stockpile. The Board reviewed the application of Integrated Safety Management (ISM) to the TEF design process to ensure that hazards were identified and appropriate controls were developed. The Board's review identified several needed improvements, including evaluation of the potential impact of water on electrical/electronic components, the need for additional high range radiation monitors, and the need to improve structural response to potential earthquakes. In response, DOE modified the design criteria, completed enhanced seismic response calculations, and made improvements to its program for ensuring quality construction.

2.2 SAFE CONDUCT OF STOCKPILE STEWARDSHIP

Stockpile stewardship is the term used by DOE to refer to activities carried out in the absence of underground nuclear weapons testing to ensure confidence in the safety, security, and reliability of nuclear weapons in the stockpile. Stockpile stewardship includes using past nuclear test data in combination with future non-nuclear test data and aggressive application of computer modeling, experimental facilities, and simulations. Safety aspects of activities at the major sites engaged in stockpile stewardship are discussed in the following subsections.

2.2.1 Pantex Plant

The Board has highlighted to DOE the need to improve scientific understanding of weapon response to certain environments that affect the safety of operations at the Pantex Plant. In many cases, the experimental data necessary to evaluate these responses are also lacking. In 2001, NNSA and its

weapon design laboratories agreed to consider new research on the least-understood aspects of Pantex operations to increase confidence in the margin of safety for these operations. NNSA will evaluate and prioritize this research at least semiannually.

2.2.2 Los Alamos National Laboratory

The Los Alamos National Laboratory, located in New Mexico, is the DOE weapons laboratory with the largest number of defense nuclear facilities and weapon-related activities. It is the main site for ongoing research and development on means for certifying the safety and reliability of nuclear weapons in the absence of nuclear testing. LANL is also the planned location of DOE's limited-scale manufacturing capability for replacement pits for existing nuclear weapons.

The Board has stressed the need for robust confinement vessels in which to perform certain potentially hazardous experiments at LANL. In 2001, DOE developed a defensible design basis for the confinement vessels to be used for these experiments and a draft standard for design and construction of these vessels.

A letter from the Board in March 2001 noted that LANL's Special Recovery Line (SRL) is the only disposition path for certain plutonium pits currently stored at the Pantex Plant. A lack of funding had nearly resulted in suspending operations and placing the facility in cold standby. The Board advised that it would be prudent to stabilize funding to maintain the SRL's ability to dispose of these vulnerable pits at Pantex. LANL and DOE have agreed to maintain the SRL in 2002.

The Board also identified problems with the design specifications and quality assurance requirements for the Fire Protection Yard Main Replacement Project at the Technical Area-55 Plutonium Facility. As a result of the Board's actions, these issues have now been largely resolved, and LANL is making progress in replacing this important safety system.

The Board reviewed the design and startup preparations for the Decontamination and Volume Reduction System, which is intended to size-reduce large components (e.g., gloveboxes) contaminated with plutonium and hazardous chemicals. Questions raised by the Board's site representative led LANL to adopt a more rigorous process for developing related safety requirements and assessing operational readiness.

LANL is planning to construct a new Emergency Operations Center (EOC). The Board noted that LANL was considering the new EOC in isolation, rather than as part of a system of EOCs that would include an older EOC and a proposed mobile command center. The Board pointed out that a systems approach would provide LANL with an EOC network capable of handling all credible emergencies, including those in which the new EOC was rendered inoperable, as could happen in a severe earthquake. LANL agreed with this concept and redefined its approach to emergency management.

2.2.3 Lawrence Livermore National Laboratory

The Lawrence Livermore National Laboratory (LLNL), located 45 miles southeast of San Francisco, California, is a nuclear weapons research and development laboratory. It provides technical expertise to support stockpile stewardship and management, including consultation on the surveillance and dismantlement of LLNL-developed nuclear weapons. Most defense nuclear activities are conducted in the Superblock complex, which includes the Building 332 Plutonium Facility and the Tritium Facility.

The Board identified deficiencies in emergency management and fire protection at LLNL. These deficiencies included weaknesses in hazard identification and assessment. In response, DOE and LLNL significantly increased attention by senior management to emergency management, and as a result, emergency hazards analyses and controls were strengthened. In the area of fire protection, the Board pointed out deficiencies that could compromise power and control for smoke detectors and fire dampers in Building 332. LLNL acknowledged the problem and implemented compensatory measures to increase the reliability of the fire alarm system. LLNL is also expediting replacement of the existing alarm system by a new safety-class system.

2.2.4 Nevada Test Site

The Nevada Test Site (NTS) covers 1,350 square miles in southern Nevada, about 75 miles northwest of Las Vegas. NTS is a remote site and one of the largest secured areas in the United States. It is surrounded by thousands of additional acres of land withdrawn from the public domain for use as a protected wildlife range and as a military gunnery range, creating an unpopulated land area comprising some 5,470 square miles. Underground testing of nuclear weapons is no longer being conducted at NTS. However, NTS is maintained in a state of readiness should national security requirements demand the resumption of underground testing.

The Board has consistently highlighted to DOE the need to develop at NTS the programs and infrastructure necessary to safely dispose of a damaged nuclear weapon or improvised nuclear device. During 2001, DOE upgraded its capabilities to conduct these activities safely by making physical improvements to G-Tunnel, developing a safety basis for G-Tunnel, and conducting a number of exercises that clearly identified further issues to be addressed.

After reviewing the Joint Actinide Shock Physics Experimental Research (JASPER) subcritical experiments at NTS, the Board concluded that the quantity of nuclear material in the targets would exceed the threshold values for a Hazard Category 3 nuclear facility. However, suitably rigorous safety controls had not been specified. As a result of a July 2001 letter from the Board, DOE identified the controls to be relied upon for safety of the operation and documented those controls as part of the authorization basis of the facility. DOE will assess and approve the adequacy of the controls and their configuration management prior to the start of this series of experiments.

2.2.5 Sandia National Laboratories

Sandia National Laboratories (SNL), which manages research and development installations at several DOE sites, including Albuquerque, New Mexico, and Livermore, California, has a major responsibility for conducting engineering research on nuclear weapon systems and components. SNL's major defense nuclear facilities, most of which are located in Technical Area V at the New Mexico site, include the Annular Core Research Reactor, the Hot Cell Facility, the Gamma Irradiation Facility, and the Sandia Pulse Reactor Facility. The Mazano Waste Storage Facilities and the Neutron Generator Facility are located elsewhere on the New Mexico site.

The Board reviewed preliminary plans for the Sandia Underground Reactor Facility (SURF) project and identified safety concerns regarding worker exposure to radiological and industrial hazards, in part stemming from the below-ground characteristics of the SURF. The Board also noted inconsistencies in DOE's documentation of preliminary facility design and analysis. In response, DOE has indicated that it intends to address these concerns before approving the SURF's preliminary safety analysis.

3. SAFE DISPOSITION OF HAZARDOUS REMNANTS OF WEAPONS PRODUCTION

3.1 STABILIZATION AND STORAGE OF REMNANT MATERIALS

3.1.1 Complex-Wide Program

In Recommendations 94-1 and 2000-1, the Board urged DOE to assess and take action on legacy nuclear materials remaining in defense nuclear facilities. This is an urgent matter because instability of materials and undesirable conditions of storage will worsen with time. Recognizing the degree of uncertainty in DOE's plans to disposition many of these nuclear materials, the Board has consistently advised DOE not to depend on disposition programs to correct near-term safety issues associated with legacy materials. The Board has pressed DOE to promptly stabilize and package these materials into forms that can be safely stored for an extended period of time, to allow time for the materials disposition programs to develop at their own pace without engendering safety issues in the interim.

This approach is most clearly illustrated in the stabilization and disposition of plutonium. DOE initially proposed constructing an Actinide Packaging and Storage Facility at SRS that would stabilize plutonium stored at SRS and provide state-of-the-art storage for plutonium received from throughout the DOE complex, pending ultimate disposition. Subsequently, based in large part on the anticipation of plutonium disposition facilities intended to be constructed at SRS, DOE abandoned this plan, and instead decided to rely entirely on a storage capability retrofit in the K-Reactor facility at SRS (called K-Area Materials Storage, or KAMS), coupled with “just-in-time” shipments of plutonium destined for immobilization.

DOE has now decided to eliminate the planned immobilization capability, and is pursuing a “rapid consolidation” option, in which as much impure plutonium as possible would be prepared for disposal at the Waste Isolation Pilot Plant (WIPP), allowing much of the remaining plutonium throughout the DOE complex to be consolidated in KAMS. However, KAMS is an aged facility with no confinement features for potentially extended storage of plutonium. This approach also fails to address disposition of several tons of plutonium at various sites that is unsuitable for disposal at WIPP and cannot be fabricated into mixed-oxide fuel. Timely actions to render these materials into a form and package suitable for indefinite storage therefore remain vital. DOE has mitigated some of the most immediate hazards, but much work remains to be done, and progress is slow. 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 wrote to DOE in March 2001. In this letter the Board identified the need to further expedite stabilization activities at SRS and LANL. In its September response to the Board’s letter, DOE presented an acceptable path forward for SRS, but indicated that it was continuing to evaluate whether stabilization activities at LANL could be accelerated. The new

approach at SRS is consistent with the Board's observation that stabilization and packaging of plutonium metal and oxide materials could be accomplished in a timely and cost-effective manner using simple equipment in the existing FB-Line facility at SRS.

Because of the slow pace of DOE's development of a firm plan for these activities, the Board issued a letter in November 2001 to the Secretary of Energy that outlined the expected attributes of an acceptable path forward. At year's end, DOE was still working to complete the plans for material stabilization at SRS and LANL. Nearly 8 years have passed since the Board issued Recommendation 94-1 for stabilization of these materials.

In the National Defense Authorization Act for Fiscal Year 2001 (Public Law 106-398), Congress barred the expenditure of funds for decommissioning of the F-Canyon facility at SRS until the Secretary of Energy and the Board jointly submit specified information to the Senate and House Armed Services Committees. The Board is performing a review of complex-wide legacy nuclear materials, including materials not addressed by Recommendations 94-1 and 2000-1, in connection with this statutory requirement.

3.1.2 Plutonium

The Board evaluated the design and safety basis for the plutonium stabilization and packaging system being installed at the Rocky Flats Environmental Technology Site (RFETS). The Board concluded that contamination controls needed to be improved. DOE made such improvements, and in June 2001 the Board was able to make a formal determination that DOE's preparations for startup of the plutonium stabilization and packaging activities were adequate to protect public health and safety.

Preparations for similar stabilization and packaging efforts at the Hanford Site and LLNL were also evaluated. As a result of the Board's scrutiny, the test procedures (based on loss-on-ignition) used to verify the stabilization of plutonium oxides at Hanford's Plutonium Finishing Plant (PFP) were revised to address concerns related to exposure of samples to humid air, cross-contamination of samples, analysis of uranium-bearing materials, and acceptance criteria for the test.

During 2001, RFETS, Hanford, and LLNL each began packaging plutonium in high-integrity, long-term storage containers, beginning the implementation of an important component of Recommendations 94-1 and 2000-1. DOE also began several new stabilization activities and continued progress on others in response to these Recommendations. These measures resulted in:

- initiating a more efficient process for stabilizing plutonium solutions at Hanford, beginning the direct disposal of lean plutonium solutions, stabilizing plutonium alloy turnings that had been stored in oil, and starting up a new process line that more than doubles PFP's thermal stabilization capacity;

- stabilizing metric tons of plutonium-bearing residues at RFETS and eliminating all plutonium-bearing solutions from Building 771; and

- completing "refreshing" of existing highly enriched uranium solution to enhance the safety of continued storage at SRS, dissolution of RFETS scrub alloy, and dissolution of Mark-42 compacts; commencing dissolution of Sterling Forest Oxide; and continuing dissolution of Mark-16/22 fuel assemblies, repackaging of metal items received from RFETS, and disposition of the remaining SRS plutonium-bearing residues.

The Board's oversight of stabilization activities resulted in several significant safety improvements. Safety precautions at PFP were improved by revising the Technical Safety Requirements to specify more appropriate action times for addressing inoperability of fire sprinkler, alarm, and detection systems and high-efficiency particulate air (HEPA) filters. PFP also instituted an administrative control specifying walkdowns by the fire protection engineer, revised Technical Safety Requirement surveillances, and upgraded the classification of a ventilation system interlock to safety-significant to address issues raised by the Board. Stabilization of the plutonium alloy turnings stored in oil occurred after the Board had identified the need for further characterization of these materials, the results of which demonstrated the need for stabilization.

During operations to stabilize plutonium-bearing residue materials at RFETS, unusual pressure fluctuations occurred that caused a positive pressure in the furnace glovebox. Several years ago, the Board identified the potential for pressurization or an explosion in a furnace when stabilizing these materials. The Board reviewed this event and noted that a safety control to characterize feed material, instituted to address the Board's prior issue, was not being implemented, and that several failures in safety management were evident. In a March 2001 letter, the Board requested that DOE identify the root causes of the problems and corrective actions that would prevent similar breakdowns in the future. DOE determined the root causes and developed and implemented a comprehensive set of corrective actions for both the contractor and the DOE field office. Other actions by the Board at RFETS led DOE to reverse an improper decision to cease external reporting of degradation in safety components, to properly classify a safety control on plutonium oxide outside of vaults in Building 371, and to revise the RFETS Unreviewed Safety Question (USQ) screening process so that such problems could be dealt with more effectively.

The Board has continued to review and evaluate changes to the long-term plutonium storage standard, DOE-STD-3013, to ensure that the material is safely stabilized and packaged. The Board reviewed a proposed methodology for certifying the stabilization process for plutonium oxide materials, intended to reduce the reliance on testing performed to prove that the product is adequately stable. The Board then provided comments on the scope of materials covered by the certification methodology, as well as requirements for handling pure and impure oxides after they have been stabilized. DOE has

incorporated these comments into the requirements of the methodology, and is preparing to implement this approach.

3.1.3 Uranium

Highly enriched uranium (HEU) solutions at SRS are being stabilized to meet commitments made by DOE in response to the Board's Recommendation 2000-1. The HEU blend-down project, which will convert the HEU to low-enriched uranium for use in commercial power reactors, achieved several milestones in 2001. The Board reviewed preliminary design and safety basis documents and pointed out areas for improvement in functional classification of equipment and radiological dose calculations.

Uranium-233 (^{233}U) is a man-made radioisotope that contains uranium-232 (^{232}U) as an unavoidable contaminant; products of decay of ^{232}U are highly radioactive. Most of this material is stored at Oak Ridge National Laboratory (ORNL) and Idaho National Engineering and Environmental Laboratory (INEEL), with a smaller quantity at LANL. Because most of the containers at ORNL have not been inspected for many years, there is uncertainty about the safety of current storage conditions. In Recommendation 97-1, the Board urged DOE to characterize, stabilize, and ensure safe storage of ^{233}U materials expeditiously. During 2001, the Board completed review of preparations for the ^{233}U inspection and repackaging program at ORNL and of DOE's resolution of numerous safety improvements identified by the Board, particularly regarding the need for formal conduct of testing and operations. Inspection began in late 2001, and at year's end ORNL had safely inspected the first eight containers. In a related matter, the Board's inquiries led DOE to further examine the ventilation system of Building 3019B. DOE has implemented compensatory measures until hazardous deposits in the ductwork can be identified and then removed.

3.1.4 Special Isotopes

The Board evaluated preparations at SRS to start up the neptunium/plutonium oxide process at the HB-Line. Operation of this process will be an important step toward stabilizing actinide solutions at SRS, as committed to by the Secretary of Energy in DOE's Implementation Plan for Recommendation 94-1. A July 2001 letter from the Board communicated a number of safety issues. Resolution of these issues has proceeded, and improvements have been made to the safety basis, supporting technical basis documents, and procedures. Stabilization of plutonium solutions presently stored in the SRS H-Canyon facility commenced in December 2001.

The need to expedite stabilization of americium/curium solutions at SRS was identified in Recommendation 94-1. Previously, DOE had planned to vitrify the material and retain it for future use. However, in view of the increasing cost and the lack of an identified need for the material, DOE has halted work on the vitrification project and now plans to dispose of the material using the SRS high-level waste system. The Board's review of the disposition plan identified several areas of concern, and in May 2001, the Board issued a letter to DOE identifying a list of issues that required prompt resolution before

committing to the disposal option. These issues included the need to determine the impact on the consequences of potential accidents in the high-level waste system, the acceptability of the material for vitrification in the Defense Waste Processing Facility, the impact on future utilization of the F-Canyon chemical separations facility, and the need for thorough cold testing and readiness preparations to ensure that this hazardous operation can be conducted safely. DOE subsequently made sufficient progress on evaluating these issues to provide adequate confidence that the disposal option can be carried out safely.

3.2 PLUTONIUM DISPOSITION

The Board continued to evaluate the developing design of the planned Pit Disassembly and Conversion Facility (PDCF) and provided comments to DOE's Office of Fissile Materials Disposition on safety aspects of the design. In an April 2001 letter, DOE informed the Board of its decision to adopt conservative seismic design criteria for the PDCF, consistent with earlier comments from the Board. DOE has also completed additional geotechnical characterization of the PDCF site. Also consistent with the Board's comments, DOE agreed to perform a full-facility criticality safety analysis instead of using a piecemeal approach, and to use the Implementation Guides for DOE Order 420.1, *Facility Safety*.

3.3 STABILIZATION OF SPENT NUCLEAR FUEL

3.3.1 Hanford Site

A major milestone in the implementation of Recommendation 94-1 was reached in late 2000 with the startup of stabilization of spent nuclear fuel from the Hanford K-West Basin. The safe startup of this activity followed several years of pressure by the Board to undertake the cleanup, preparations by DOE and extensive oversight by the Board, which led to the identification and correction of numerous safety issues before operations commenced. Fuel movement from K-West Basin continued throughout 2001 while DOE implemented a revised strategy for fuel movement from the K-East Basin. The Board's review of the fuel transfer system project revealed shortcomings requiring additional controls to protect the basin structure during the construction phase, particularly during the excavation of a foundation for a new annex facility adjacent to the K-East Basin. Increased attention on the part of DOE and contractor management throughout the year and continued oversight by the Board have led to an improvement in the conduct of operations, resulting in improved operating efficiency and an increase in the fuel removal rate from K-West Basin. However, one must not forget that the early removal of fuel from the K-West Basin was for the purpose of obtaining operational experience in preparation for removal of deteriorating fuel at the more vulnerable K-East Basin.

3.3.2 Savannah River Site

DOE started design and safety basis development work for the L-Area Experimental Facility (LEF) which it believes will in operation demonstrate the melt-and-dilute process for stabilizing irradiated research reactor fuel at SRS. The Board reviewed design and safety basis documents and pointed out areas for improvement in electrical safety and in instrumentation and control. DOE has acknowledged the issues raised by the Board, and has taken corrective measures, including performing needed electrical calculations, obtaining a new uninterruptible power supply for the LEF, installing a lightning protection system, and reclassifying the furnace shutdown circuit as safety-significant.

3.4 WASTE MANAGEMENT

3.4.1 High-Level Waste

In January 2001, Tank 6 in the SRS high-level waste (HLW) tank farm leaked waste from the primary tank into the tank's secondary containment. As a result of an unacceptable response by DOE to the Board's warnings, the Board issued Recommendation 2001-1 urging DOE to remove waste from the leaking tank and to take several other actions to improve safety and operational flexibility in the tank farms. The recommended actions included accelerating the salt processing project, exploring new options for freeing up additional storage space in the tank farms, and reevaluating the performance-based incentives in the HLW portion of the site contract.

As a continuation of efforts to implement Recommendation 96-1, DOE completed an evaluation of HLW salt processing technologies and selected caustic side solvent extraction as the preferred method for salt processing at SRS. The Board reviewed DOE's selection and suggested that another technology also be pursued in parallel through pilot-scale operation, to better ensure timely tank waste stabilization. To further expedite waste stabilization and relieve the strain on the HLW tank farms at SRS, the Board encouraged DOE to assess the feasibility of direct disposal of low-activity salt wastes through the existing Saltstone Production Facility at SRS.

The Board has continued to press DOE to improve programs that protect and verify the integrity of the HLW storage tanks at Hanford and SRS. As a result, during 2001 DOE made several improvements to its tank integrity program at Hanford. These improvements included adding corrosion inhibitors to tanks with off-specification chemistry, implementing improved requirements for monitoring tank chemistry, and operating the annulus ventilation systems to help prevent corrosion of the primary tank wall.

The Board reviewed the safety of cleaning activities designed to remove an unexpected accumulation of solid deposits in one of the HLW evaporators at SRS. These accumulated materials constituted criticality and flammable gas generation hazards. Oversight of the contractor's readiness review by the Board

disclosed deficiencies in the contractor's procedures, training, and equipment readiness. The Board's observations were subsequently confirmed by DOE's own review. The contractor completed corrective actions, and the deposits were removed, but periodic cleaning will be necessary. The Board also reviewed new safety controls developed to address hazards posed by deposits expected to accumulate between cleanings. Based on its review of the new safety controls, the Board wrote to DOE in late September 2001, suggesting that a safety-significant high-level alarm and interlock system be installed to better ensure prevention of potential explosions. In response, DOE implemented compensatory measures and is evaluating further upgrades.

3.4.2 Transuranic and Low-Level Waste

The Board performed reviews to help ensure safe disposal of transuranic (TRU) waste at the WIPP as that facility continued to ramp up operations toward full throughput capacity. These reviews focused on confirming implementation of ISM and configuration management for vital safety systems, including the application of ISM to maintenance management. The Board examined the construction of facilities at WIPP designed to accommodate disposal of remote-handled transuranic (RH-TRU) wastes to ensure that future RH-TRU disposal operations can be carried out safely. Lastly, the Board examined the application of new fire protection standards at WIPP. This led, at year's end, to the Board's pursuing deficiencies in the fire protection "baseline needs assessment."

The Board reviewed design and construction activities at a feeder facility for WIPP—the Melton Valley Waste Treatment and Packaging Facility at ORNL. Melton Valley will prepare TRU and RH-TRU waste for disposal at WIPP, and low-level waste for disposal at NTS. These reviews resulted in a letter from the Board to DOE in May 2001, identifying the need to ensure that safety documentation was sufficiently developed to support design and construction. The Board's action contributed to improvements in design, including the addition of a fire suppression system. Nuclear criticality safety documents for liquid wastes were also examined and replaced by improved versions after the Board pointed out to DOE the inadequacy of the original documents.

3.5 FACILITY DEACTIVATION AND DECOMMISSIONING

3.5.1 Y-12 National Security Complex

For several years, the Board has pressed DOE to expeditiously pursue risk reduction and deactivation activities in Building 9206 at Y-12. Shortly after an on-site review, the Board wrote a letter to DOE noting that despite several accomplishments in support of deactivation and risk reduction, the hazards of most concern to the Board had not been markedly alleviated. During a follow-up review in May 2001, the Board noted that significant steps had been taken to raise the priority of hazard reduction in Building 9206. The Board also observed that more aggressive deactivation was being considered, including reclassifying

some materials as waste to support timely direct disposal. Preparations for stabilizing pyrophoric material are proceeding, with the start of operations expected in early 2002.

The Board has also long urged that DOE conduct a radiological survey of underground ventilation ductwork associated with Building 9206, suspected of being contaminated with fissile uranium. This project was completed during 2001, and initial results indicate that uranium levels are low enough that a criticality event is extremely unlikely.

3.5.2 Hanford Site

The Board continued to review deactivation and decommissioning at Hanford, and provided comments to DOE regarding the safe conduct of this work. The Board identified fire protection and authorization basis issues associated with the storage of plutonium-contaminated waste in a wooden enclosure outside the Plutonium Concentration Facility (Building 233-S), a facility that is being decommissioned. These findings led to the prohibition of storing waste in the enclosure, declaration of a positive Unreviewed Safety Question, development of a Justification for Continued Operation, and revision of the fire hazard analysis and safety analysis.

In 1999, the Board discovered that no one had entered the process section of the Bulk Reduction Building (224-T) in approximately 15 years, and that the contents of the process cells were unknown. As a direct result of the Board's interest, funding was provided to support characterization of hazards in Building 224-T. Because of continued interest and attention by the Board, characterization began in 2001. Several tanks were discovered to be submerged in water in a flooded cell, a problem still under investigation.

The Board also evaluated the sitewide process for disposing of excess facilities, and in a letter to DOE in August 2001, provided suggestions to improve the methods used to manage such work.

3.5.3 Rocky Flats Environmental Technology Site

The Board observed deactivation and decommissioning activities at RFETS and reviewed new related work planning requirements and guidance. During these reviews, the Board made suggestions to RFETS for improving and clarifying work planning requirements, and RFETS made those improvements. Also in response to comments from the Board, the site contractor revised an engineering procedure to preclude inadvertent damage to safety systems during decommissioning activities (a safety system had been damaged in Building 707 during removal of a wall).

RFETS improved engineered controls used for size reduction of gloveboxes and related equipment that are highly contaminated with plutonium, continuing an effort that commenced in 1999 with encouragement from the Board. Through the use of engineered containment chambers, RFETS has greatly reduced the airborne plutonium hazard to workers during size reduction and has decreased past reliance on equipment used for personnel respiratory protection. In 2001, two generations of containment chambers

were deployed in Buildings 776 and 771. The latest chambers incorporate superior features for mechanical and ventilation containment that essentially eliminate reliance on equipment for personnel respiratory protection. Other improvements in the use of engineered controls for tank cleanout were implemented in 2001.

3.5.4 Fernald Environmental Management Project

The Board provided safety oversight of deactivation and decommissioning at Fernald. In January 2001, the Board issued a letter to DOE identifying weaknesses in the fire protection program for Tension Support Structures used for radioactive material storage at the site. DOE acted promptly to address the identified problems.

4. COMPLEX-WIDE HEALTH AND SAFETY ISSUES

4.1 IMPLEMENTATION OF INTEGRATED SAFETY MANAGEMENT

Integrated Safety Management is a concept that evolved from the Board's Recommendation 95-2, *Safety Management*. The basic tenets of ISM provide the framework for safely performing all of the diverse hazardous activities in the defense nuclear complex.

ISM provides for a single safety management program rather than multiple, unintegrated programs. Nuclear safety is an important but not exclusive target of ISM. Nonradioactive hazardous materials and operations require attention at least in proportion to the risks they pose to the public, workers, and the environment. ISM builds upon standards of safe practice for nuclear, chemical, and other hazardous operations to ensure protection of the public, workers, and the environment.

Since the Board's initial recommendation, the implementation of ISM has progressed through three phases: (1) developing necessary guidance documents; (2) establishing the infrastructure for implementing ISM at individual sites and facilities, including instructing leaders and workers in the application of ISM; and (3) confirming that ISM Systems are effective and being applied to all stages of each facility's life cycle—design and construction, startup, operation, and decommissioning. At the end of 1999, the implementation of ISM was well into the second phase. With the successful completion of ISM System Verification Reviews at all sites during 2000, the Board's focus on implementation of ISM has shifted to the third phase. Throughout the year, the Board stressed the need to look beyond initial implementation to ensure continued improvement.

The Board held two public meetings in 2001 to discuss ISM implementation in detail. DOE has committed to using feedback and improvement programs, including the annual ISM update process, to ensure continued improvement. By the end of the year, the Board's reviews had raised questions about the efficacy of the ISM update process. DOE has committed to correcting the process as necessary.

Specific activities on complex-wide implementation of ISM during 2001 included the following:

- In 2001, the Board continued to evaluate the effectiveness of feedback and improvement programs maintained by DOE and its contractors, an essential element of ISM. In October the Board sent DOE the results of a review of feedback and improvement programs applied by the contractor at the Hanford high-level waste tank farms, noting that a series of reviews by the Board and DOE had consistently identified problems with these programs. In response, DOE committed to strengthening its processes for self-assessment and contractor oversight and to performing an annual ISM review at Hanford—the first to

be completed by May 2002. This review is to be of sufficient scope to assess the effectiveness of the contractor's corrective action program.

- The Board continued to seek improvements in DOE's execution of quality assurance (QA) programs. The Board held three public meetings on the subject and issued a technical report, DNFSB/TECH-31, *Engineering Quality into Safety Systems*, that provided additional insight into these QA issues. In response to the Board's urging, DOE performed assessments of QA programs throughout the complex. These assessments confirmed the Board's concerns. DOE is developing corrective action plans to address the issues raised.

- The Board's technical report DNFSB/TECH-25, *Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities*, identified weaknesses in DOE's development and maintenance of computer software used for safety analysis and for design of safety-class structures, systems, and components. In October 2000, DOE provided a corrective action plan that partially addressed these issues. During its public meetings on QA, the Board stressed the importance of software QA and explored methods used by the Department of Defense, the National Aeronautics and Space Administration, and the chemical and nuclear power industries. DOE is developing a QA improvement plan that will include actions to improve software QA.

- The Board's Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, addressed the need for actions to remedy degradation of safety systems. During 2001, DOE completed initial reviews of vital safety systems at priority facilities and conducted detailed pilot reviews of confinement ventilation systems at SRS and LLNL. The Board provided DOE with its observations from the pilot reviews, and these lessons learned are being factored into all subsequent reviews.

- In response to Recommendation 2000-2, DOE committed to addressing issues identified by the Board with respect to HEPA filters. In 2001, the Office of River Protection (ORP) revised its guidance to require that initially, all safety-class and safety-significant HEPA filters would be tested at the Filter Test Facility, but that this testing would eventually be replaced by an independent statistical sampling program. After the Board questioned this strategy, ORP clarified its guidance to specify that all safety-class and safety-significant HEPA filters will continue to undergo 100 percent QA testing. The Board also had concerns with regard to the possibility of ORP contractor Fluor Hanford using for safety-class/safety-significant applications an existing backlog of HEPA filters that had not been tested at the Filter Test Facility. DOE's Richland Operations Office directed Fluor Hanford to immediately implement the use of only tested filters for these applications.

4.2 HEALTH AND SAFETY DIRECTIVES

4.2.1 Directives Improvement

During 2001, the Board received 30 new or revised drafts of health and safety directives and associated standards from DOE for review. Highlights of the Board's reviews follow:

- **Nuclear Explosive Standards.** The Board reviewed and provided extensive comments to DOE on O 452.1B, *Nuclear Explosive and Weapon Surety Program;* O 452.2B, *Safety of Nuclear Explosive Operations;* O 452.4A, *Security and Control of Nuclear Explosives and Nuclear Weapons;* and DOE-STD-3015, *Nuclear Explosive Safety Study Process*.

- **Emergency Management.** The Board provided comments on the latest revisions of two DOE Orders addressing emergency preparedness: O 151.1B, *Comprehensive Emergency Management System*, and O 153.X, *Departmental Radiological Emergency Response Assets.* The Board also provided comments on three associated manuals: M 151.1-1, *Operational Emergency Hazardous Material Programs for Fixed Facilities and Associated On-Site Activities*; M 151.1-2, *Emergency Management Program for Transportation Safeguards System Activities*; and M 151.1-3, *Emergency Management Program for Non-Weapons Off-Site Transportation Activities*.

- **Authorization Basis Documentation.** The Board reviewed DOE directives covering development and implementation of safety basis documentation. These included O 420.1A, *Facility Safety*, and three associated guides: G 421.X-X, *Implementation Guide for Use in Developing Documented Safety Analyses to Meet Subpart B of 10 CFR 830*; G 423.X, *Implementation Guide for Use in Developing Technical Safety Requirements*; and G 424.X, *Implementation Guide for Use in Addressing Unresolved Safety Question Requirements.*

- **Assignment of Authorities and Responsibilities.** Comments by the Board on a revision of DOE M 411.1B, *Safety Management Functions, Responsibilities, and Authorities Manual*, helped clarify formerly confusing portions of this important directive.

- **Software Quality Assurance.** The Board continued to press DOE to strengthen its guidance on engineering practices for safety-related software. DOE responded by drafting DOE O 203.X, *Software Quality Assurance*. The Board provided extensive comments on this directive.

4.2.2 Implementation of Directives

Determination of Operational Readiness

The Board continues to identify significant deficiencies in the preparations for and subsequent determination of readiness to commence nuclear operations. These deficiencies include premature declaration of readiness by the contractor; use of readiness confirmation reviews to assist in attaining readiness, rather than as an independent confirmation of readiness; and in some cases, DOE's reluctance to conduct independent reviews at all. These deficiencies affected the startup of a dismantlement campaign at Y-12 (documented in a letter from the Board dated June 28, 2001), the startup of a weapon disassembly process at Pantex, the startup of a weapon special operation at Pantex, startup preparations for T-Plant fuel movements at Hanford, and the startup of a plutonium stabilization and packaging system at Hanford.

The Board has observed that the large number of pre-start findings and the recurrence of the same or similar finding from contractor management self-assessments, contractor readiness reviews, and DOE readiness reviews demonstrate a failure by line management to conduct thorough startup preparations and correct operational and safety problems in an effective manner prior to commencing readiness reviews. The Board has intervened in these and other cases to ensure that nuclear operations are not commenced until readiness has been properly demonstrated. The Board's actions should not be relied upon to cure inadequate readiness preparation by DOE's and the contractor's line management.

Conduct of Operations

Conduct of operations is a key element in ISM and the safe performance of work. Once hazards and appropriate controls have been identified, the controls must be implemented in the field through the disciplined conduct of operations. In its reviews of work practices and occurrence reports, the Board continues to observe that workers are not always following requirements. Specific examples of conduct-of-operations concerns during the last year include weapons operations at Pantex, nuclear material packaging at RFETS, and spent fuel stabilization and packaging at the Hanford Site.

The causes of these procedural deviations vary, and include poor procedures, inadequate training, lack of clear management expectations, inadequate supervisory presence, and poor engineering support. Establishing and maintaining conduct of operations requires continued vigilance by DOE and its contractors. Through its site representatives and on-site reviews, the Board continues to stress the importance of conduct of operations in ensuring worker and public health and safety.

Safety Analysis Methodology

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 they proposed an alternative methodology. The Board discouraged use of this alternative methodology in a November 2000 letter, followed by a formal reporting requirement issued to DOE in April 2001. The Board's review led to the conclusion that this methodology would reduce the conservatism inherent in the currently acceptable approach by using a probabilistic combination of uncertainties or errors in calculating unmitigated consequences. DOE agreed with the Board's position and prohibited the use of this alternative methodology pending further studies.

The Board's reviews at several DOE sites indicated that requirements for hazards analyses have not been sufficiently integrated to ensure identification and implementation of adequate controls. Consequently, hazard analyses performed for safety analysis reports, emergency response plans, environmental impact assessments, and fire safety plans may not be adequate. A series of letters from the Board in early 2001 identified additional hazards that had been overlooked at LLNL (January), LANL (March), and Y-12 (April). These letters also called for needed improvements and additional controls to improve operational safety.

Criticality Safety

DOE completed all remaining milestones in its Implementation Plan for Recommendation 97-2, *Criticality Safety*. To sustain the momentum of improvements, the Board issued technical report DNFSB/TECH-29, *Criticality Safety at Department of Energy Defense Nuclear Facilities*, offering additional suggestions for improving criticality safety throughout the complex. In its response, DOE addressed a number of observations in this report, but some of the actions lacked sufficient detail. A July 2001 letter from the Board identified specific actions to be taken by DOE before the criticality infrastructure envisioned in Recommendation 97-2 could be considered adequate. These actions included:

- Establishment of a stable funding mechanism for criticality safety programmatic support,
- Steps to ensure the long-term availability of an experimental criticality test facility for hands-on training of criticality engineers,
- Assessment of qualifications for nuclear criticality safety engineers employed by contractors,
- Review of the Implementation Guides for 10 CFR Part 830 (Nuclear Safety Rule) by the Criticality Safety Support Group (CSS), and

- Establishment of a strong criticality safety group within each DOE field office to ensure that the site nuclear criticality safety program is functioning properly.

In December 2001, DOE provided a response to the Board's letter that addressed the qualifications of criticality safety engineers and the CSS's review of the Implementation Guides. DOE expects to complete the remaining actions in 2002.

In addition to investigating specific criticality safety concerns during 2001, the Board reviewed the reported criticality safety violations at defense nuclear facilities and attempted to draw conclusions on trends and common causes from the data. Significant causes fell into three broad categories: poor conduct of operations, inadequate safety documentation, and equipment degradation. Inadequate training and management control could be assumed as root causes for a large percentage of the criticality safety violations. Continued effort is needed to limit the potential for a criticality event at defense nuclear facilities.

Electrical Safety

In 1998, DOE issued DOE-HDBK-1092-98, *Handbook on Electrical Safety.* The Board reviewed this document before it was issued, provided constructive comments, and encouraged its use complex-wide. In 2000 and 2001, the Board performed reviews at several DOE nuclear sites and noted that DOE was not giving appropriate consideration to the guidance in the handbook. The Board urged DOE to ensure that adequate electrical safety programs are in place at every defense nuclear facility. The Board was particularly concerned that many sites do not have a structured program for identifying existing noncompliant and nonlisted electrical equipment. Defective or improperly installed electrical equipment not only can pose an electrical safety risk to workers, but also can initiate facility fires and disable important safety equipment. DOE continues to make progress in addressing the Board's concerns; a formal response is expected in the first part of 2002.

Design Review: Hanford Spent Nuclear Fuel Project

The Board's review of the Hanford Spent Nuclear Fuel Project was documented in DNFSB/TECH-30, *Safety Review of the Hanford Spent Nuclear Fuel Project During the Design and Construction Phase*. This report described safety issues identified by the Board and means for resolution. The Board stated in a March 2001 letter to DOE that the lessons learned presented in this report should be applied to ongoing projects throughout the defense nuclear complex. These lessons include implementation of QA, preoperational testing, phased preparation of safety analysis reports, and conduct of design reviews.

4.3 TECHNICAL COMPETENCE

The Board continued to assess, and to seek an improvement in, the competence of key safety personnel at defense nuclear facilities. During 2001, DOE improved the quality of its Facility Representatives, but outside of this accomplishment, progress has been minimal at best. The technical workforce at DOE may be severely depleted by retirements over the next few years, yet DOE is failing to take steps necessary to acquire and train young talent. A study submitted by DOE to the Office of Management and Budget indicated that the average age of DOE employees is 48; only 9 percent are under the age of 35, and only 6 percent of technical employees are under the age of 35. DOE has failed to use adequately the excepted service hiring authority it has been granted by Congress to attract bright young engineers and scientists to the federal workforce. Unless these policies are reversed, DOE may find itself within a very few years at the mercy of its contractors, and be unable to do anything more than provide funds for critical national security missions.

The need to improve technical expertise within DOE is nothing new. More than 20 years ago, a DOE report noted that both DOE Headquarters and field offices suffered from a lack of highly competent technical people assigned nuclear responsibilities. Since then, numerous other internal and external reports have called attention to this major deficiency.

The Board's Recommendation 93-3 and DOE's Implementation Plan resulted in some corrective actions, but the spirit of the recommendation was never adequately carried out. DOE applied for and obtained excepted appointment authority—yet has not filled the positions it was allotted. Human resources managers at DOE have been unenthusiastic about solving this endemic problem. The Board is hopeful that recent changes in the leadership of the DOE Technical Capability Panel will give renewed life to overcoming the challenges.

Actions and initiatives in this area during 2001 included:

- At Y-12, the Board identified deficiencies in the contractor's program for certification of fissile material handlers and weaknesses in controlling the actions of workers who had not completed their qualifications/certifications. DOE reinstated proper controls over these workers, and approximately 150 fissile material handlers have now been properly reclassified and completed their certifications.

- In June 2001, the Board conducted a review of the institutionalization of the Federal Technical Capability Program at the Albuquerque Operations Office (ALO), the Kirtland Area Office (KAO), and the Los Alamos Area Office (LAAO). This review disclosed that the technical qualification program in these offices continues to languish. In a subsequent letter to DOE, the Board suggested that LAAO and KAO may not be adequately staffed to handle their mission requirements and safety management functions, and that DOE management did not appear to be fully committed to hiring the highly qualified technical personnel needed.

- In response to a letter from the Board asserting that LLNL displayed inadequate understanding of authorization basis requirements, the laboratory strengthened the capability of the staff of the Nuclear Material Technology Program devoted to planning and controlling nuclear activities.

- Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, urged DOE to develop formal requirements for training and qualification of competent subject matter experts for vital safety systems (system engineers) in both federal and contractor organizations. As part of its response to this Recommendation, DOE issued a significant modification to DOE Order 420.1, *Facility Safety*, defining responsibilities and training requirements for contractors' system engineers. DOE also revised Order 433.1, *Maintenance Management Program for DOE Nuclear Facilities*, to include requirements for establishing a system engineer program for the management of vital safety systems. The Board continues to emphasize to DOE the importance of assigning qualified system engineers for vital safety systems. However, many of the commitments included in DOE's Implementation Plan for Recommendation 2000-2 are significantly overdue. In a July 2001 letter to the Board, DOE committed to expediting actions on these key commitments.

5. INFORMING THE PUBLIC

The Board keeps the public informed of its work through public meetings, quick responses to public requests for documents, effective responses to public inquires into health and safety issues, outreach activities of the Board's Site Representatives, and an Internet website.

5.1 PUBLIC MEETINGS

During 2001, the Board conducted five public meetings at its Washington, D.C., headquarters. Two of these meetings focused on the Board's follow-up of DOE's Implementation Plan for Recommendation 95-2, *Safety Management*, and the status of DOE's implementation of Recommendation 98-1, *Resolution of Safety Issues Identified by DOE Internal Oversight*. The remaining three meetings addressed quality assurance within DOE nuclear defense facilities.

5.2 RESPONDING TO PUBLIC REQUESTS

The Board responded to numerous public requests for documents and information during 2001. The Board also responded to 21 requests filed under the Freedom of Information Act (FOIA). The average response time was 9 working days as compared with the statutory requirement of 20 working days. The Board has posted on its website a complete list of FOIA requests processed since the beginning of 1997.

5.3 EVENTS OF SEPTEMBER 11, 2001

As the tragic events of September 11 unfolded, the Board took immediate actions to protect its staff and to ensure the continuity of operations. Within an hour after the attacks on the World Trade Center and the Pentagon, the Board created a command center within its headquarters facility, instructed employees to move to safe areas of the building away from windows, and created a crisis management team. In the days that followed, the Board adopted additional safety and security measures, in coordination with other federal agencies when appropriate.

In October 2001, after the first instances of anthrax infection were made public, the Board concluded that it could be a target for this form of assault and took a series of actions to reduce the risk to employees. Mail was opened in a separately ventilated area, and all employees involved in the processing of incoming mail were put on preventive antibiotics. The Board requested that the Centers for Disease Control and Prevention test the mail room facility and established new procedures for the safe handling of incoming mail. These included developing and rehearsing an emergency response procedure to be used if the presence of a dangerous substance was suspected. Similar to other federal agencies, the Board was subject to delays in

receiving mail that was being processed in post offices subject to anthrax attack. Accordingly, two and three month delays resulted in receiving and responding to written inquiries.

The Board has from its inception taken very seriously its obligation to inform the public of safety issues at defense nuclear facilities. The Board has made every effort to provide information to the public promptly through public hearings and access to documents in the Board's public reading room, and by request under FOIA. New national security concerns now exist regarding the potential value of information on defense nuclear facilities to enemies of the United States. The Board will continue to make every effort to provide documents to requesters in a timely manner. However, the Board, in cooperation with DOE, must ensure that the release of requested documents will not damage the security of the nation. By law, the Secretary of Energy has the responsibility to determine what information furnished to the Board may, for security reasons, be denied to other persons.

5.4 INQUIRIES INTO HEALTH AND SAFETY ISSUES

The Board often receives information regarding potential safety problems from private citizens or from employees at defense nuclear facilities. The Board treats these matters with the utmost seriousness by assigning members of its legal and technical staff to investigate or inquire further. These inquiries, which may involve interviews, review of documents, and site visits, are continued until the Board is able to reach a technical judgment on the issues raised. If the Board finds that safety problems exist, it takes prompt action to inform DOE and closely monitors DOE's corrective actions. In cases where the Board receives information on matters outside its jurisdiction, such as alleged criminal activities, it refers the information to the appropriate federal agency for action.

During 2001, the Board directed inquiries into health and safety issues at DOE Headquarters, Oak Ridge, LANL, SRS, and Mound. The Oak Ridge inquiry led to significant improvements in the coordination of area emergency response resources being in place prior to the events of September 11. The Mound inquiry resulted in institution of improved radiological work controls. The Board also assisted former workers and their families in obtaining information and assistance from DOE concerning possible health effects attributable to work at defense nuclear facilities.

5.5 SITE REPRESENTATIVE OUTREACH ACTIVITIES

Prior to 2001, the Board had established site offices at five major DOE sites: SRS, Y-12, Pantex, Hanford, and RFETS. In 2001, the Board established a sixth site office at LANL. Members of the Board's technical staff assigned to these site offices are resident representatives of the Board.

An important function of these site representatives is to serve as the Board's liaison with the local community. This function is accomplished through a variety of interactions with local citizens and organizations. These interactions include attendance and presentations at citizen advisory board meetings; presentations to leaders of local organized labor and to city, county, and federal elected officials or their staffs; discussions with state regulatory officials; and responses to inquiries from local citizens and the media.

Through daily interactions with DOE and its contractors at the sites, the Board's site representatives provide in-depth information to the Board, amounting to continuous oversight of site activities. Observations by site representatives are documented in a weekly site representative report that is posted on the Board's website (www.dnfsb.gov) for public access. The weekly reports from the six site offices are an important outreach tool for informing the public of the Board's activities.

APPENDIX A

RECOMMENDATION 2001-1

APPENDIX B
TECHNICAL REPORTS ISSUED IN 2001

***Criticality Safety at Department of Energy Defense Nuclear Facilities*, DNFSB/TECH-29 (February 2001)**. Excerpt from the cover letter to Secretary Abraham:

> During the past year, the staff of the Defense Nuclear Facilities Safety Board (Board) performed reviews of criticality safety programs at four Department of Energy (DOE) sites: Savannah River Site, Oak Ridge Y-12 Plant, Rocky Flats Environmental Technology Site, and the Hanford Reservation. The Board's staff reviews followed, and were complementary to a similar series of reviews sponsored by the DOE Deputy Assistant Secretary for Oversight (EH-2). Observations from the Board's staff reviews are documented in the enclosed technical report.

***Safety Review of the Hanford Spent Nuclear Fuel Project During the Design and Construction Phase*, DNFSB/TECH-30 (February 2001)**. Excerpt from the cover letter to the Acting Assistant Secretary for Environmental Management:

> The Board previously forwarded a technical report, DNFSB/TECH-17, *Review of the Hanford Spent Nuclear Fuel Project*, October 1997, addressing the schedule problems associated with the SNFP at Hanford. Since DNFSB/TECH-17 was issued, the Board's staff has continued its reviews of the project to ensure that safety problems are identified and addressed expeditiously and effectively. The results of these reviews are described in the enclosed technical report, DNFSB/TECH-30, *Safety Review of the Hanford Spent Nuclear Fuel Project During the Design and Construction Phase*, November 2000.

***Engineering Quality into Safety Systems*, DNFSB/TECH-31 (March 2001)**. Excerpt from the cover letter to Secretary Abraham:

> The Defense Nuclear Facilities Safety Board (Board) has on a number of occasions, during the past several years, urged the Department of Energy (DOE) to upgrade its programs for ensuring reliability and operability of structures, systems, and components serving vital nuclear safety functions at defense nuclear facilities. DOE's Quality Assurance (QA) program is central to that effort. Departmental assessments of the status and effectiveness of implementation are currently underway. The Board is planning a series of public meetings on the subject of nuclear quality assurance (NQA). The first is scheduled for March 28, 2001. Our objective is the gathering of information that may be useful in planning a path forward to enhance effectiveness of DOE's QA program. Enclosed for consideration of those in DOE with nuclear safety responsibilities is technical report, DNFSB/TECH-31, Engineering Quality into Safety Systems.

APPENDIX C
CORRESPONDENCE

The Board's 2001 letters are organized below in two ways, first by strategic plan area and second by site or facility. Some letters pertain to more than one strategic plan area or site; in these cases the letter is listed only once.

I. STRATEGIC AREAS LIST

Strategic Area of Planning I: Complex-wide Issues

March 5 letter to Secretary Abraham forwarding DNFSB/TECH-29, *Criticality Safety at Department of Energy Defense Nuclear Facilities*, dated February 2001.

April 10 letter to Secretary Abraham on an accident dose calculations (95th percentile methodology).

May 29 letter to Secretary Abraham requesting a report on DOE line management chain of authority and responsibility.

June 21 letter to Secretary Abraham formally closing Recommendation 90-2.

June 21 letter to Secretary Abraham forwarding a staff issue report on the DOE's electrical safety program.

July 18 letter to the Deputy Secretary of Energy commending the Facility Representative Program.

July 20 letter to Secretary Abraham on Recommendation 97-2, *Criticality Safety.*

August 14 letter to the Acting Assistant Secretary for Environment, Safety and Health on the pilot Phase II assessments of confinement ventilation systems at Savannah River Site.

October 10 letter to the Deputy Secretary of Energy forwarding a staff issue report on review of workforce analyses, technical qualification program, and facility representative training.

November 5 letter to the Deputy Secretary of Energy forwarding a staff issue report on support facilities needed during emergencies at the Los Alamos National Laboratory.

November 8 letter to Secretary Abraham on DOE's commitment to integrated safety management.

December 18 letter to Secretary Abraham on Recommendation 2000-2, *Configuration Management, Vital Safety Systems.*

Strategic Area of Planning II: **Safe Management and Stewardship of Nuclear Weapons Stockpile and Components**

January 8 letter to the Deputy Administrator for Defense Programs forwarding a staff issue report on integrated hazard analysis review at the Lawrence Livermore National Laboratory.

January 23 letter to the Administrator of the National Nuclear Security Administration forwarding a list of unresolved issues at the Y-12 National Security Complex.

January 22 letter to the Manager, Albuquerque Operations Office, project engineering and safety basis development at the Los Alamos National Laboratory forwarding a staff issue report on design and construction projects at the laboratory.

January 26 letter to the Manager, Albuquerque Operation Office forwarding a staff issue report on authorization bases at the Los Alamos National Laboratory.

January 30 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on proposed changes to lightning controls for W87 stockpile life extension program at Pantex.

February 27 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on reauthorization of W76 and W88 assembly and disassembly and inspection at Pantex.

March 5 letter to the Administrator of the National Nuclear Security Administration on the Pantex Enhanced Transportation Cart Project Plan.

March 15 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on review of the maintenance program at the Y-12 National Security Complex.

March 29 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on tritium operations and emergency hazard assessment activities at the Los Alamos National Laboratory.

April 30 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on integrated hazard analysis review at the Y-12 National Security Complex.

May 29 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on material storage facilities at the Y-12 National Security Complex.

June 21 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on review of Pantex fire protection basis for interim operation.

June 21 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on hazard analysis and procedural requirements at Pantex.

June 22 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on review of lightning protection controls at Pantex.

June 28 letter to the Administrator of the National Nuclear Security Administration on the review of W88 assembly, and disassembly at Pantex.

June 28 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on National Nuclear Security Administration's readiness assessment of the new disassembly campaign at the Y-12 National Security Complex.

July 17 letter to Acting Deputy Administrator for Defense Programs forwarding a staff issue report on the Joint Actinide Shock Physics Experimental Research (JASPER) facility at the Nevada Test Site.

July 20 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on review of approved container program at Pantex.

September 25 letter to the Acting Deputy Administrator for Defense Programs on concerns about the justification for continued operations for W88 activities at Pantex.

September 25 letter to the Administrator of the National Nuclear Security Administration on the safety of canned subassemblies at Pantex.

September 25 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on the Hydrogen Fluoride Supply System at theY-12 National Security Complex.

October 15 letter to Under Secretary of Energy, Science and Environment, adequacy of safety controls and supporting safety analyses for Environmental Management activities at Oak Ridge.

November 26 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on follow-up review of maintenance program at theY-12 National Security Complex.

Strategic Area of Planning III: Safe Disposition of Hazardous Remnants of Weapons Production

January 8 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on fire protection program at the Fernald Environmental Management Project.

March 5 letter to the Acting Assistant Secretary for Environmental Management forwarding DNFSB/TECH-30, *Safety Review of the Hanford Spent Nuclear Fuel Project During the Design and Construction Phase* dated February 2001.

March 21 letter to the Acting Assistant Secretary for Environmental Management forwarding a staff issue report on the americium/curium stabilization project at the Savannah River Site.

March 23 letter to Secretary Abraham on DOE stabilization plans to meet commitments for Recommendations 94-1 and 2000-1.

March 23 letter to the Acting Assistant Secretary for Environmental Management forwarding a staff issue report on safety management during thermal stabilization activities in Building 707 at the Rocky Flats Environmental Technology Site.

April 10 letter to Secretary Abraham on an accident dose calculation (95th percentile) methodology.

May 3 letter to the Acting Assistant Secretary for Environmental Management on DOE stabilizing and repackaging plutonium in accordance with DOE-STD-3013.

May 3 letter to the Acting Assistant Secretary for Environmental Management forwarding a staff issue report on the resolution of technical issues in support of waste feed delivery at the Hanford Site.

May 10 letter to the Acting Assistant Secretary for Environmental Management forwarding a staff issue report on the final design review of the Melton Valley Transuranic Waste Project at the Oak Ridge National Laboratory.

May 24 letter to Secretary Abraham on DOE's response to the Board's Recommendation 2001-1.

May 29 letter to Secretary Abraham on DOE plan for use of the Savannah River canyons.

May 29 letter to the Acting Assistant Secretary for Environmental Management on plans to stabilize americium and curium solutions in F-Canyon at the Savannah River Site.

May 29 letter to the Acting Assistant Secretary for Environmental Management forwarding a staff issue report on electrical and instrumentation and control systems for the Savannah River Site L-Area Experimental Facility.

June 7 letter to Secretary Abraham on the plutonium stabilization and packaging system in Building 371 at the Rocky Flats Environmental Technology Site.

July 20 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on electrical and instrumentation and control systems, HB-Line Phase II at the Savannah River Site.

July 30 letter to Secretary Abraham forwarding a staff issue report on salt processing at the Savannah River Site.

August 14 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on facility disposition activities at the Hanford Site.

September 6 letter to the Administrator of the National Nuclear Security Administration on preparations for the Phase I Uranium-233 Inspection and Repackaging Program at Oak Ridge.

September 25 letter to the Assistant Secretary for Environmental Management on the revised safety basis for the 242-16H evaporator being prepared to restart operation at the Savannah River Site.

October 2 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on review of facility evaluation board findings, emergency preparedness, waste processing, and spent fuel movement at the Idaho National Engineering and Environmental Laboratory.

October 2 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on feedback and improvement programs at the Hanford tank farms.

November 21 letter to Secretary Abraham on nuclear materials stabilization programs responding to Recommendations 94-1 and 2000-1.

II. SITE/FACILITY LIST

Fernald Environmental Management Project

January 8 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on fire protection program.

Hanford Site

March 5 letter to the Acting Assistant Secretary for Environmental Management forwarding DNFSB/TECH-30, *Safety Review of the Hanford Spent Nuclear Fuel Project During the Design and Construction Phase*.

April 10 letter to Secretary Abraham on an accident dose calculation (95th percentile) methodology.

May 3 letter to the Acting Assistant Secretary for Environmental Management on DOE stabilizing and repackaging plutonium in accordance with DOE-STD-3013.

August 14 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on facility disposition activities.

October 2 letter to the Assistant Secretary for Environment Management forwarding a staff issue report on the feedback and improvement program at the Hanford tank farms.

Idaho National Engineering and Environmental Laboratory

October 2 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on review of facility evaluation board findings, emergency preparedness, waste processing, and spent fuel movement.

Lawrence Livermore National Laboratory

January 8 letter to the Deputy Administrator for Defense Programs forwarding a staff issue report on integrated hazard analysis review.

Los Alamos National Laboratory

January 22 letter to the Manager, Albuquerque Operations Office, project engineering and safety basis development forwarding a staff issue report on design and construction projects.

January 26 letter to the Manager, Albuquerque Operation Office forwarding a staff issue report on authorization bases.

March 29 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on tritium operations and emergency hazard assessment activities.

November 5 letter to the Deputy Secretary of Energy forwarding a staff issue report on support facilities needed during emergencies.

Nevada Test Site

July 17 letter to Acting Deputy Administrator for Defense Programs forwarding a staff issue report on the Joint Actinide Shock Physics Experimental Research (JASPER) facility.

Oak Ridge

January 23 letter to the Administrator of the National Nuclear Security Administration forwarding a list of unresolved issues at the Y-12 National Security Complex.

March 15 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on review of the maintenance program at the Y-12 National Security Complex.

April 30 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on integrated hazard analysis review at the Y-12 National Security Complex.

May 10 letter to the Acting Assistant Secretary for Environmental Management forwarding a staff issue report on the final design review of Melton Valley Transuranic Waste Project at the Oak Ridge National Laboratory.

May 29 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on material storage facilities.

June 28 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on National Nuclear Security Administration's readiness assessment of the new disassembly campaign at the Y-12 National Security Complex.

September 6 letter to the Administrator of the National Nuclear Security Administration on preparations for the Phase I Uranium-233 Inspection and Repackaging Program at Oak Ridge.

September 25 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on the Hydrogen Fluoride Supply System at the Y-12 National Security Complex.

October 15 letter to Under Secretary of Energy, Science and Environment, adequacy of safety controls and supporting safety analyses for Environmental Management activities at Oak Ridge.

November 26 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on follow-up review of maintenance program at the Y-12 National Security Complex.

Pantex

January 30 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on proposed changes to lightning controls for W87 stockpile life extension program.

February 27 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on reauthorization of the W76 and W88 assembly and disassembly and inspection.

March 5 letter to the Administrator of the National Nuclear Security Administration on the Enhanced Transportation Cart Project Plan.

June 21 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on review of Pantex fire protection basis for interim operation.

June 21 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on review of the W78 hazards analysis and procedural requirements.

June 22 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on review of lightning protection controls.

June 28 letter to the Administrator of the National Nuclear Security Administration on the review of W88 assembly, and disassembly.

July 20 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on review of approved container program.

September 25 letter to the Acting Deputy Administrator for Defense Programs on concerns about the justification for continued operations for W88 activities.

September 25 letter to the Administrator of the National Nuclear Security Administration, safety of canned subassemblies at Pantex.

Rocky Flats Environmental Technology Site

March 23 letter to the Acting Assistant Secretary for Environmental Management forwarding a staff issue report on safety management during thermal stabilization activities in Building 707.

June 7 letter to Secretary Abraham on the plutonium stabilization and packaging system in Building 371.

Savannah River Site

March 21 letter to the Acting Assistant Secretary for Environmental Management forwarding a staff issue report on the americium/curium stabilization project.

May 29 letter to Secretary Abraham on DOE plan for use of the canyons.

May 29 letter to the Acting Assistant Secretary for Environmental Management on plans to stabilize americium and curium solution in F-Canyon.

May 29 letter to the Acting Assistant Secretary for Environmental Management forwarding a staff issue report on electrical and instrumentation and control systems for the L-Area Experimental Facility.

July 20 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on electrical and instrumentation and control systems for HB-Line Phase II.

July 30 letter to Secretary Abraham forwarding a staff issue report on salt processing.

September 25 letter to the Assistant Secretary for Environmental Management on the revised safety basis for the 242-16H evaporator being prepared to restart operation.

APPENDIX D
ADMINISTRATIVE ACTIVITIES

HUMAN RESOURCES

The Board has assembled a professional staff of exceptional technical capability. Staff members' expertise covers all major aspects of nuclear safety: nuclear, mechanical, electrical, chemical, and structural engineering, as well as physics and metallurgy. Most mid- to senior-level technical staff members possess practical nuclear experience gained from duty in the United States Navy nuclear propulsion program, the nuclear weapons field, or the civilian nuclear reactor industry. Both the Board and its staff include individuals experienced in environmental impact assessments and regulatory processes. Two of the Board's attorneys have technical degrees, and one is a licensed professional engineer.

Ten technical staff members are located at priority DOE sites. There are two Site Representatives each at the Pantex Plant near Amarillo, Texas; at the Hanford Site near Richland, Washington; at the Savannah River Site near Aiken, South Carolina; and at the Oak Ridge Reservation near Oak Ridge, Tennessee. There is one Site Representative at the Rocky Flats Environmental Technology Site near Boulder, Colorado, and one at Los Alamos National Laboratory in New Mexico.

The Board expects its engineers and scientists to maintain the highest level of technical knowledge, encouraging them to improve their skills continually through academic study. Currently, 92 percent of the staff hold advanced degrees, 30 percent of which are at the Ph.D. level. Younger technical staff members have been recruited through the Board's professional development program. Entry-level employees recruited into this 3-year program receive graduate-school education and intensive on-the-job training guided by experienced technical mentors. Currently, there are eight entry-level employees in this program. Two completed their master's degrees in the summer of 2001 and are in their third-year field assignment. By the summer of 2002, three more of these individuals should be awarded a master's degree in an engineering discipline. The Board's professional development program remains extremely useful in attracting and retaining high-quality entry-level engineers and preparing them for challenging assignments in their fields.

The Board continues to attract and retain a highly qualified workforce. Several factors contribute to this success, including continued use of excepted service flexibilities in pay compensation, appointing authorities, and recruitment strategies. The Board has made full use of recruitment/relocation bonuses and relocation allowances to attract and retain quality candidates and employees. The Board plans to continue its recruitment of engineering students through its Professional Development Program to compensate for attrition, and recently implemented a summer internship program for high caliber juniors and seniors. These programs function as a feeder pool for full-time entry-level positions. Students

receive salaries competitive with those in the private sector, a technical mentor, structured technical assignments, vacation, sick leave, and other benefits.

INFORMATION TECHNOLOGY AND SECURITY

The Board has continued to make improvements to the information technology (IT) resources it provides to its staff. Desktop hardware and software are continually upgraded to ensure the Board has the latest tools available. Centralized project management software is being introduced to help track the status of ongoing projects.

Improvements in IT resources have also allowed the Board to provide expanded services to the public. The Board's public website has been completely redesigned. The new format makes it easier for the public and other interested parties to locate documents. An expanded career opportunities section has been added so that the website can become one of the Board's primary recruiting tools. The redesigned website is also compliant with Section 508 of the Rehabilitation Act, making it possible for visually impaired persons to navigate the site. In addition, the Board expanded its use of media streaming technology and broadcast its two most recent public meetings live over the Internet in streaming format.

The Board has also placed a heightened emphasis on IT security. Even before the terrorist attacks of September 11th, the Board was evaluating IT security. Based on the results of an in-depth analysis of the existing IT security program, the Board has initiated numerous upgrades. These include updating the Board's existing perimeter defenses; enhancing and centralizing the Board's anti-virus capability; improving and integrating the Board's incident handling capability with those of other federal agencies, such as the Federal Computer Incident Response Center and the National Infrastructure Protection Center; and evaluating the use of two-factor authentication devices to provide stronger user authentication.

STAFF

As of December 31, the Board employed 91 full-time staff in addition to the four Board Members. The Board continued its aggressive recruitment program to attract the brightest engineering students from colleges and universities across the country, as well as experienced engineering professionals. This year, technical recruiters visited 15 campuses and seven career fairs, and the Board expanded its outreach program to include recruitment efforts through the National Society of Black Engineers and the Mexican-American Engineers and Scientists.

DISPUTE RESOLUTION PROGRAMS

The Board, like other federal agencies, is required by the Administrative Dispute Resolution Act of 1996 to provide an alternative dispute resolution program for use in resolving appropriate disputes.

During 2000, the Board established such a program, making innovative use of cooperative agreements with other agencies to provide alternative dispute resolution services for the resolution of disputes most economically.

MEMORIAL AWARD

The Board was pleased to learn that the American Academy of Health Physics (AAHP) voted to establish a new award to be known as the Joyce P. Davis Memorial Award. Ms. Davis, a member of the Board's staff, was a senior health physicist and a key contributor to the Board's health physics oversight program during the 1990s. Future recipients of this award will have demonstrated the extraordinary qualities exemplified by Ms. Davis, distinguishing themselves through long-standing professional service to the AAHP and through their ethical behavior and interpersonal skills.

APPENDIX E
LIST OF ABBREVIATIONS AND ACRONYMS

AAHP	American Academy of Health Physics
ALO	Albuquerque Operations Office
CD	Command Disablement
CSS	Criticality Safety Support Group
DOE	Department of Energy
EOC	Emergency Operations Center
EUO	Enriched Uranium Operations
FOIA	Freedom of Information Act
GPRA	Government Performance and Results Act
HEPA	High-Efficiency Particulate Air
HEU	Highly Enriched Uranium
HLW	High-level Waste
INEEL	Idaho National Engineering and Environmental Laboratory
ISM	Integrated Safety Management
IT	Information Technology
JASPER	Joint Actinide Shock Physics Experiment Research
KAMS	K-Area Materials Storage
KAO	Kirtland Area Office
LAAO	Los Alamos Area Office
LANL	Los Alamos National Laboratory
LEF	L-Area Experimental Facility
LLNL	Lawrence Livermore National Laboratory
NCSD	Nuclear Criticality Safety Documents
NNSA	National Nuclear Security Administration
NTS	Nevada Test Site
ORP	Office of River Protection
ORNL	Oak Ridge National Laboratory
PDCF	Pit Disassembly and Conversion Facility
PFP	Plutonium Furnishing Plant
QA	Quality Assurance
RFETS	Rocky Flats Environmental Technology Site
RH-TRU	Remote-Handled Transuranic
SNFP	Spent Nuclear Fuel Project
SNL	Sandia National Laboratories
SRL	Special Recovery Line
SRS	Savannah River Site
SS-21	Seamless Safety for the 21st Century
SURF	Sandia Underground Reactor Facility
TEF	Tritium Extraction Facility
TRU	Transuranic

USQ	Unreviewed Safety Question
WIPP	Waste Isolation Pilot Plant
YAO	Y-12 Area Office
Y-12	Y-12 National Security Complex
^{232}U	Uranium-232
^{233}U	Uranium-233