



Fiscal Year 2003 Performance Report

**Submitted Under Provisions of the
Government Performance and Results Act**

**Defense Nuclear Facilities
Safety Board**

March 2004

INTRODUCTION

The Defense Nuclear Facilities Safety Board (Board) is an independent Federal agency established by Congress in 1989. Broadly speaking, the Board's mandate under the Atomic Energy Act is to provide safety oversight of the nuclear weapons complex operated by the Department of Energy (DOE). The nation's nuclear weapons program continues to be a complex and hazardous activity, under which DOE must maintain readiness of the nuclear arsenal, dismantle surplus weapons, dispose of excess radioactive materials, and clean up surplus facilities. These operations not only involve existing facilities, but also require new facilities of sophisticated design and function. All of these activities must be carried out in a manner that protects the public, the workers, and the environment.

The Board's contribution to the safety of DOE's defense nuclear activities derives from four basic types of activities. First, the Board evaluates DOE's organization policies and processes to ensure that fundamental safety requirements necessary to undertake highly hazardous operations exist at DOE. These reviews evaluate topics such as technical competence of DOE and contractor personnel, adequacy of safety requirements and guidance, and the presence of a strong safety culture. The space shuttle Columbia tragedy and the subsequent report by the Columbia Accident Investigation Board clearly point out the safety significance of deficiencies in these areas and the need for safety organizations, such as the Board, to emphasize reviews of this type. The Board plans this type of oversight in advance and those plans are generally not affected by unanticipated changes in DOE's plans or activities.

The second major type of safety oversight activity performed by the Board is the evaluation of actual hazardous activities and facilities in the field. These reviews focus on identifying the hazards attendant with DOE's mission activities and evaluating the controls put in place to mitigate those hazards. The Board plans for these types of reviews based on the risk, complexity, maturity, and significance of the activities underway or planned by DOE. However, unanticipated changes in DOE's plans or new, emergent information, can and do change the priority of the Board's oversight in this area. The Board continuously seeks to be proactive and to focus DOE's attention on the most significant safety issues present in the defense nuclear complex at any given time. Therefore, because the priority of safety issues can change rapidly, the Board cannot always predict in advance what activities it will review or what safety outcomes it will ultimately achieve.

Third, the Board provides expert-level reviews of the safety implications of DOE's actions, decisions, and analyses. It is extremely important that the Board provide DOE with independent evaluations of the technical quality and safety impacts of DOE's decisions and actions. For example, well-intended actions by DOE managers can have significant unintended negative consequences if they are based on faulty, inadequate, or misunderstood information. The Board attempts to be proactive in conducting these types of reviews, but it is necessary that DOE first develop at least preliminary plans with sufficient detail to allow for a meaningful technical review. Therefore, it is not possible for the Board to plan its efforts in this important area explicitly in advance. The Board does allocate resources to this form of oversight, and does report the significant outcomes that result from such oversight in its Performance Reports.

The last major type of oversight performed by the Board is the identification of new safety issues that were otherwise unknown in the DOE complex. Since, by definition, these safety issues would not have been addressed without the Board's efforts, this may be the area in which the Board has the largest impact on the safety of DOE's highly hazardous operations. However, by their very nature, it is impossible to plan for these emergent safety issues in advance. The effectiveness of this type of safety oversight activity relies exclusively on the expertise of the Board and its staff. The Board's ability to identify previously unknown safety issues is constrained by the Board's limited resources.

The Board uses its Strategic Plan and Annual Performance Plan to ensure that its limited resources remain focused on the most significant safety challenges and the DOE activities that warrant the most external review. All of the Board's safety activities are closely tied to goals and objectives embodied in these plans. This approach gives the Board confidence that its small staff (fewer than 100, including Board Members) and budget (less than \$20 million per year) are dedicated to the highest-risk activities under the Board's jurisdiction. The Board's Strategic Plan may be viewed in its entirety on the Board's internet website at www.dnfsb.gov.

The information in this Government Performance and Results Act (GPRA) Report is also provided directly to Congress in the Board's statutorily required Annual Report, also available on the Board's website. There are slight differences between the two reports because the Annual Report covers calendar year (CY) 2003 rather than fiscal year (FY) 2003. Both of these reports are prepared by the Board without any contribution from contractors.

Overall Outcome: Using its expert knowledge, the Board has complied with its statutory mission to ensure that public and worker health and safety are adequately protected at DOE defense nuclear facilities and met its performance goals for FY 2003. In a few cases noted in the report, additional safety improvements sought by the Board have not yet been fully achieved by DOE. The Board is pursuing these safety improvements in FY 2004.

SAFETY GOALS AND OBJECTIVES

In November 2003, the Board updated its Strategic Plan to focus its efforts for the remainder of this decade. However, the performance objectives for fiscal year 2003 were based on the previous version of the Board's Strategic Plan. That plan comprised the three safety goals described below and seven subordinate objectives that are explained in more detail in the following pages.

- 1. Complex-Wide Health and Safety Issues.** Integrated safety management (including comprehensive health and safety requirements, technically competent personnel, and effective implementing mechanisms) continues to evolve through feedback and improvement, and is implemented in all life cycle phases—design and construction, startup, operation, and decommissioning.
- 2. Safe Stewardship of 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.
- 3. 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 the workers, the public, and the environment.

Comparison of Fiscal Year 2003 Actual Performance with Planned Performance

The following pages provide detailed information comparing the Board's actual performance driving safety improvements at DOE to its plans for fiscal year 2003.

GOAL 1. COMPLEX-WIDE HEALTH AND SAFETY ISSUES

Integrated safety management (including comprehensive health and safety requirements, technically competent personnel, and effective implementing mechanisms) continues to evolve through feedback and improvement, and is implemented in all life cycle phases—design and construction, startup, operation, and decommissioning.

OBJECTIVE 1-A: IMPROVEMENT AND INTEGRATION OF HEALTH AND SAFETY DIRECTIVES

The Board and its staff will verify that new and revised DOE directives contain adequate requirements for the protection of the health and safety of the workers and the public. During the strategic planning period, the Board will review and assess proposed new DOE health and safety directives and safety-significant modifications to existing directives. When DOE issues new or modified health and safety directives after addressing the Board's comments, the directives will be in an enhanced form, resulting in improved safety through standardized requirements and guidance that provide for adequate protection of the health and safety of workers and the public.

FY 2003 Performance Goal

In its review of DOE's ongoing biennial review cycle of its directives, the Board and its staff will continue to assess the adequacy of those directives to ensure that any proposed revisions are appropriate and adequate. The results of reviews completed by the Board and its staff will be provided to DOE for consideration and action.

The Board anticipates that approximately 30 DOE directives will require review, of which two or three are likely to have major significance. For those few in this category, significant effort by the Board and its staff is expected to be needed to ensure satisfactory resolution of identified issues.

DOE's program for the maintenance and upgrading of its directives is expected to have reached a stage of relative maturity by FY 2003, particularly those directives aimed at integrated safety management. The Board and its staff will continue to scrutinize proposed changes in requirements and guidance set forth in DOE's directives program to ensure that there is no reduction in their rigor. In this regard, the Board and its staff will be especially attentive to those requirements and guidance associated with facility safety during operation and in post-operation activities, especially in the content of authorization basis documentation for new facilities or those undergoing major renovation or mission changes.

As a result of these reviews, new or modified health and safety directives will be issued in an enhanced form, resulting in improved safety through standardized requirements and guidance that provide for adequate protection of the workers and the public.

FY 2003 Performance

Board efforts to achieve this objective involved expert-level review of many technical directives and standards. This activity involves most, if not all, of the Board's technical and legal staffs. The wide variety of directives and standards to be assessed requires a multi-disciplined team and is one of the most resource intensive activities the Board conducts.

Review of New and Revised Directives. As required by law, the Board reviewed all new and revised directives proposed by DOE that impact health and safety requirements for the defense nuclear complex, for the purpose of improving the content, clarity, and consistency of safety requirements and guidance. In FY 2003, the Board reviewed 79 such directives. At the end of the year, 12 directives remained under review by the Board. Examples of the Board's achievements are described below:

- **Worker Protection Management.** The Board worked closely with DOE to revise the requirements in Change 1 to DOE Order 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*. **Outcome: DOE issued an updated directive that included important new biological agent protection requirements developed in response to increased homeland security awareness.**
- **Electrical Safety.** The Board has long urged DOE to take a proactive stance to ensure adequate electrical safety, using its *Electrical Safety Handbook*. In July 2003, the Board informed DOE that the proposed revision of the handbook deleted much of the important technical content. In response, DOE formed an Electrical Safety Group to rewrite the handbook, as well as to develop a general framework for DOE electrical safety training programs, to improve electrical safety programs across the complex. **Outcome: DOE changed its plans and retained important electrical safety guidance such as standards for grounding and bonding of electrical installations and electrical preventive maintenance in its *Electrical Safety Handbook*.**
- **Environment, Safety and Health Reporting.** During FY 2003, the Board worked closely with DOE to consolidate and revise the various DOE reporting orders into a single directive. **Outcome: A consolidated directive with specific reporting criteria, which is key to maintaining a strong feedback and improvement program across the defense nuclear complex, is being implemented.**
- **National Nuclear Security Administration (NNSA) Policy Letters.** During FY 2003, NNSA instituted an internal system of directives. The Board's review found that the system architecture had not been adequately described, the directive being issued was potentially in conflict with existing DOE directives, and the system did not satisfy all of the conditions required by law. **Outcome: NNSA acknowledged the Board's issue and suspended use of the system. The Board is working closely with NNSA to design a system that will meet the needs of NNSA, while protecting the integrity of the environment, safety, and health requirements already established by DOE.**

DOE's Systematic Review of All Directives. In 2001, DOE initiated an internal review to determine whether the requirements in DOE Orders were consistent with its current intent to focus on performance objectives. The Board reviewed the proposed changes and determined that two significant issues remained outstanding, the first involving a proposed relaxing of requirements for accident investigations, and the second, a reduction in the applicability of DOE Orders to defense nuclear facility contracts. **Outcome: DOE has recognized the Board's safety issues and is working with the Board to resolve them.**

Unreviewed Safety Question (USQ) Procedures. The USQ process required by 10 CFR 830.203 is the mechanism for ensuring that the safety basis for a defense nuclear facility is not invalidated by undocumented or unauthorized changes. In 2003, the Board reviewed seven USQ procedures and identified significant deviations from the governing requirements. DOE subsequently required substantial revisions to the procedures and demanded that contractors submit them for approval. **Outcome: Changes to important safety documents and safety controls, which previously could have been made unilaterally by the contractors, now require DOE approval at sites such as Hanford and Lawrence Livermore National Laboratory.**

OBJECTIVE 1-B: TECHNICAL COMPETENCE

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

FY 2003 Performance Goal

The Board and staff will conduct the following type of assessments:

- Assess whether competence is commensurate with assigned responsibilities for key safety personnel at defense nuclear contractor organizations involved in such areas as, but not limited to, fire protection engineers, system engineers, or radiation protection personnel.
- Investigate the integration of human factors engineering principles with respect to the design, operation, and maintenance of defense nuclear facilities, and with emphasis on implementation, use, appropriateness, and effectiveness of administrative controls in lieu of safety-class passive design features and engineered safety features. Site reviews will be conducted to provide specific details regarding the status of human factors engineering issues in the DOE complex.
- Assess the effectiveness of DOE's project manager qualification program at DOE headquarters office and DOE sites, including its depth and level of technical rigor.
- Evaluate the degree to which DOE and its contractors have implemented measures to ensure a viable criticality safety infrastructure, including progress toward qualification of contractor criticality safety engineers, through DOE site reviews.

Results of assessments will be communicated to DOE to enhance understanding of safety-related roles and responsibilities in support of DOE's execution of functions associated with protecting the workers and the public, and to help DOE to upgrade the quality of its technical workforce.

FY 2003 Performance

To fulfill this objective the Board evaluated numerous programs and specific qualification requirements that set DOE's expectations for the knowledge, skills, and abilities it requires of its workforce. The Board conducted extensive field evaluations to ensure that DOE's written expectations are being achieved. This effort requires significant time and attention from the Board's technical staff and its Site Representatives.

Technical Qualifications of DOE Personnel. During 2003, the Board provided extensive comments on 16 new/revised Functional Area Qualification Standards. DOE's Federal Technical Capabilities Panel is working closely with the Board in its effort to bring about a major upgrade in the knowledge, skills, and abilities among DOE technical personnel. **Outcome: Specific guidance designed to improve the technical qualifications of DOE personnel in functional areas such as electrical safety, radiation protection and nuclear explosive safety has been issued to the defense nuclear complex.**

System Engineers and Federal Subject Matter Experts. In Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, the Board urged DOE to develop requirements for training and qualification of subject matter experts in vital safety systems ("system engineers"). In 2003, the Board determined that the effectiveness of site contractors' systems engineer programs varied significantly. Also, the staffing of Federal and contractor positions for subject matter experts and systems engineers was incomplete, and qualification programs were inadequately enforced. DOE is now attempting to fill vacant, vital technical positions, and focus senior management attention and resources on this effort. **Outcome: Additional System Engineers are being trained at defense nuclear sites to ensure that safety systems operate and are maintained appropriately.**

Training and Qualification of NNSA Contractor Personnel. The Board found that the Pantex Plant and other NNSA sites were not fulfilling safety-related training requirements and requested that NNSA determine whether adequate assessments were being performed across the complex. NNSA's subsequent review discovered that three NNSA sites, in addition to Pantex, were not in compliance with the scope and periodicity of required reviews. Therefore, NNSA developed a number of corrective actions for Pantex and committed to conducting the required reviews by the end of June 2004. **Outcome: Safety-related training of operators such as nuclear weapon production technicians at the Pantex Plant and nuclear material handlers at the Los Alamos National Laboratory (LANL) is being improved.**

Administrative Controls. DOE and its contractors have developed a significant number of safety-related administrative controls to ensure safety. However, the Board noted that many administrative controls have not been developed with the same reliability as would be expected from an analogous safety-related engineered feature. Therefore, the Board issued Recommendation 2002-3, *Requirements for the Design, Implementation, and Maintenance of Administrative Controls*. In response, DOE has begun to implement a plan to strengthen the guidance and expectations associated with the development of administrative controls, stressing the importance of human factors engineering, and to upgrade, where necessary, the existing set of administrative controls to ensure that these revised expectations are being met. **Outcome: DOE has issued improved guidance for field use in the form of a Nuclear Safety Technical Position, and developed the initial draft of a formal standard to define an acceptable process to be used in designing and maintaining administrative controls. Implementation of this guidance should make administrative safety controls more effective and more reliable.**

Nuclear Criticality Safety Program. The Board continued to stress the need for stable funding for future nuclear criticality safety program elements, particularly when funding to the program was cut. Throughout 2003, the Board conducted a comprehensive review of the results obtained through DOE's implementation of the Board's Recommendation 97-2, *Continuation of Criticality Safety at Defense Nuclear Facilities*. The Board determined that nuclear criticality safety had improved but that continuing attention was required to ensure that DOE maintains a focus on this important safety issue. **Outcome: DOE has committed to continue to stress criticality safety through a formal program of evaluations and an annual report of problems and corrective actions. The DOE funding levels projected for the next five years in the latest draft Nuclear Criticality Safety Program Plan appear adequate and stable.**

Development and Implementation of Safety Controls. The Board's reviews of safety bases throughout the DOE complex identified a number of instances where unjustified assumptions and methodologies were used. For example, some analyses did not consistently use bounding input assumptions and implicitly credited non-qualified plant equipment. These deficiencies led to safety analyses that may not have bounded the actual hazard conditions for the facilities concerned. In response, DOE and its contractors have taken explicit corrective actions. **Outcome: Safety controls throughout the DOE complex that prevent or mitigate accidents are being improved, including identification of adequate controls for the tank farms at the Hanford Site, the Plutonium Facility at Lawrence Livermore National Laboratory (LLNL), and the Waste Isolation Pilot Plant.**

DOE Project Manager Qualification Program. The Board reviewed and commented on several key qualification standards: *Construction Management Functional Area Qualification Standard, Civil/Structural Engineering Functional Area Qualification Standard, Technical Program Manager Functional Area Qualification Standard*. DOE is in the process of incorporating the Board's comments. **Outcome: Project management qualification standards are being strengthened to improve overall DOE project management and ensure that major DOE projects are designed and constructed to protect the safety of the public and the work force.**

OBJECTIVE 1-C: COMPLEX-WIDE IMPLEMENTATION OF INTEGRATED SAFETY MANAGEMENT IN FACILITY DESIGN, CONSTRUCTION, OPERATION, AND POST-OPERATION.

The Board and its staff will verify the effective and expeditious development and implementation of DOE's Integrated Safety Management (ISM) program.

During the strategic planning period, the Board will review the development and implementation of DOE's ISM program, including the effectiveness of DOE's feedback and improvement function. Needed improvements will be communicated to DOE, and this information will be used to continually upgrade the quality of the safety management program. The Board will also review design and construction activities, including technical project management, criteria development, design preparation, and construction, and identify any issues that require resolution to provide adequate protection of workers and the public. Candidates for review will be based on relative hazards and on DOE's schedule for and progress on the candidate facilities. An adequate approach and schedule for the resolution of issues identified by the Board will be established to support safe startup and operation of new or modified defense nuclear facilities.

FY 2003 Performance Goal

The Board and its staff will continue its reviews of DOE's implementation of ISM in design and construction, operation, and post operation activities, as well as ongoing efforts to make ISM more effective. Candidates for review include:

- Assess the adequacy of DOE's review of Title I/II design, resolution of significant design safety issues, the implementation of quality assurance requirements during facility construction, and the procurement of safety significant facility equipment. Candidate facilities for these activities include the Tritium Extraction Facility and the Pit Disassembly and Conversion Facility at the Savannah River Site.
- Activity-level ISM implementation at sites with performance indicators judged to have higher than expected rates of abnormal occurrences related to worker protection.
- The quality and effectiveness of at least one ISM review by the DOE Office of Oversight, and the implementation of line oversight of ISM per DOE Policy 450.5 at one Environmental Management (EM) site and one NNSA site.
- Assess the adequacy and comprehensiveness of root cause determinations of operating events at DOE facilities. Emphasis will be placed on evaluating the prioritization and implementation of the corrective actions with respect to the relative risk significance of the findings which were identified.

- Evaluate the reliability and availability of important safety systems with respect to equipment aging concerns. The evaluation will occur through several site reviews to assess site-specific issues associated with equipment availability and reliability from an aging perspective.
- Assess the adequacy of the updates to the analysis of the natural phenomenon hazards (e.g., earthquakes, tornados, floods) mandated by DOE Order 420.1, *Facility Safety*, and associated guides and standards at the Y-12 National Security Complex (Y-12).

As a result of these reviews, DOE needs to provide an adequate approach and schedule for resolution of identified issues that supports safe start-up and operation of new or modified defense nuclear facilities.

FY 2003 Performance

The effort to achieve this objective is rapidly becoming one of the most significant demands on the Board's resources. Effective safety oversight of the design and construction of several complex, unique and hazardous facilities at the same time requires many experts with a wide range of technical disciplines. In addition, changes in DOE's design and construction plans impact the Board's oversight plans and the use of its resources. The Board's staff, and particularly its Site Representatives, observe DOE activities on a continuing basis and identify issues for improvement. Most of these safety improvements are implemented quickly and do not require the time or attention of senior DOE managers.

Hanford Waste Treatment Plant (WTP) Hydrogen Generation. The Board determined that hydrogen generation rates from high-level waste in the WTP were not adequately understood and that WTP personnel were not providing enough attention to this significant safety issue. Unanticipated hydrogen generation during waste processing could lead to an explosive quantity of hydrogen. The Board requested that DOE develop the needed technical basis for hydrogen generation during waste processing. DOE accepted the issue and developed a research plan to understand the issue better. **Outcome: DOE has acknowledged the significance of this issue and is working to develop an understanding of hydrogen generation in order to adequately control hydrogen accumulation and prevent a hydrogen explosion.**

Hanford WTP Site Seismic Characterization. To ensure the adequacy of the WTP structures to withstand an earthquake, the characteristics of the geologic formations under the structure must be understood. The Board expressed its concern about DOE's understanding of the geology near the plant and suggested that DOE develop site-specific seismic attenuation relationships to properly characterize the geological formations for the WTP. **Outcome: DOE accepted the issue and proposed a plan to characterize the geologic formations in areas adjacent to the Waste Treatment Plant site. The Board is currently reviewing this plan to ensure that it provides an adequate geological characterization to support seismic evaluation of the structures.**

WTP Electrical Design. The Board found numerous design deficiencies during reviews of the electrical equipment for the WTP. Most significantly, the design did not consider radiation impact on electrical cabling. The Board issued a letter dated March 7, 2003, describing each issue and requested that DOE take appropriate corrective action to resolve the issues. **Outcome: The design of the electrical equipment in the plant has been improved to enhance safety. For example, DOE agreed to either qualify the cable for high radiation areas, reroute the cables out of high radiation areas, or adopt a routine cable replacement plan.**

Highly Enriched Uranium Materials Facility (HEUMF) Confinement Ventilation. The Board questioned the adequacy of the design of the HEUMF ventilation system to protect the public, workers, and environment at Y-12. The Board also identified safety problems with the form and packaging requirements for long-term storage of uranium at HEUMF. DOE agreed and subsequently modified the confinement ventilation system design. **Outcome: DOE modified the ventilation system design to improve confinement and revised its requirements to ensure that highly enriched uranium is stored and confined in standardized, robust forms and containers.**

HEUMF – Geotechnical Engineering. The Board determined that the structural design of the HEUMF was started without a complete understanding of the geology and subsurface conditions of the proposed construction site and without the necessary studies to predict the seismic loads during an earthquake. Also, the proposed foundation fill material had not been tested and the response of this material under earthquake loading was unknown. DOE agreed with these issues and has now completed the required studies and changed the foundation fill design. **Outcome: DOE agreed with the issues, completed the required studies and changed the foundation fill design. These actions provide increased assurance that the building can withstand the design basis earthquake.**

Suspect/Counterfeit Items. The Board observed that DOE had failed to determine whether potentially non-conforming aluminum parts heat-treated by Temperform USA were installed in safety-related applications. The Board also observed that systemic failures had occurred in DOE programs established to prevent the introduction of suspect/counterfeit parts into safety-related applications. In response, DOE formalized programs and responsibilities for issues involving suspect/counterfeit parts. **Outcome: DOE has confirmed that potentially non-conforming aluminum parts are not installed in safety-related applications and has improved its program to identify and eliminate suspect/counterfeit parts.**

Software Quality Assurance. The Board issued Recommendation 2002-1, *Quality Assurance for Safety-Related Software*, after it found that rigorous quality assurance principles had not been applied in the development and application of safety-related computer codes and programs. In response, DOE has begun to implement a plan to ensure that safety-related software codes have been validated, verified, and can provide reliable information for use in safety applications. **Outcome: The quality of computer-generated safety information and control functions is being increased and assured.**

Design Requirements and Guidance for Facilities. The Board noted that the design requirements for nuclear facilities in DOE Order 420.1, *Facility Safety*, and its associated guidance documents were not being implemented at Los Alamos National Laboratory. Such requirements and guidance are important for properly selecting discipline-specific industry codes and standards for safety-class and safety-significant structures, systems and components. **Outcome: NNSA developed complete crosswalks between the codes and standards in the implementation guide and those in the appropriate contractor documents such as design manuals, design criteria, and procedures. Contractors are updating their internal requirements and guidance documents. Therefore, design standards used to ensure safety of hazardous activities are being applied more consistently and appropriately.**

Tritium Extraction Facility (TEF) Design. The Board conducted extensive design reviews of TEF at the Savannah River Site (SRS) as the project progressed from initial conception to final design. In 2003, the Board provided comments to DOE including a concern about the need to ensure that workers can escape from process rooms in the event of an earthquake. DOE addressed the Board's concerns and developed a program to test a seismic alarm in a nearby operational tritium facility. **Outcome: DOE has tested a new alarm system and has subsequently proven its adequacy. This alarm system will now be used to protect workers at TEF when it becomes operational.**

Pit Disassembly and Conversion Facility (PDCF) Design. The Board continues to review the PDCF Title II design. The Board identified that the main structure of the PDCF Processing Building was designed to survive the design basis earthquake, however, many of the fire barriers between some fire zones are not designed to withstand this earthquake. A full-facility fire could result from this design inadequacy. In a May 13, 2003 letter, the Board urged DOE to consider upgrading the design of the fire barriers to withstand the design basis earthquake, eliminating the potential for a full-facility fire. **Outcome: The Board has met with DOE several times to discuss the rationale for upgrading the fire barriers. To date, the Board and DOE have not reached agreement and are continuing to review this issue.**

Hoisting and Rigging. The proper planning for and conduct of lifting tasks is an important element of nuclear operations safety at defense nuclear facilities. In 2003, the Board identified problems with the safety of hoisting and rigging activities at Pantex concerning equipment design, reliability, maintenance, and training. **Outcome: As a result of the Board's review, DOE and its contractor made substantial safety improvements in this program. This has significantly improved the safety of lifting nuclear explosives at Pantex.**

Integrated Safety Management Annual Update Process. In 2003, the Board continued to oversee the implementation and effectiveness of ISM at defense nuclear facilities. For example, the Board evaluated the efforts of the Energy Facility Contractor's Group (EFCOG) to improve ISM and assessed the updated ISM systems at several sites. The Board noted substantial improvements in the operations of the Bechtel Jacobs Company (BJC) at Oak Ridge National Laboratory (ORNL). **Outcome: DOE is increasing its focus on annual ISM system description updates to ensure continuous improvement in Integrated Safety Management, particularly by BJC at ORNL.**

Activity Level Work Planning. The Board has been emphasizing the importance of ensuring that hazards are identified and controlled, that work is performed in a careful manner in accordance with the safety controls, and that DOE use appropriate feedback mechanisms to ensure continuous improvement at the individual activity level. The concept of ISM is particularly well suited to ensuring safety at the activity level. In 2003, the Board focused attention on the implementation of ISM at the activity level by conducting a number of site-specific safety reviews. Significant deficiencies were revealed in the methods used to implement ISM at Pantex, LLNL, and LANL. **Outcome: DOE and NNSA have acknowledged the deficiencies at each of these sites and are working closely with the Board as they define and implement corrective actions.**

Recommendation 2000-2. Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, addressed the degrading condition of safety systems, calling upon DOE to assess the condition of vital safety systems. In response, DOE completed detailed reviews of vital safety systems throughout the defense nuclear complex. These reviews identified degraded equipment to be repaired, as well as associated administrative programs (such as drawing control) that needed improvement. As a result of the Board's recommendation, DOE is working to ensure that the Federal and contractor workforce is adequately trained and qualified to conduct periodic reviews of vital safety systems, verifying that these systems are operational and remain reliable. **Outcome: DOE reviews uncovered weaknesses in the operability of several safety systems, leading to further evaluation and repairs. DOE is in the process of formulating corrective actions under close oversight by the Board.**

GOAL 2: SAFE STEWARDSHIP OF 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.

OBJECTIVE 2-A: SAFE CONDUCT OF STOCKPILE MANAGEMENT

The Board and its staff will verify the safety of DOE's defense nuclear facilities and activities relating to the maintenance, storage, and dismantlement of the nuclear weapons stockpile.

FY 2003 Performance Goal

The Board and its staff will conduct assessments of DOE's efforts to develop and implement safety management systems for stockpile management activities. The Board's evaluations will be split between DOE efforts to develop safety systems (e.g., system and process designs, safety bases, control schemes, and administrative programs) and DOE efforts to implement aspects of safety management systems. These reviews will focus on activities at the Pantex Plant, Y-12 National Security Complex, and Savannah River Site tritium facilities. Candidate areas for Board and staff review include:

- Site-wide and facility-specific safety analyses and controls identification and implementation for nuclear weapon activities (e.g., safety analysis reports developed in response to 10 CFR 830).
- Weapon-specific safety analyses and controls identification and implementation for nuclear weapon activities (e.g., the W62 and the W78).
- Start-up of highly enriched uranium processing activities at the Y-12 National Security Complex (e.g., secondary extraction).
- Nuclear Explosive Safety Studies at Pantex (e.g., the W62, special purpose facilities, and on-site transportation).
- Crosscutting functional areas at the Pantex Plant, Y-12 National Security Complex, or SRS tritium facilities (nuclear criticality safety, fire protection, nuclear explosive safety).
- Special studies of unique or significant hazards at DOE weapons facilities (e.g., process technology alternatives).

While performing its reviews, the staff will assess the effectiveness of ISM implementation and the safety controls identified for ongoing operations as well as any new weapon system dismantlement projects at the Pantex Plant or Y-12 National Security Complex that start in FY 2003.

FY 2003 Performance

The Board's efforts to achieve this objective are focused on field-level reviews and assessments. The Board, its headquarters staff, and its Site Representatives review operations at DOE's weapons-related sites and laboratories on a continuing basis.

Nuclear Criticality Safety Controls at Y-12. The Board urged NNSA to standardize storage conditions, requirements, postings, and containers to better ensure that facility operators understood and were able to comply with criticality safety requirements. DOE reduced the amount of stored nuclear materials and began an initiative to standardize fissile material storage containers. **Outcome: The likelihood of a criticality accident is reduced because criticality safety controls are now simpler, more standardized, and more reliable.**

Nuclear Explosive Safety at Pantex. For several years, the Board has urged DOE to simplify and expedite its SS-21 process¹ for the re-engineering of nuclear explosive operations at Pantex. In 2003, DOE completed the start-up of the SS-21 process for W62 Disassembly and Inspection Program and the W88 Bay operations; SS-21 is now being applied to the W78, B83, W87, and B61 weapon programs. **Outcome: Tooling, equipment, and processes have been improved so that operations involving nuclear explosives at Pantex are significantly safer.**

Readiness Review Processes. The Board has repeatedly warned NNSA that concurrent Nuclear Explosive Safety Studies (NESS) and readiness reviews at Pantex strain contractor resources and hamper the effectiveness of both safety reviews. In response, NNSA made changes to its NESS Process Guide to better coordinate these two reviews. **Outcome: Hazardous operations are now more thoroughly evaluated for safety before they are started.**

Highly Enriched Uranium Processing Fire Protection. The Board questioned the adequacy of the fire safety provided by the sprinkler system in Building 9212 at Y-12. In response, NNSA evaluated the existing sprinkler system against modern requirements and assessed various methods to resolve the safety issue. In the interim, DOE restricted the quantities of combustible organic liquids permitted in the unsprinklered part of the building. **Outcome: NNSA has taken steps to reduce the likelihood of a fire and started a project to upgrade fire protection that includes providing a fire sprinkler system to parts of Building 9212.**

¹SS-21 is the preferred protocol for weapons assembly and disassembly at Pantex. It is designed to achieve controlled interactions of the weapon, personnel, facility, tooling, and equipment at all stages of the operation.

Plutonium Pit Repackaging. In response to Recommendation 99-1, DOE has continued to repackage pits at the Pantex Plant into sturdy containers suitable for interim storage. More than 8,600 pits have been repackaged to date. The associated container surveillance program has also been rejuvenated; the surveillance backlog was eliminated by the end of 2003. **Outcome: The potential for an accidental plutonium release has been reduced because pits are being stored in an improved and safer configuration.**

Unstable Nuclear Material Storage. As a result of a Board inquiry, NNSA determined that some depleted uranium chips had been stored in Building 9204-4 at Y-12 in an unsafe configuration for more than 10 years. DOE initiated measures to vent the storage drums and place the chips in a safe condition for long-term storage. Y-12 management also verified that there were no other similar storage deficiencies elsewhere at the plant. **Outcome: The potential for pressurized drums at Y-12 to rupture and spread nuclear material is being reduced and these materials are being stored in safer conditions.**

Nuclear Materials and Weapons Transportation Quality Assurance. The Board highlighted significant software quality assurance problems in the system used at Pantex to control on-site transportation of nuclear materials and nuclear explosives. In response, Pantex upgraded requirements for software quality assurance and took compensatory actions to improve the transportation program until the software system is strengthened. **Outcome: The safety of moving nuclear explosives at Pantex has been improved because Pantex upgraded requirements for software quality assurance and took compensatory actions to improve the transportation program until the software system is strengthened.**

OBJECTIVE 2-B: SAFE CONDUCT OF STOCKPILE STEWARDSHIP

The Board and its staff will verify the safety of DOE's defense nuclear activities undertaken to ensure the continuing effectiveness of the nuclear weapon stockpile in the absence of underground nuclear testing.

FY 2003 Performance Goal

The Board and its staff will conduct assessments of DOE's efforts to develop and implement safety management systems for stockpile stewardship activities. The Board will also cover DOE's efforts to address safety issues of aging-related changes in nuclear weapons components, including research and modeling, for weapon systems and components in the enduring stockpile. These reviews will focus on activities at Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the Nevada Test Site (NTS), and Sandia National Laboratories (SNL). Candidate areas for Board and staff review include:

- Site-wide and facility-specific safety analyses and controls identification and implementation for defense nuclear activities or facilities (e.g., safety analysis reports developed in response to 10 CFR 830).

- Work-planning process (e.g., activity-specific hazard analysis, controls identification, and implementation of safety controls).
- Plutonium pit manufacturing and certification at LANL.
- Preparations to dispose of damaged nuclear weapons or improvised nuclear devices at NTS.
- DOE/contractor operational readiness reviews or other readiness determinations.
- Design and construction of defense nuclear facilities (e.g., relocation of the TA-18 mission [the Los Alamos Critical Experiments Facility]) and the Sandia Underground Reactor Facility.
- Aging-related changes in nuclear weapons components for weapon systems in the enduring stockpile.
- Safety controls selected for hazardous weapons complex activities.
- Crosscutting functional areas at LANL, LLNL, NTS, and SNL.

While performing the above reviews, the Board and its staff will assess the effectiveness of ISM implementation for proposed and ongoing operations.

FY 2003 Performance

The Board's efforts to achieve this objective are focused on field-level reviews and assessments. The Board, its headquarters staff, and its Site Representatives review operations at DOE's weapons-related sites and laboratories on a continuing basis. Changes in DOE's plans and programs have had a significant effect in this area. For example, DOE had planned to build the Sandia Underground Reactor Facility. The Board conducted a thorough review of the plans and identified safety issues that DOE agreed needed resolution. DOE subsequently cancelled the project. The Board also expended considerable resources to evaluate a potentially hazardous classified experiment that was intended to support pit manufacturing and certification. DOE recently has deferred that experiment for several years.

Inadequate Safety Bases. The Board communicated to NNSA problems with the safety bases for the LLNL Plutonium Facility, the Hardened Engineering Test Facility, and the Material Management Source Vault. Subsequently, NNSA committed to resolving the safety issues raised by the Board as part of the facilities' new documented safety analyses. **Outcome: The understanding and control of hazards at LLNL nuclear facilities are being improved. For example, the tracking and control of hazardous chemicals within the plutonium facility has been improved.**

Hazardous Operations Work Planning. When the Board reviewed LANL's process for identifying hazards, writing controls, and authorizing work, it concluded that improvements were needed in the involvement of subject matter experts, training, and use of engineering standards. In response, LANL is revising its work planning requirements to correct these weaknesses. **Outcome: Work planning at LANL is now more structured, comprehensive, and standards-based, therefore, hazards are being identified and controlled more effectively.**

Plutonium-238 Chemical Processing. LANL has almost completed construction of an aqueous processing line for recovery of scrap Plutonium-238 (^{238}Pu). The Board found significant deficiencies in the safety basis and the proposed implementation of safety controls associated with the line. LANL and NNSA have corrected most of these deficiencies. **Outcome: Safety controls for the ^{238}Pu scrap recovery line such as those to mitigate a hydrogen explosion or an explosion of the ion-exchanger column have been added or improved.**

Laboratory Support of the Defense Nuclear Complex. To prevent the erosion of technical competence and to reemphasize the priority of work that directly supports nuclear safety, the Board issued, and DOE accepted, Recommendation 2002-2, *Weapons Laboratory Support of the Defense Nuclear Complex*. In 2003, DOE developed and the Board approved a plan to correct the safety issues raised in the recommendation. **Outcome: The priority of nuclear weapons work has been reemphasized and DOE is establishing a position at each relevant site office that will be responsible for tracking and ensuring closure of nuclear safety support requirements for weapon laboratories.**

Safety of Underground Testing Planning. The Board found that NTS lacked the qualified personnel, safety basis, and pretest procedures necessary to conduct safely an underground weapon test, should one become necessary. In response, NTS improved its capability. **Outcome: Knowledge and equipment needed to safely conduct an underground test have been enhanced to improve the safety of underground nuclear testing should the need arise.**

Readiness to Dispose of Damaged Nuclear Weapons or Improvised Nuclear Devices at NTS. The Board continued to highlight the need to develop the programs and infrastructure necessary at NTS to safely dispose of a damaged nuclear weapon or improvised nuclear device. During 2003, the Board reviewed safety basis developments, infrastructure improvements, practices, procedures, and training. The Board provided feedback on the developing safety basis and pointed out that the conduct and formality of operations needs to be improved significantly for use in nuclear explosive operations. **Outcome: NNSA is using appropriate data for the consequence analysis, has identified a broader scope of controls for the safety basis, is addressing conduct of operations, is developing specific procedures for disposition operations, and is conducting specific training activities.**

Start-up of the Joint Actinide Shock Physics Experimental Research Facility. The Board reviewed the readiness of the controls and configuration management at the Joint Actinide Shock Physics Experimental Research subcritical experiments at NTS prior to experiments with plutonium. In addition to the findings of the DOE review team, the Board identified training, qualification, and procedural issues. Also, the scope of DOE's review did not include significant hazardous operations. **Outcome: The scope of the review was expanded and the issues identified by the Board were addressed before authorizing plutonium operations.**

GOAL 3. 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 the worker, the public, and the environment.

OBJECTIVE 3-A: MATERIAL STABILIZATION

The Board and its staff will verify that DOE properly characterizes, stabilizes, processes, and safely stores surplus plutonium, uranium, and other actinides, residues, spent fuel, and wastes from the nuclear weapons program, and that DOE provides for expeditious disposal, as needed.

FY 2003 Performance Goal

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

- Stabilization, packaging, and storage of plutonium metal and oxide at Hanford and LANL (Recommendation 94-1/2000-1).
- Design of facilities for stabilization and packaging of plutonium metal and oxide at SRS (Recommendation 94-1/2000-1).
- Stabilization and disposal of plutonium-bearing solutions and residues at SRS and LANL (Recommendation 94-1/2000-1).
- Preparations for neptunium solutions stabilization at SRS (Recommendation 94-1/2000-1).
- Preparations for pretreatment and disposition of americium/curium solutions at SRS (Recommendation 94-1/2000-1).
- Characterization, stabilization, and packaging of uranium-233 (^{233}U) materials at Oak Ridge (Recommendation 97-1), as well as planning and preparations for processing of ^{233}U for potential medical applications.

- Stabilization and disposition of highly-enriched uranium solutions at SRS (Recommendation 94-1/2000-1).
- Design of the treatment facility for high-level waste liquids and salts at SRS (Recommendation 96-1), including pilot plant operations, and system improvements to ensure safe management of SRS high-level waste in the interim (Recommendation 2001-1).
- Design of facilities for treatment of high-level waste, and testing and operation of high-level waste retrieval and transfer systems at Hanford.
- Start-up of the Melton Valley transuranic/alpha waste treatment facility at Oak Ridge National Laboratory.
- Safety of spent nuclear fuel and sludge transfer and storage/stabilization operations at Hanford (Recommendation 94-1/2000-1).
- Safety of full throughput contact-handled and remote-handled transuranic waste operations at the Waste Isolation Pilot Plant (WIPP).
- Complex-wide legacy nuclear material issues, including evaluation of materials not addressed by Recommendations 94-1 and 2000-1 and utilization of stabilization capabilities.

FY 2003 Performance

The Board's efforts to achieve this objective are focused on field-level reviews and assessments. The Board, its headquarters staff, and its Site Representatives review operations at DOE sites on a continuing basis. This type of work, and these hazards, exist throughout the DOE defense nuclear complex. In addition, the complex, multi-site aspects of many waste treatment, storage, and disposal operations require that the Board expend additional resources to compare plans across sites to identify interface problems that could affect safety.

Plutonium Stabilization and Packaging. In Recommendations 94-1, *Improved Schedule for Remediation in the Defense Nuclear Facilities Complex*, and 2000-1, *Prioritization for Stabilizing Nuclear Materials*, the Board urged DOE to take action on nuclear materials, recognizing that unstable materials and undesirable storage conditions would worsen with time. In response, DOE completed the following risk reduction activities in FY 2003:

- Workers at Rocky Flats Environmental Technology Site (RFETS) completed stabilizing and packaging all of its plutonium metal and oxide into durable, sealed containers complying with DOE-STD-3013.
- Personnel at SRS started up plutonium oxide stabilization furnaces and a packaging system for its plutonium oxides and metals.

- Workers completed the stabilization and packaging of plutonium solutions, alloys, polycubes, and residues at the Plutonium Finishing Plant (PFP).
- PFP workers completed packaging of plutonium metal items in containers compliant with DOE-STD-3013, but weld porosity problems led DOE to conclude that 358 of the cans require further evaluation with digital radiography.

Outcome: The risk that hazardous nuclear materials could be released into the environment and harm workers and the public has been reduced by stabilizing and repackaging nuclear materials.

Stabilization Criteria for Plutonium Oxides. During FY 2003, the Board evaluated a Hanford proposal to stabilize plutonium oxides containing chloride salts at a lower temperature than established by DOE-STD-3013. This request was based on achieving technical equivalency with the standard's requirements for allowable moisture. The Board agreed with the revised process after DOE agreed to test the stabilized material for residual volatile compounds using the rigorous test conditions specified in DOE-STD-3013, instead of using the lower test temperature initially proposed by Hanford personnel. **Outcome: Stabilized plutonium oxides containing chloride salts are required to be tested to the same strict criteria as pure oxides before packaging for long-term storage.**

Inactive Nuclear Materials at NNSA Sites. In a response to the Board highlighting continued deficiencies in the NNSA's nuclear materials management program, NNSA formed an Inactive Actinides Working Group (IAWG) that is pursuing improvements. The Board's close oversight of this program spurred NNSA to release funds making it possible for Y-12 to begin disposing of material no longer needed to support site missions. **Outcome: Environment, safety, and health vulnerabilities are being reduced by the near-term disposition of combustibles contaminated with highly enriched uranium, highly enriched uranium residues, and excess depleted uranium.**

Highly Enriched Uranium at SRS. Operators at SRS met the commitment in the Recommendation 2000-1 Implementation Plan to begin blending down solutions of highly-enriched uranium solutions. The low-enriched uranium solution resulting from this activity is being shipped off-site for fabrication into fuel for commercial power reactors. **Outcome: Fissile material in solution form is being removed from SRS and put to beneficial use.**

Depleted Uranium at SRS. During approximately 40 years of plutonium production, a significant inventory of depleted uranium trioxide and metal accumulated at SRS. The Board urged DOE to correct unacceptable storage conditions and to develop an integrated plan for disposing of this excess material. DOE responded with a project plan to dispose of these materials. **Outcome: Overpacking of severely degraded drums now has been completed, and DOE is on track to dispose of more than 20,000 metric tons of excess depleted uranium from SRS by the end of 2004.**

Uranium-233 at ORNL. The Board found weaknesses in the documented safety analysis for the building used as the national repository for ^{233}U . The ORNL contractor agreed to revise the process used in the Documented Safety Analysis (DSA) for evaluating and screening toxicological and radiological hazards to comply with current standards; designate the high efficiency particulate air filters in the Vessel Offgas System as safety-significant equipment; add a Limiting Condition of Operation for operability of the Vessel Offgas System; and add a Technical Safety Requirement to ensure that the cell covers, which provide a safety-class function for radiological confinement, are in place. **Outcome: Improvements in the process for evaluating hazards and in the requirements applicable to the systems and controls essential to radiological confinement have improved storage safety for ^{233}U materials at ORNL.**

^{233}U in Sodium Fluoride Traps at ORNL. DOE is taking action in response to a letter issued by the Board regarding the safe storage of sodium fluoride traps. These vessels, which store ^{233}U hexafluoride recovered from the Molten Salt Reactor Experiment, are being subjected to increasing internal pressure from radiolytic gas production. **Outcome: ORNL is depressurizing the traps to improve the safety of these vessels.**

Special Isotopes at SRS. The Board reviewed DOE plans for a complicated inter-area transfer of 30,000 gallons of slurry containing 148,000 curies of americium and curium which required extensive coordination between F-Canyon, F-Area Tank Farms, and H-Area Tank Farms. The Board suggested safety improvements, and encouraged integrated test-runs with surrogate slurry materials. DOE incorporated the Board's comments into the control strategy and preparatory activities for the transfer. Based on DOE's present schedules, the Board plans to evaluate preparations for stabilization of neptunium solutions at SRS early in FY 2004. **Outcome: Numerous process control issues were identified and corrected during the test-runs that had been advocated by the Board. The americium/curium material was safely transferred to the high-level waste system, thus removing a major radiological hazard from F-Canyon.**

Hanford Spent Nuclear Fuel Project. During FY 2003, Hanford continued to make progress in removal of deteriorating spent nuclear fuel from the K-Basins. However, in its letter of March 7, 2003, the Board pointed out deficiencies in the contractor's preparations for startup of the system to transfer fuel between basins. DOE did not effectively address these problems and was subsequently unable to successfully commence removal of the 42 cubic meters of highly radioactive sludge in the basins. Subsequent reviews by the Board, DOE facility representatives, and independent contractors identified programmatic breakdowns in the areas of configuration management, conduct of engineering, conduct of design, project management, and project oversight. **Outcome: DOE has removed more than half the spent fuel from the K-Basins, and is working to develop an executable strategy for removing the sludge.**

Welding of Hanford Spent Fuel Containers. The spent nuclear fuel retrieved from the K-Basins is cleaned, dried, and sealed in Multi-Canister Overpacks (MCOs). When the Board suggested that the lack of capability to perform the required closure weld on the MCOs was a significant vulnerability, DOE chose to implement such a system. **Outcome: All MCOs in storage now have mechanical or welded seals which have passed the required leak tests.**

High-Level Waste Tank Integrity. Based on guidance provided by the Board, DOE modified the high-level waste tank inspection program at SRS to require ultrasonic inspection of all double-shell tanks instead of just a subset. At Hanford, DOE added corrosion inhibitors to double-shell tank 241-AN-107, as part of a DOE commitment to correct the chemistry for four double-shell tanks. **Outcome: The potential for high-level waste leaks is being reduced by improved tank chemistry and inspection programs.**

High-Level Waste Management at SRS. In 2003, the Board sought to reverse a marked and worrisome increase in inadvertent transfer events at the high-level waste tank farms. Causes included operator errors, inadequate procedures, and equipment malfunctions. With the Board's oversight, the tank farms' contractor developed corrective actions in conduct of operations, equipment conditions, and work practices to reduce the number of inadvertent transfer events. **Outcome: The risk of accidents due to inadvertent transfers was reduced through improvements in equipment condition and operations.**

High-Level Waste Treatment at SRS. The Board has cautioned DOE to avoid excessive reliance on optimistic predictions of unproven technologies and initiatives to dispose of high-level waste at SRS. Instead, the Board has encouraged DOE to systematically and realistically assess the technical and regulatory risks associated with its plans for disposing of salt waste, and to develop strategies to mitigate identified risks. The DOE Implementation Plan for Recommendation 2001-1, *High-Level Waste Management at the Savannah River Site*, required DOE to submit to the Board by August 2003 a programmatic risk analysis for the salt processing program as well as an evaluation of the progress on the saltcake disposition effort. **Outcome: DOE was unable to meet this deadline. The Board will continue to urge DOE to expedite completion of these tasks.**

High-Level Waste Management at Hanford. The Board reviewed the Documented Safety Analysis for high-level waste storage and transfer systems at Hanford, and provided comments to DOE. In response, DOE performed a more conservative calculation of the radiological consequences of a flammable gas accident scenario, and modified the Technical Safety Requirements for the tank farms to explicitly require the use of process control plans for activities that can induce a flammable gas release from the wastes. **Outcome: The safety basis and operational safety for tank farms operations improved.**

Hanford Transuranic Waste Retrieval. The Board's review of plans to retrieve 38,000 drums of transuranic waste from soil-covered trenches found that improved controls were needed to ensure that drums potentially pressurized with flammable gas were handled safely and promptly vented to prevent a deflagration. DOE subsequently directed the contractor to strengthen the controls for venting suspect drums. **Outcome: The risk of a fire involving drums of transuranic waste was reduced by ensuring that suspect drums were vented promptly after retrieval.**

Idaho National Engineering and Environmental Laboratory Transuranic Waste Retrieval. The Board determined that the Advanced Mixed Waste Treatment Project lacked an activity-based hazard analysis for the retrieval of transuranic waste containers. In response, DOE imposed a requirement that workers wear respirators. **Outcome: The use of respirators protected workers from airborne radioactivity during waste retrieval operations.**

Melton Valley Transuranic Waste Treatment Project. The Board reviewed the design and construction of the project's Waste Processing Facility and the preparation of its Documented Safety Analysis. The Board concluded that further evaluation of hands-on activities such as waste seal-out and contact maintenance was warranted due to the hazards posed by the high radioactivity of substantial portions of the wastes to be processed by this facility. These reviews were planned to take place during the contractor operational readiness review (ORR), DOE Oak Ridge line management assessment of readiness in late 2003, and DOE-Headquarters ORR in early 2004. **Outcome: The Board's review identified the need to evaluate the safety of certain hands-on operations during startup activities planned for FY 2004.**

Waste Isolation Pilot Plant. During 2003, WIPP received and deposited in the underground repository, more than 800 shipments totaling more than 8,000 cubic meters of waste. The Board monitored operations at WIPP to assure that worker safety would be protected as the facility moved toward full production. The Board also evaluated continuing preparations for the eventual disposal of higher-hazard, remote-handled transuranic waste at WIPP and provided DOE with a number of comments on the Preliminary Safety Analysis Report for that activity, notably on the functional classification of equipment and controls important to worker safety. **Outcome: WIPP continues to dispose of contact-handled transuranic waste safely; the Board will evaluate the Documented Safety Analysis for the disposal of remote-handled transuranic waste when it becomes available in FY 2004.**

OBJECTIVE 3-B: FACILITY DECOMMISSIONING

The Board and its staff will verify that DOE aggressively pursues the safe decommissioning of excess defense nuclear facilities that pose a significant risk to the workers or the public.

FY 2003 Performance Goal

The Board and its staff will conduct assessments of the adequacy of plans, standards, procedures, and execution for activities associated with decommissioning of DOE defense nuclear facilities. These assessments will be conducted using the principles of Integrated Safety Management to ensure that decommissioning efforts are performed safely. Additionally, the Board and its staff will continue efforts to confirm that high-risk facilities are decommissioned in a timely manner. These assessments are conducted in collaboration with State and other regulatory authorities, as needed, and on a schedule that supports DOE's operational plans. Representative areas for Board and staff review include:

- Plutonium Finishing Plant deactivation planning at Hanford.
- Building 371, 707, or 776/777 at Rocky Flats.
- Decommissioning activities at Mound and Fernald Environmental Management Projects.

- Building 9206 at Y-12 National Security Complex.
- Promulgation of lessons-learned and decommissioning techniques from sites where significant decommissioning activities have been accomplished.

FY 2003 Performance

Facility decommissioning is a dynamic activity. The hazards and safety controls at a single site, and even the size and composition of the workforce, can change dramatically during a short period of time. Therefore, the Board's efforts to achieve this objective focus on activity-level operations, hazards, and controls.

Rocky Flats Environmental Technology Site. The Board determined that poor fire protection practices, ineffective DOE oversight and inadequate work planning led to a fire in a highly contaminated glovebox at Rocky Flats. In response, DOE performed an immediate inspection for combustible materials in other gloveboxes, and both DOE and its contractor began developing broad corrective actions regarding the planning, execution, and safety oversight of decommissioning work. **Outcome: Improved implementation of controls on combustible materials reduces the likelihood of a serious fire at Rocky Flats. Improved work planning for hazardous operations makes decommissioning work at Rocky Flats safer by more effectively identifying hazards and corresponding safety controls.**

RFETS Filter Vandalism. The Board learned that high-efficiency particulate air filters at Rocky Flats had been damaged as the result of vandalism. The Board further determined that neither the manager of DOE's Rocky Flats Field Office nor appropriate personnel within DOE Headquarters were aware of the vandalism. DOE acted on the Board's information and took action appropriate to the seriousness of the event. **Outcome: DOE took action to discourage future unacceptable, intentional acts to damage safety-related equipment.**

DOE Ohio Field Office. DOE's Ohio Field Office is responsible for the cleanup of the Fernald and Mound sites. Work at these sites has been progressing on or ahead of schedule, but experienced DOE and contractor personnel are leaving as the completion date of 2006 draws near. The Board recognizes the need for DOE to consolidate resources as work at these sites is completed, but such consolidation cannot be allowed to reduce prematurely necessary Federal oversight of contractor work. The Board has informed DOE of this concern. **Outcome: DOE has acknowledged that this is a potential problem, but informed the Board that it believes it can show that the reduced Federal staff can perform adequate safety oversight of site closure work.**

Fernald Closure Project. The Board's review of work activities at the Fernald Closure Project showed that many of the contractor's managers believed that they had achieved adequate safety and that meeting the site closure schedule was the top priority despite an increase in reportable occurrences and near misses. Statistics also showed that new workers at the site were involved in a disproportionate share of the site's injuries. In response, DOE and the contractor took corrective actions including training field managers to emphasize accountability for safety performance, more closely examining the qualifications of new workers, and halting work on the Silos project and other decommissioning projects to evaluate safety issues and improve safety performance. The site contractor later terminated the main subcontractor on the decommissioning project and assumed responsibility for completing the remainder of the work. **Outcome: Reemphasis on safety performance, improved qualification of new workers, and replacement of the decommissioning subcontractor are expected to improve worker safety at the Fernald Closure Project.**

Building 9206 at Y-12. The Board urged NNSA to reduce the risk of unneeded hazardous and radioactive materials in Building 9206, particularly uranium-contaminated solutions in glass extraction columns. In response, Y-12 drained the secondary extraction columns and the bulk of the liquid in the primary extraction columns. **Outcome: The risks of legacy radioactive materials in Building 9206 have been reduced considerably.**

ATTACHMENT 1 ADDITIONAL INFORMATION

Evaluation of the Fiscal Year 2004 Performance Plan

No changes to the FY 2004 Performance Plan have been identified based on a review of actual results achieved in FY 2003.

Assessment of the Reliability and Completeness of Performance Data

The Board measures progress toward achieving the positive outcomes embedded in each of its annual performance goal in three stages, by evaluating:

- DOE's acknowledgment that a safety enhancement is needed after the Board communicates the results of its technical reviews.
- DOE's subsequent development of appropriate corrective actions to resolve the Board-identified safety issue.
- DOE's implementation of the necessary corrective actions, leading to the successful resolution of the safety issue and resulting in improved protection of the public, the workers, or the environment.

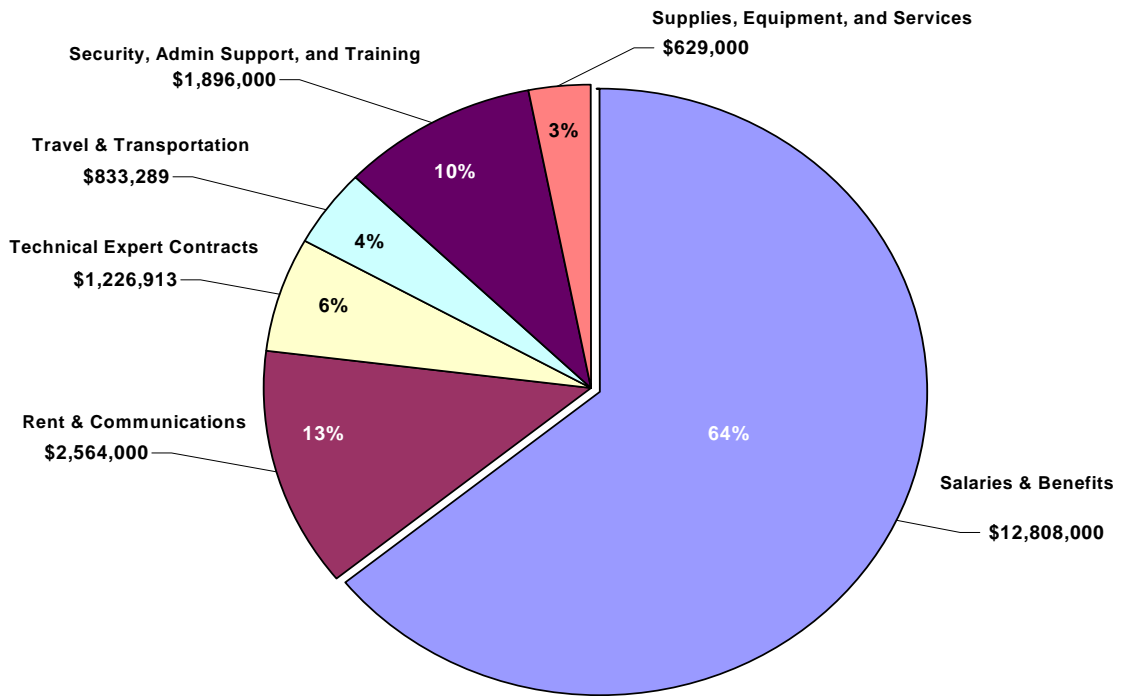
The basis of measurement for the qualitative assessment includes formal correspondence of DOE and its defense nuclear contractors; DOE and contractor public testimony; direct Board observations and review of technical information; and other sources. The Board did not conduct a program evaluation in FY 2003. The sources used by the Board to measure its outcomes are robust, varied, and independent. As such, the Board believes that the performance data used in this report are reliable and complete.

Budget Summary

To support the Board's public and worker health and safety oversight mission throughout the DOE nuclear weapons complex, the Board obligated \$19,957,000 during FY 2003.

As shown on the following pie chart, the Board's budget expenditures were used primarily to pay the salaries and benefits of its headquarters and field employees, who are responsible for achieving the accomplishments documented in this performance report.

FY 2003 Total Obligations = \$19,957,000



Actual Performance Results for Prior Fiscal Years

Detailed information demonstrating the Board's performance relative to its Strategic Plan and its Annual Performance Plans for the fiscal years 1999-2002 is available in previous year Performance Reports published on the Board's website at www.dnfsb.gov. The following tables provide abbreviated summaries and information concerning the Board's actual performance in FY 2000, FY 2001, and FY 2002.

GOAL 1 — Complex-Wide Health and Safety Issues

Objective 1–A:

Improvement and Integration of Health and Safety Directives. The Board and its staff will verify that new and revised DOE directives contain adequate requirements for the protection of the health and safety of the workers and the public.

Examples of FY 2000 Accomplishments

Chemical Management Handbook. The Board provided comments to DOE on the draft *Chemical Management Handbook*. The preliminary draft was unacceptable, lacking proper integration with integrated safety management concepts. As a result of suggestions from the Board, the rewritten handbook incorporates integrated safety management, the applicable DOE standards, and other government agency regulations to allow ease of contractor use.

Nuclear Explosive Safety. Following the issuance of DOE-DP-STD-3016-99, *Limited Standard, Hazard Analysis Reports for Nuclear Explosive Operations*, the Board helped the Pantex contractor prepare an Authorization Basis Manual that described in more detail the format and content of the Hazard Analysis Report, as well as the analytical process, in preparation for nuclear explosive operations. This significantly improved the quality of the authorization basis for nuclear explosive operations including clear identification of the necessary safety controls.

Integrated Safety Management. During 2000, DOE G 450.4-1, *Integrated Safety Management Guide*, was revised to incorporate a major new section on how to maintain a site's Integrated Safety Management system following initial implementation. Significant involvement of the Board was key to the development of the approach as well as the revision to DOE G 450.4-1. This new guidance ensures the sites' ISM systems are maintained current and continue to improve.

Examples of FY 2001 Accomplishments

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

Safety of Nuclear Explosive Operations. The Board made significant safety improvements to the DOE Orders associated with the safety of operations involving nuclear explosives: DOE Order 452.1B, *Nuclear Explosive and Weapon Surety Program*; and DOE Order 452.2B, *Safety of Nuclear Explosive Operations*.

Safety Management Functions, Responsibilities, and Authorities Manual. The Board provided specific suggestions for improvements to DOE Manual 411.1-1B, *Safety Management Functions, Responsibilities, and Authorities Manual*. These improvements strengthened the role of the DOE Office of Environment, Safety, and Health (EH). For example, the Board urged that EH be given the responsibility for approving alternative methodologies for safety analyses by DOE contractors when used instead of the "safe harbor" approaches provided in 10 CFR 830, *Nuclear Safety Management*.

Examples of FY 2002 Accomplishments

Natural Phenomena Hazards. The Board worked closely with DOE to revise criteria for design and evaluation of DOE facilities to withstand natural phenomena hazards such as earthquakes, storms, and floods. This effort culminated in an updated standard that meets the requirements of current building codes and industry standards.

Software Quality Assurance. The Board reviewed a new draft DOE Order, O-203.X, *Software Quality Assurance*, and suggested significant safety improvements. As a result of the Board's effort, DOE improved its understanding of the importance of software quality assurance to nuclear safety.

Facility Representative Program. The Board reviewed the qualification standard for DOE Facility Representatives (TRNG-0019, *Facility Representative Functional Area Qualification Standard*). As a result of the Board's efforts, this key standard was strengthened and issued expeditiously in April 2002.

GOAL 1 — Complex-Wide Health and Safety Issues

Objective 1–B:

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

Examples of FY 2000 Accomplishments

Criticality Safety Training. The Board continued to engage DOE in regard to the development of formal training and qualification for Federal and contractor criticality safety personnel resulting in the upgrade of DOE Order 420.1, *Facility Safety*, emphasizing this important aspect of criticality safety. Also, in response to Board concerns, DOE directed that criticality engineers increase the time spent observing work on the floor, and report these hours to headquarters and program offices responsible for the site.

Training Standards. Working closely with the Board and its staff, DOE has upgraded DOE Order 360.1A, *Federal Employee Training*, and DOE-STD-1063-2000, *Facility Representatives*, as elements of the revised Implementation Plan for Board Recommendation 93-3, *Improving DOE Technical Capability in Defense Nuclear Facilities Programs*. DOE further institutionalized its technical personnel processes with the issuance of DOE M 426.1-1, *Federal Technical Capability Manual*.

Examples of FY 2001 Accomplishments

Fissile Material Handlers. The Board's Site Representative identified deficiencies in Y-12's program for certification of fissile material handlers and in controlling the actions of workers who had not completed their qualifications/certifications. As a result, Y-12 reinstated proper controls over these workers and completed their certifications.

Project Management/Engineering. The Board identified a lack of qualified and experienced Federal personnel capable of managing design and construction of major nuclear projects at LANL and Y-12. The Board also found that DOE's local project engineering review process was inadequate to identify issues with quality assurance and safety implications. In response, NNSA implemented a corrective plan to ensure that safety is integrated in the design and construction of DOE nuclear projects.

System Engineers. The Board urged DOE to develop formal training and qualification requirements for both federal and contractor system engineers in response to Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*. As a result, DOE drafted a significant modification to DOE Order 420.1, *Facility Safety*, defining responsibilities and training requirements for contractor system engineers.

Examples of FY 2002 Accomplishments

Federal Technical Oversight of Safety Systems. In Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, the Board urged DOE to identify Federal expertise needed to ensure effective oversight of contractor safety systems. In response, DOE identified 31 additional personnel needed for this important function, and identified critical technical skill gaps in the areas of mechanical engineering, fire protection, electrical engineering, instrumentation and control, and nuclear criticality. DOE subsequently took action to recruit, train and qualify Federal employees for oversight of the vital safety systems.

Human Factors Engineering. The Board's review of the use of human factors engineering principles at Y-12 identified a high reliance on administrative controls in lieu of engineered fire protection features. The Board communicated specific concerns to DOE related to the use of administrative controls. As a result of the Board's effort, DOE is now working to improve its understanding and use of administrative controls.

Contractor Training and Qualification. The Board reviewed the safety basis and supporting programs of the Waste Examination Facility (WEF) at the Nevada Test Site and its readiness to begin operations as a Hazard Category 3 nuclear facility. The Board noted that the training and qualification program was not adequate to meet the requirements of nuclear facilities as addressed in 10 CFR Part 830, *Nuclear Safety Management*. DOE subsequently improved nuclear operations at the WEF.

GOAL 1 — Complex-Wide Health and Safety Issues

Objective 1–C:	<u>Complex-Wide Implementation of Integrated Safety Management in Facility Design, Construction, Operation, and Post-Operation.</u> The Board and its staff will verify the effective and expeditious development and implementation of DOE’s Integrated Safety Management (ISM) program.
Examples of FY 2000 Accomplishments	
<p>Tritium Extraction Facility. The Board identified that the preliminary TEF design did not implement the hierarchy of safety controls consistent with the site’s manuals of practice. There was an over-reliance on administrative controls being used instead of engineered safety features. DOE accepted the Board’s suggestions and improved the final design.</p> <p>Spent Nuclear Fuel Project. The Board’s reviews of the Hanford Spent Nuclear Fuel Project identified safety issues related to safety-related ventilation systems and electrical systems at the Cold Vacuum Drying Facility. DOE addressed these issues, including addition of a diesel generator to supply power to the safety significant ventilation fans.</p> <p>Pit Disassembly and Conversion Facility. The Board reviewed the PDCF design and identified that sand filters provide better resistance to severe accidents than do high efficiency particulate air filters. In response, DOE revised its design to use sand filters.</p> <p>ISM - Feedback and Improvement. In response to Board Recommendation 98-1, <i>Resolution of DOE Internal Oversight Findings</i>, DOE implemented a formal process for dealing with safety issues identified by DOE’s internal independent oversight organization. This resulted in a clearly defined, systematic, and comprehensive process for addressing and resolving these safety issues.</p>	
Examples of FY 2001 Accomplishments	
<p>Analysis Methodology. Several DOE contractors requested to use a methodology for identifying safety-class and safety-significant structures, systems and components, that was inappropriate compared to the approved process in DOE-STD-3009-94, <i>Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports</i>. The Board discouraged use of this alternate methodology. DOE agreed with the Board’s position and prohibited use of this alternate methodology.</p> <p>Recommendation 2000-2. Board Recommendation 2000-2, <i>Configuration Management, Vital Safety Systems</i>, called on DOE to address the degrading condition of safety systems. In response, DOE conducted detailed reviews of confinement ventilation systems at two facilities and identified safety issues to be corrected.</p>	
Examples of FY 2002 Accomplishments	
<p>Maintenance Programs. At the Hanford Site, a review of the maintenance program at the Spent Nuclear Fuel Project program identified weaknesses which threatened to delay the schedule for removing the fuel from the reactor basins. Similarly, at Y-12, reviews of the maintenance program identified programmatic weaknesses which significantly impaired the effectiveness of the program. In response, DOE improved activities which have strengthened both programs.</p> <p>Emergency Power. At LLNL, a review of the emergency power system in Building 332 disclosed a lack of understanding of system vulnerabilities. In response, the contractor made design and equipment changes that significantly increased the reliability of the system.</p> <p>Highly Enriched Uranium Materials Facility at Y-12. The Board’s review of the HEUMF design concluded that additional work was needed to accurately document the design bases and to specify the general design criteria and specific requirements for safety class systems. In response, DOE made immediate safety improvements to the building foundation design and changed the general design criteria to more adequately capture the appropriate codes and standards.</p>	

GOAL 2 — Safe Stewardship of Nuclear Weapons Stockpile and Components

Objective 2–A:

Safe Conduct of Stockpile Management. The Board and its staff will verify the safety of DOE’s defense nuclear facilities and activities relating to the maintenance, storage, and dismantlement of the nuclear weapon stockpile.

Examples of FY 2000 Accomplishments

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

Pantex Fire Protection. The Board highlighted to DOE that the fire detection system at Pantex was failing because the commercial vendor had stopped producing spare parts. As a result of the Board’s actions, DOE installed a fire detection system to activate the deluge system in the cells, greatly improving the fire safety of explosive operations in the area. Additionally, DOE started plans (in response to Recommendation 98-2) to accelerate replacement of the fire detection system with a non-proprietary system.

Canned Subassemblies. The Board noted that safety analyses at Pantex did not consider the potential damage resulting from exposure of canned subassemblies (CSAs – the fusion portion of a nuclear weapon) to fires. Further research by the Board identified a significant hazard at Pantex that was not considered by the site or the Design Agency. Controls were subsequently enhanced to ensure that they were adequate to protect the CSAs.

Examples of FY 2001 Accomplishments

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

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

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

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

Examples of FY 2002 Accomplishments

Fire Protection in B-1 Wing at Y-12. Proposed upgrades to the fire protection program supporting the wet chemistry area consisted of minor plant improvements and nearly three dozen administrative controls. The Board noted significant problems with maintaining administrative controls at Y-12, and identified inconsistencies in the safety basis supporting this operation. In response, NNSA is making fire safety improvements including installation of a fixed fire suppression system.

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

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

Recommendation 99-1. Continuing to respond to Board Recommendation 99-1, *Safe Storage of Fissionable Material called “Pits,”* DOE repackaged its 5000th pit into a robust container suitable for interim storage 2002.

GOAL 2 — Safe Stewardship of Nuclear Weapons Stockpile and Components

Objective 2-B:

Safe Conduct of Stockpile Stewardship. The Board and its staff will verify the safety of DOE's defense nuclear activities undertaken to ensure the continuing effectiveness of the nuclear weapon stockpile in the absence of underground nuclear testing.

Examples of FY 2000 Accomplishments

LLNL Electrical and Instrumentation and Control (I&C). The Board concluded that the safety-class emergency power system at LLNL's plutonium facility (Building 332) was neither designed nor maintained to safety-class standards. In response, LLNL took prompt actions to address the Board's issues such as correcting improper seismic mounts for electrical components and switchgear.

LANL Authorization Basis (AB) Documents. The Board noted significant deficiencies in the quality of some AB documents at LANL and urged DOE and the laboratory to take decisive corrective actions. As a result of highlighting these issues, LANL performed a thorough self-assessment of the AB documentation and found that most of the analyses had significant deficiencies. LANL agreed to upgrade the quality of the safety bases involved. LANL has also reorganized to improve its ability to assure the quality of ABs.

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

Examples of FY 2001 Accomplishments

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

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

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

Examples of FY 2002 Accomplishments

Plutonium-238 Scrap Recovery Line at LANL. LANL was proceeding toward initial operation of the plutonium-238 scrap recovery line by the end of FY 2002. The Board noted that the project had not fully characterized and developed controls to address the hazards associated with this operation. DOE and LANL took actions to resolve the issues and improve the safety of the scrap recovery line.

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

Deactivation LLNL Heavy Element Facility. The Board reviewed plans for deactivation of the Heavy Element Facility, including the removal of nearly 300 radioactive items, some of which pose significant radiological risk. Planning for the project was being approached piecemeal, rather than in a systematic and integrated manner. The Board informed DOE that comprehensive planning methods, such as those contained in DOE Order 430.1A, *Life Cycle Asset Management*, should be used to better identify hazards and necessary controls and improve safety. LLNL revised its approach to be safer and to follow standard DOE expectations.

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

GOAL 3 — Safe Disposition of Hazardous Remnants of Weapons Production

Objective 3–A:	Material Stabilization. The Board and its staff will verify that DOE properly characterizes, stabilizes, processes, and safely stores surplus plutonium, uranium, and other actinides, residues, spent fuel, and wastes from the nuclear weapons program, and that DOE provides for expeditious disposal, as needed.
Examples of FY 2000 Accomplishments	
<p>Improved Remediation Schedules for Legacy Materials. The Board issued Recommendation 2000-1 to ensure that the stabilization of legacy materials continues in a manner that reflects the risks posed by the materials. Additionally, the Board recommended that funding shortfalls preventing timely stabilization of materials be identified and reported as required by law. According to the plan, the vast majority of remaining material will be stabilized within the next several years. Outstanding issues relating to material stabilization were communicated to DOE in a letter dated July 14, 2000.</p> <p>Standards for Safe Storage of Fissile Materials. In response to Board Recommendation 97-1, DOE issued a standard for stabilization and packaging of uranium-233 metals and oxides for safe long-term storage. This standard contains appropriate requirements for safely storing this highly radioactive isotope.</p> <p>Engineered Safety Controls. In several reviews of new operations at the Savannah River Site, the Board identified inadequacies in the use of engineered controls to prevent potential accidents. As a result, improved controls were implemented for high-level waste retrieval activities.</p>	
Examples of FY 2001 Accomplishments	
<p>High-Level Waste (HLW) Management at SRS. In response to the leakage of HLW from a storage tank and inadequate corrective action from DOE and its contractor, the Board issued Recommendation 2001-1, <i>High-Level Waste Management at the Savannah River Site</i>, urging DOE to remove waste from the leaking tank and to improve the overall safety and operability of the HLW system at SRS. DOE's actions in response have improved the safety of HLW storage at SRS.</p> <p>Plutonium Stabilization and Packaging. During FY 2001, Rocky Flats, Hanford, and LLNL each began packaging plutonium into high-integrity, long-term storage containers. This represented a significant safety improvement and fulfilled a commitment made by DOE in response to the Board's Recommendations 94-1 and 2000-1 regarding the stabilization of legacy nuclear materials.</p> <p>Hanford Spent Nuclear Fuel Project. During FY 2001, a major milestone in the implementation of Recommendation 94-1 was reached with the start-up of stabilization of spent fuel from the Hanford K-West Basin. The safe start-up of this activity followed several years of intensive preparations by DOE and extensive oversight by the Board, which led to the identification and correction of numerous safety issues before operations commenced.</p>	
Examples of FY 2002 Accomplishments	
<p>Plutonium Stabilization. DOE completed several significant milestones in implementation of Board Recommendation 94-1. Rocky Flats Environmental Technology Site completed repackaging more than 100 tons of plutonium-bearing residues and about one half of its plutonium metal and oxide. Hanford completed packaging its plutonium metal and stabilized all of its plutonium solutions.</p> <p>Uranium-233 Stabilization. In response to Board Recommendation 97-1, DOE commenced its ²³³U inspection program at Oak Ridge National Laboratory. This program will characterize the hazards of materials stored for more than 20 years with little surveillance. So far, most packages inspected have been found to be in good condition, except for a package containing an uncommon form of ²³³U. The inner can of this package was severely corroded.</p> <p>Savannah River Depleted Uranium Storage. In March 2002, the Board identified the need for DOE to address large quantities of depleted uranium materials stored in deteriorating containers and facilities at Savannah River. As a result, DOE management has initiated aggressive actions to disposition the material.</p>	

GOAL 3 — Safe Disposition of Hazardous Remnants of Weapons Production

Objective 3-B:

Facility Decommissioning: The Board and its staff will verify that DOE aggressively pursues the safe decommissioning of excess defense nuclear facilities that pose a significant risk to the workers or the public.

Examples of FY 2000 Accomplishments

Decommissioning Work at the Hanford 233-S Facility. The Board's review of decommissioning work at the Hanford 233-S Plutonium Concentration Facility identified work planning and implementation deficiencies. In response, DOE improved work planning and implementation.

Upgraded Work Controls for Decommissioning at Rocky Flats. The Board has followed dismantlement work activities for gloveboxes and other equipment in Building 771 at the Rocky Flats Environmental Technology Site and provided comments to RFETS personnel noting problems with work planning and control. In response, the contractor revised the work planning manual and has taken steps to improve the implementation of the program.

New and Revised Procedures for Decommissioning Work at the Miamisburg Environmental Management Project (MEMP). The Board reviewed and provided comments regarding a draft technical basis document, new and revised implementing procedures, and plans for determining readiness for decommissioning work involving special tritiated compounds at MEMP. DOE subsequently improved the documents and the safety of decommissioning work.

Examples of FY 2001 Accomplishments

Building 9206 at Y-12. For several years, the Board pressed DOE to pursue risk reduction and deactivation activities at the Y-12 Building 9206. In FY 2001, DOE responded by raising the priority of hazard reduction and reclassifying some materials as waste for direct disposal in order to complete deactivation of the building in six years.

Hanford Site Deactivation Activities. During FY 2001, the Board's staff continued to review deactivation and decommissioning efforts at Hanford. Comments regarding safety were given to the contractor; subsequently, changes were made and improvements were evident. The Board also evaluated the site-wide approach to excess facility disposition at Hanford, and provided suggestions to improve the processes used to manage such work.

Examples of FY 2002 Accomplishments

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

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

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

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

LIST OF ABBREVIATIONS AND ACRONYMS

AB	Authorization Basis
BJC	Bechtel Jacobs Company
Board	Defense Nuclear Facilities Safety Board
CFR	Code of Federal Regulations
CSAs	Canned Subassemblies
CY	calendar year
D&D	Deactivation and Decommissioning
DOE	(U.S.) Department of Energy
DSA	Documented Safety Analysis
EFCOG	Energy Facility Contractors Group
EH	Environment, Safety and Health
EM	Environmental Management
FY	fiscal year
GPRA	Government Performance and Results Act
HLW	high-level (radioactive) waste
HEUMF	Highly Enriched Uranium Materials Facility
IAWG	Inactive Actinides Working Group
I&C	Instrumentation and Control
IEEE	Institute of Electrical and Electronics Engineers
ISM	Integrated Safety Management
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
MCOs	Multi-Canister Overpacks
MEMP	Miamisburg Environmental Management Project
NESS	Nuclear Explosive Safety Studies
NNSA	National Nuclear Security Administration
NTS	(Department of Energy) Nevada Test Site
PDCF	Pit Disassembly and Conversion Facility (at SRS)
PFP	Plutonium Finishing Plant
ORNL	Oak Ridge National Laboratory
ORR	Operational Readiness Review
RFETS	Rocky Flats Environmental Technology Site
SNL	Sandia National Laboratories
SRL	Special Recovery Line
SRS	Savannah River Site
SS-21	Seamless Safety for the 21 st Century
TEF	Tritium Extraction Facility
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question
WEF	Waste Examination Facility
WIPP	Waste Isolation Pilot Plant
WTP	Hanford Waste Treatment Plant
Y-12	Y-12 National Security Complex
²³³ U	uranium-233
²³⁸ Pu	plutonium-238