
**Fiscal Year 2000 Performance Report
Submitted Under Provisions of the
Government Performance and Results Act**

**Defense Nuclear Facilities
Safety Board**



March 2001

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 nuclear weapons program remains a complex and hazardous operation. DOE must maintain readiness of the nuclear arsenal, dismantle surplus weapons, dispose of excess radioactive materials, clean up surplus facilities, and construct new facilities for many purposes. All of these functions must be carried out in a manner that protects the public, workers, and the environment.

The Board uses its Strategic Plan and Annual Performance Plan to ensure that its limited resources remain focused on the most significant safety challenges, keeping pace with shifts in those challenges from year to year. All of the Board's safety activities are closely tied to goals and objectives embodied in this plan. This approach gives the Board confidence that its small staff (less than 100 including Board members) and budget (\$18.5 million) 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: www.dnfsb.gov.

The information in this GPRA report is provided directly to Congress in the Board's statutory Annual Report, also available on the Board's website. There are slight differences between the two reports because the Annual Report covers CY 2000 rather than FY 2000.

Overall Outcome: The Board met its performance goals for FY 2000. In a few cases noted in the report, the safety improvements sought by the Board have not yet been fully achieved by DOE. The Board is vigorously pursuing those goals in FY 2001.

Goal 1: Complex-Wide Health and Safety Issues. The Board will ensure that Integrated Safety Management, including comprehensive health and safety requirements, technically competent personnel, and effective implementing mechanisms, matures 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 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 the workers and the public.

FY 2000 Performance Goal: The Board and its staff will review and assess the adequacy of health and safety requirements in new directives and rules, as well as in specific DOE directives that may be revised as a result of DOE's 2-year review cycle. Results are communicated to DOE by the Board or its staff for incorporation or resolution, as appropriate. It is estimated that DOE will issue a minimum of 40 directives for review by the Board and its staff in FY 2000. Based on experience from FY 1999, it is expected that approximately three of these reviews will be of major significance, and as such will require substantial Board and staff interaction with DOE to satisfactorily resolve identified issues prior to finalization. The Board will place particular emphasis on encouraging DOE to develop necessary new directives and to improve, consolidate, and integrate existing directives and rules related to health and safety in (a) Integrated Safety Management (ISM), including requirements selection, feedback and improvement, and performance measures, (b) project management and systems engineering throughout the full facility life cycle, and (c) Hazard Analysis Reports for nuclear explosive operations. 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 workers and the public.

FY 2000 Performance: The goal was met. During 2000, the Board provided substantive oversight review of 41 health and safety directives covering topics such as ISM, chemical safety, nuclear explosive operations, and training and qualification of technical personnel. A description of FY 2000 outcomes follows.

Nuclear Safety Rule. The Board reviewed and commented on numerous drafts of an amended DOE nuclear safety rule, 10 CFR Part 830, *Nuclear Safety Management*, together with its implementation guides. On December 11, 2000, DOE made the interim final rule effective. In addition to commenting on the interim final rule, the Board prepared technical report DNFSB/TECH-28, *Safety Basis Expectations for Existing Department of Energy Defense Nuclear Facilities and Activities*, to

provide guidance for upgrading facility safety bases. The Board urged both DOE and its contractors to consider this technical report in implementing the amended nuclear safety rule. **Outcome: strengthened and clarified rule and guidance.**

Program Management Directives. The Board reviewed DOE Policy 413.1, *Department of Energy Program and Project Management Policy for the Planning, Programming, Budgeting, and Acquisition of Capital Assets*; and DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*. The Board provided comments to DOE on the initial drafts and subsequent revisions of these directives. **Outcome: strengthened and clarified policy and order that affect a wide range of DOE contracting initiatives through incorporation of ISM principles.**

Integrated Safety Management Guide. Significant involvement of the Board was key to DOE's revision of DOE G 450.4-1, *Integrated Safety Management Guide*. This revision incorporates a major new section on an approach to maintaining a site's Integrated Safety Management System following initial implementation. **Outcome: strengthened and clarified guide that will ensure uniform ISM implementation.**

Federal Technical Capability. Responding to the Board's oversight, DOE upgraded Order 360.1A, *Federal Employee Training*, and DOE-STD-1063-2000, *Facility Representatives*; and issued DOE Manual 426.1-1, *Federal Technical Capability Manual*. **Outcome: strengthened and clarified order and standards needed to support improvements in DOE technical capability.**

Chemical Management Handbook. The Board guided efforts by DOE and its contractors to clarify the role of ISM Systems in chemical safety, eliminate redundant hazard analysis information, include other applicable DOE Orders and directives, and incorporate best industry practices. In June 2000, DOE provided the final draft of a Chemical Management Handbook, which the Board endorsed with the changes recommended. **Outcome: strengthened and clarified handbook that will contribute to greater worker safety.**

Hazard Analysis Reports. With Board technical oversight, the Pantex contractor prepared an *Authorization Basis Manual* for implementing DOE-DP-STD-3016-99, *Limited Standard, Hazard Analysis Reports for Nuclear Explosive Operations*. This effort led to significant improvements in the quality of the authorization basis and the necessary safety controls for nuclear explosive operations. **Outcome: improved implementing manual for nuclear explosive operations safety.**

Objective 1-B: Technical Competence. The Board will verify that the 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. During the strategic planning period, the Board will closely monitor DOE and its contractors' efforts to recruit, train, and retain a technical staff of exceptional quality, education, and experience. The Board will communicate areas of needed improvement to DOE.

FY 2000 Performance Goal: The Board and its staff will complete eight assessments of DOE's efforts to (a) define roles and responsibilities for safety management at DOE Headquarters and in the field, including appropriate consideration of the associated Functions, Responsibilities, and Authorities Manuals (FRAMs), for three DOE organizations (one Headquarters and two field), (b) periodically assess the effectiveness of the Federal Technical Capabilities Program for DOE employees, and (c) ensure that competence is commensurate with assigned responsibilities for key safety management personnel in the field, including qualifications to perform criticality safety oversight, for two DOE Field Offices and two defense nuclear contractor organizations.

Results of these 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 workers and the public, and to be used by DOE to upgrade the quality of its technical workforce.

FY 2000 Performance: The goal was met. FY 2000 results are set out below.

DOE Technical Capability: Recommendation 93-3. The Board encouraged DOE to develop and maintain a corporate program to recruit, develop, deploy, and retain technically capable personnel at defense nuclear facilities. DOE made significant improvements through its implementation of Recommendation 93-3, *Improving DOE Technical Capability in Defense Nuclear Facilities Programs*, but the Board continues to urge DOE to improve its technical capabilities. In a June 2000 letter to DOE, the Board pointed out the need for increased attention on the part of senior line management at the DOE Headquarters level to improve the technical capabilities of the federal workforce. As a result of this letter, the Deputy Secretary focused management effort on several personnel initiatives, including revitalizing the Technical Leadership Development Program designed to recruit and develop top-notch engineering and science graduates. **Outcome: strengthened DOE technical capability.**

DOE Technical Capability: Recommendation 2000-2. Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, noted that DOE had not adopted the nuclear industry's long-standing practice of designating subject matter experts, often called systems engineers, for systems and processes vital to safety. Successful implementation of Recommendation 2000-2 will require DOE to strengthen the safety system expertise of its federal and contractor personnel. **Outcome: strengthened DOE and contractor systems engineering capability.**

DOE Functions, Responsibilities and Authorities (FRAMs). The Board's staff observed seven ISM Verification Reviews and reviewed FRAMs for DOE-Headquarters and Idaho Operations. The staff found that assignments for safety management roles and responsibilities were consistent with the DOE manual. The staff's review of FRAMs for DOE-Headquarters and Idaho Operations found that assignments for safety management roles and responsibilities were consistent with the DOE manual.

Outcome: ensured that roles and responsibilities for safety were clearly defined.

Criticality Safety. During 2000, DOE worked toward completing the remaining commitments made in response to Board Recommendation 97-2, *Continuation of Criticality Safety*. The staff's reviews of four criticality safety programs at the Savannah River Site, the Y-12 Plant, the Rocky Flats Environmental Technology Site, and the Hanford Site disclosed varying approaches to criticality safety throughout the complex. In response to issues identified by the Board's staff during these reviews, DOE directed criticality engineers to increase the number of hours spent observing work on the floor, and to report those hours to DOE Headquarters and program offices responsible for the site. While not published in this reporting period, staff observations from the four criticality safety reviews are documented in DNFSB TECH-29, *Criticality Safety at Department of Energy Defense Nuclear Facilities*, issued in February 2001. **Outcome: strengthened DOE and contractor criticality safety technical capability.**

Objective 1-C: Complex-Wide Implementation of Integrated Safety Management. The Board will verify the effective and expeditious development and implementation of Integrated Safety Management in facility design and construction, operation, and post-operation. During the strategic planning period, the Board will review development and implementation of DOE's integrated safety management program, including the effectiveness of DOE's feedback and improvement function. Needed improvements will be communicated to DOE, and this information used to continually upgrade the quality of the program. The Board will also review design and construction activities, including technical project management, criteria development, design preparation, and construction, and communicate any identified issues that will require resolution to provide for adequate protection of workers and the public. Selection for review will be based on relative hazards and on DOE's schedule and progress on the candidate facilities. An adequate approach and schedule for resolution of issues identified by the Board will be established to support safe start-up and operation of new or modified defense nuclear facilities.

FY 2000 Performance Goal: The Board and its staff will conduct at least six reviews of DOE's efforts to implement ISM throughout all facility life-cycle phases. To support DOE's strategic objective to implement ISM complex-wide by the end of FY 2000, the Board will improve its communication effectiveness by consistently characterizing technical review results using standard ISM terminology. As a result of these reviews, DOE will provide an adequate approach and schedule for resolution of identified issues to support safe startup and operation of new or modified defense nuclear facilities.

FY 2000 Performance: The goal was met. A description of FY 2000 results follows.

Integrated Safety Management. The Board monitored and critiqued all ISM System Verification Reviews conducted by DOE at defense nuclear facilities during 2000. These Verification Reviews, performed by teams experienced in nuclear operations and nuclear safety, provided DOE senior management with an assessment of whether the basic elements of an acceptable ISM System had been implemented at each site. With the exception of LANL and certain activities at the Nevada Test Site and the Y-12 National Security Complex, all sites completed their Verification Reviews and declared ISM implemented.

During FY 2000, the Board held two public meetings at which representatives from DOE's Program Offices and the Albuquerque, Richland, Oak Ridge, and Idaho Operations Offices presented testimony and were questioned on the status of ISM implementation. During the fall of 2000, the Board held videoconferences with all major sites to continue its oversight of ISM implementation. The Board was briefed by DOE on actions needed at each site to firmly establish effective ISM programs and on plans for continuing ISM improvement. **Outcome: completing the effort to embed ISM in DOE safety programs, ensuring a lasting impact on the safety culture at DOE sites and facilities.**

DOE Internal Oversight. In response to the Board's Recommendation 98-1, *Resolution of DOE Internal Oversight Findings*, DOE implemented a formal process for dealing with safety issues identified by its internal independent oversight organization. The result has been a clearly defined, systematic, and comprehensive process for addressing and resolving safety issues. **Outcome: strengthened process for resolving identified safety issues.**

Implementation of Health and Safety Directives. The Board provided oversight of DOE's implementation of its health and safety directives. Where needed, the Board took actions to improve this implementation. Examples follow:

- ! **Adequate Contractual Requirements.** Board reviews of DOE operating contracts revealed several instances in which safety requirements were inadequate. The Board addressed the problem generically in a May 23, 2000, letter to the Secretary of Energy. The Board continues to scrutinize each DOE Request for Proposal and each operating contract for defense nuclear facilities to ensure that the contract imposes adequate safety requirements and standards. **Outcome: strengthened contractual basis for safety at all defense nuclear facilities.**

- ! **Tritium Extraction Facility.** During 2000, the Board made site visits and held staff-to-staff discussions concerning the design of systems and structures for the TEF. The Board observed design reviews and discussed several issues and observations originally transmitted to DOE by the Board in a letter dated December 7, 1999. Significant among those issues were the seismic and structural design of the buildings, the classification and design of safety systems, and the frequent use of administrative instead of engineered controls. As site preparation and early construction activities for the TEF commenced in the fall of 2000, the Board's staff visited the site and found the project to be progressing adequately. **Outcome: improved design and safety controls, greater assurance of adequate final design.**

- ! **Hanford Spent Nuclear Fuel Project.** Reviews of the Hanford Spent Nuclear Fuel Project by the Board identified safety concerns with the safety-related ventilation systems and electrical systems at the Cold Vacuum Drying Facility. **Outcome: DOE addressed these safety concerns prior to facility startup.**

- ! **Configuration Management.** In March 2000, the Board issued Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, seeking to reverse the degrading conditions of vital safety systems and stressing the need to maintain the configuration and operational readiness of these systems. The Board recommended that DOE assess the current condition of vital safety systems, strengthen its system expertise, and improve the self-assessment processes that should be used to continually evaluate the condition of these systems. In April 2000, DOE accepted this recommendation and began developing an Implementation Plan. To guide DOE in developing its Implementation Plan, a letter from the Board dated September 8,

2000, amplified the intent of Recommendation 2000-2 and further addressed the range and extent of vital safety systems to be assessed (i.e., safety-class systems, safety-significant systems, and other defense-in-depth systems). **Outcome: DOE provided an Implementation Plan, which the Board accepted in December 2000.**

! **Fire Safety.** In the past several years, improved and more detailed safety analyses for defense nuclear facilities have demonstrated that the possibility of fire remains one of the main sources of risk to the public and workers. Accordingly, the Board has intensified its review of this critical safety area. In June 2000, the Board issued DNFSB/TECH-27, *Fire Protection at Defense Nuclear Facilities*, setting forth technical concepts and principles important to maintaining the quality of DOE's fire protection program. Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, when fully implemented, should also have a significant effect on DOE's fire safety program. Further, the Board conducted fire protection reviews at Pantex, Y-12, ORNL, Hanford, RFETS, LANL, and FEMP. These reviews ranged from a comprehensive fire protection program review at Y-12, Pantex, and Hanford, to examination of the fire protection for specific processes and facilities at ORNL, LANL, RFETS, and FEMP. Several common issues identified during these on-site reviews are being pursued to closure with DOE. **Outcome: strengthened DOE fire safety program.**

! **Quality Assurance.** A viable quality assurance program is key to preserving the desired conservatism in robust safety systems during their design, fabrication, and installation. The Board's concerns with regard to missing or passive quality assurance programs were identified in a December 1999 letter to DOE. In response to this letter, DOE's Offices of Defense Programs and Environmental Management have proposed separate plans to address the Board's concerns. The Board reviewed these proposed plans and conditionally accepted their different approaches pending satisfactory results from initial field reviews. **Outcome: DOE is now conducting reviews to identify areas requiring improvement in quality assurance programs.**

! **Software Quality Assurance.** Computer software is used by DOE and its contractors to determine the possible effects of identified hazards and to design and control safety-related structures, systems, and components. Software quality assurance is used for the systematic development, testing, documentation, maintenance, and execution of this software. In January 2000, the Board issued DNFSB/TECH-25, *Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities*. This report identifies the root cause of problems with software quality assurance as deficiencies in the supporting infrastructure. In a February 2000 letter to the Board, the Deputy Secretary of Energy concurred with the Board's assessment and agreed to provide a corrective action plan. **Outcome: DOE agreed to address an important and previously unrecognized safety issue.**

! **Instrumentation and Control.** The Board conducted several reviews of distributed control systems and safety-significant instrumentation and control systems and found that some could not

be shown to meet industry standards for reliability. The Board observed a lack of design requirements at the DOE level and few requirements at the site level. Letters from the Board in February and March 30, 2000, addressed these problems and identified an industry standard (Instrument Society of America [ISA] 84.01, *Application of Safety Instrumented Systems for the Process Industries*) for potential use by DOE as a design guideline. **Outcome: Several DOE sites have adopted the ISA 84.01 standard, and other sites are reviewing it for possible use.**

! **Y2K Program.** Board review of DOE's Year 2000 (Y2K) Program pointed out that the Y2K review at the Los Alamos and Lawrence Livermore National Laboratories needed to look beyond computer systems to consider possible problems with process equipment. **Outcome: DOE responded to the Board's concerns and, as a result, there were no significant failures of safety-related systems at the calendar year turnover.**

! **Lessons Learned Process.** In response to numerous letters from the Board, DOE upgraded its lessons learned process. These upgrades included issuing new guidance documents and developing a centralized Web-based lesson learned database. DOE also issued a set of ISM performance indicators to provide senior DOE managers with a uniform means of assessing the effectiveness of ISM at their sites. **Outcome: stronger and more efficient lessons learned process, ensuring that emerging safety problems and solutions are shared complex-wide.**

Goal 2: The Board will ensure that nuclear weapons stockpile support and defense nuclear research activities will be planned and executed safely at defense nuclear facilities.

Objective 2-A: Safe Conduct of Stockpile Management. The Board will verify the safety of DOE's defense nuclear facilities and activities relating to the maintenance, storage, and dismantlement of the nuclear weapons stockpile. During the strategic planning period, the Board will confirm that DOE develops and implements Integrated Safety Management systems that are tailored adequately to the hazards of activities relating to stockpile management, and will communicate any needed enhancements to DOE for resolution. Issues identified by the Board will be resolved, or an adequate approach and schedule for resolution will be developed.

FY 2000 Performance Goal: The Board and its staff will complete 16 assessments of DOE's efforts to develop and implement safety management systems for stockpile management activities. The Board's evaluations will be split roughly evenly between DOE's efforts to develop safety systems (e.g., system and process designs, safety bases, control schemes, and administrative programs) and DOE's efforts to implement aspects of safety management systems. These reviews will focus on activities at the Pantex Plant, Oak Ridge Y-12 Plant (now called the Y-12 National Security Complex), and Savannah River Site tritium activities. In addition, the Board and staff will assess the adequacy of development and implementation of the ISM System and the safety controls identified for any new weapon system dismantlement projects at the Pantex Plant or the Oak Ridge Y-12 Plant (such as the W56) that start in FY 2000.

FY 2000 Performance: The goal was met. A description of FY 2000 results follows.

Pantex Plant. The Pantex Plant, located near Amarillo, Texas, serves a central role in stockpile management. Operations at the site include the assembly, disassembly, dismantlement, and surveillance of nuclear weapons, as well as interim storage of plutonium removed from retired weapons.

! **Recommendation 98-2, *Safety Management at the Pantex Plant.*** In late 1998, the Board issued Recommendation 98-2, urging DOE to take fundamental actions to improve the safety of all weapon-related work at the Pantex Plant. Although DOE embraced the tenets of the Recommendation, progress has been disappointing, resulting in the deferment rather than the acceleration of a number of safety improvements. During 2000, the Board provided oversight to DOE as it developed a revised Implementation Plan for Recommendation 98-2 that is better focused and should achieve substantive results if funded and executed. **Outcome: incremental progress at Pantex, though the pace is still slower than the Board has recommended.**

! **Recommendation 99-1, *Safe Storage of Fissionable Material called "Pits."*** The Board issued Recommendation 99-1 to urge DOE to improve the storage environment for plutonium pits. In response, DOE committed to accelerate the transfer of pits from a relatively uncontrolled and potentially corrosive environment to a controlled, inert storage environment. In

addition, DOE fulfilled a commitment to the Board to replace incompatible bolts on the pit storage containers with bolts that will resist corrosion. In 2000, more than 1000 pits were repackaged. **Outcome: safer storage of plutonium pits.**

- ! **Technical Report on High Explosives.** The Board issued a technical report, DNFSB/TECH-24, *Safe Handling of Insensitive High Explosive Weapon Subassemblies at the Pantex Plant*, together with a reporting requirement, concerning the safe handling of composite assemblies of insensitive high explosives and conventional high explosives. **Outcome: continued safety improvements in nuclear explosive operations.**
- ! **Performance of Readiness Reviews.** In response to a Board reporting requirement, DOE developed a remedial training program and increased senior management attention in this area. **Outcome: significant improvements in the Readiness Review for the W76 Program at the Pantex Plant.**
- ! **Nuclear Explosive Program Activities.** In FY 2000, the Board conducted numerous assessments of the safety of specific nuclear explosive program activities at Pantex. These reviews included the W87 Life Extension Program, the W62 Disassembly & Inspection Program, the W88 Assembly and Disassembly & Inspection Re-authorization Program, and the full Seamless Safety for the 21st Century (SS-21) W76 Disassembly & Inspection Program. The reviews revealed deficiencies in safety analyses and controls, flowdown of controls into operating-level procedures, and readiness of activities to be conducted safely. These deficiencies were particularly acute in programs to which the SS-21 process had not been fully applied. **Outcome: DOE awareness of safety deficiencies and need to apply SS-21 process more broadly.**
- ! **Weapon-Specific Tooling at Pantex.** Board oversight of the reauthorization of disassembly and inspection operations for the W62 nuclear warhead led DOE to upgrade the tooling and procedures used for these operations. **Outcome: increased safety in nuclear explosive operations.**
- ! **Lightning Protection.** The Board provided oversight to DOE in addressing the potential hazards that lightning poses to nuclear explosive operations at Pantex. During 2000, DOE upgraded its lightning protection under a new Lightning Basis for Interim Operation that provides a sound initial step toward establishing a set of uniform, technically justified controls for all nuclear explosive operations. **Outcome: improved lightning protection program that reduces the lightning threat to nuclear explosive operations.**
- ! **Fire Protection.** On the basis of several reviews, the Board concluded that the potential hazards to nuclear explosive operations from fire at Pantex had not been comprehensively and consistently addressed. In March 2000, the Board notified DOE that observed shortcomings in the plant-wide fire alarm system, inconsistencies in the application of ultraviolet detectors, and

inadequate fire protection assessment practices needed to be addressed promptly. In response to a May 2000 letter from the Board, DOE and its contractor formulated plans at Pantex for accelerating replacement of the deteriorating plant-wide fire alarm system, upgrading the fire detection system, formalizing fire protection controls, and revising the analytical methodology used in fire hazard analyses. **Outcome: acceleration of DOE efforts to upgrade and replace fire safety systems.**

- ! **Canned Subassemblies.** In May 2000, based on issues identified by its staff, the Board asked DOE to evaluate the hazard posed by potentially sensitive weapons components (other than high explosives) under thermal stresses—in particular, the canned subassemblies used in four warheads designed by Los Alamos National Laboratory. DOE has acknowledged the need to address this issue, but actions to that end remain incomplete. In the interim, DOE has implemented compensatory controls on the handling of these canned subassemblies. **Outcome: improved safety in handling canned subassemblies.**

Y-12 National Security Complex. DOE fabricates nuclear weapon secondary components and weapon cases for nuclear weapons at the Y-12 National Security Complex (Y-12), located in Oak Ridge, Tennessee. The Y-12 mission also includes surveillance, inspection, and testing of certain weapon components.

- ! **Dismantlement.** Early in 2000, Y-12 began preparations for the first new weapon dismantlement campaign in more than five years. The Board identified a number of safety issues, including failure to establish an authorization basis, implement safety-related controls, or conduct an adequate readiness review. During a September 2000 review, the Board noted that these issues remained unresolved and identified further safety deficiencies in the areas of fire protection and radiological controls. DOE and its contractor are working to correct these deficiencies prior to authorizing startup of the campaign. **Outcome: assurance of safe startup of dismantlement operations.**

- ! **Preparations for Reduction Process Restart.** In July 1999, the Board reviewed plans to resume operations to reduce uranium hexafluoride to metal, identifying safety concerns related to the design and structural integrity of the reduction vessel. Following a readiness assessment of the reduction process, DOE disapproved the proposed restart. During a follow-up review in July 2000, the Board found that a number of original safety issues had not been resolved. This review revealed additional problems with the technical basis for safety controls, the technical basis for the reduction vessel test plan, and the preparation for Operational Readiness Reviews. Under the impetus of an August 2000 letter from the Board, Y-12 made significant progress toward developing the technical basis for restarting the reduction process with improved safety procedures. **Outcome: stronger safety controls on a hazardous process.**

- ! **Hydrogen Fluoride Supply System.** Reviews by the Board conducted in 1999 and 2000 revealed that the new Hydrogen Fluoride Supply System for EUO lacked safety features and quality controls commensurate with the hazards of the proposed operation. In March and May 2000, the Board wrote to DOE noting that key components of the Hydrogen Fluoride Supply System appeared to have been designed without incorporating appropriate safety requirements. DOE responded to these letters, acknowledging the concerns raised by the Board and committing to address them. In one effort, the contractor conducted a new hazard evaluation study aimed at capturing all credible hydrogen fluoride release paths. This study led to the identification of several safety improvements, which will be evaluated for implementation prior to system startup. **Outcome: stronger safety controls on a hazardous process have been imposed.**

- ! **Design and Construction.** In a November 1999 letter, the Board pointed out inadequate safety management and insufficient attention to technical safety matters in design and construction projects at Y-12. DOE developed and began to implement a corrective action plan for addressing these issues, but in July 2000 claimed that financial constraints had forced suspension of much of the implementation of the plan and refocusing of resources on the new Highly Enriched Uranium Materials Facility. This shift in focus was due in part to objections raised by the Board upon discovering that the preliminary design of the facility did not include high-efficiency particulate air filters on the heating, ventilation, and air conditioning system, a continuous air monitoring system for the protection of workers; or a stack monitoring system for assessment of any accidental release of radioactivity to the environment. Following DOE's engagement of a new Y-12 operating contractor, the Board urged DOE to refocus and reinvigorate efforts to resolve these safety issues. **Outcome: DOE and a new contractor are better focused on correcting significant design and construction problems.**

- ! **Chemical Safety.** In June 2000, the Board pointed out deficiencies in the Y-12 site-wide Chemical Safety Action Plan and inadequacies in both the hazard identification and analysis methodologies and the operating procedures at Y-12. **Outcome: corrective actions for the Lithium Hydride Production Facility, resulting in greater worker safety.**

- ! **Fire Protection.** Following a staff review of Y-12 fire protection systems, the Board sent DOE a letter in August 2000 describing the need for safety improvements in several areas: numerous fire suppression systems were not being tested as required, a smoke detection system that was installed in 1998 had not been tested since that time, various fire barriers were not being inspected, and in many cases there were no available procedures for performing important inspections or tests. In response, the contractor committed to preparing a corrective action plan for the fire protection program. **Outcome: incremental progress towards fire protection program improvements.**

- ! **Safety Basis Upgrades.** The Board conducted a series of safety basis reviews at Y-12 that identified a number of significant issues, including the persistent lack of adequate resources (both funding and staff) to develop high-quality safety bases for the hazardous activities at the site. The capability to develop, maintain, and refurbish the safety controls and systems (such as the fire protection system) necessary to protect the public, workers, and the environment is also substandard. **Outcome: DOE has committed to improve the analysis and control of hazards at Y-12.**

- ! **Emergency Preparedness.** In response to deficiencies in emergency management identified by the Board, the Y-12 emergency preparedness group made progress in developing comprehensive hazard assessments for high-priority materials in its inventory. **Outcome: improvements in emergency preparedness.**

- ! **National Consensus Standards.** In a May 2000 letter, the Board requested that DOE address continuing deficiencies in the implementation of consensus safety standards at Y-12. DOE has committed to correct these deficiencies. **Outcome: greater use of consensus safety standards.**

Savannah River Site. Currently, DOE does not have the capability to produce tritium. A Tritium Area Office was established by the National Nuclear Security Administration (NNSA) at the Savannah River Site (SRS) during 2000, with responsibility for tritium stockpile stewardship, management of the high-priority Tritium Modernization and Consolidation Project, and construction of the new Tritium Extraction Facility (TEF).

- ! **Tritium Modernization and Consolidation.** Under the Tritium Modernization and Consolidation Project, the processing capabilities in an old facility (232-H) necessary for handling gas streams from the TEF are to be relocated to a modern building (Building 233-H) and upgraded. A new building is planned to be constructed to house material testing operations currently performed in 232-H. In a December 1999 review, the Board questioned the contractor's decision not to functionally classify the 234-7H fire suppression system as safety significant. The Board conducted a follow-up review in June 2000 and confirmed that the fire suppression system had been reclassified as safety-significant, consistent with guidance in DNFSB/TECH-27, *Fire Protection at Defense Nuclear Facilities*. **Outcome: improved design and safety controls, greater assurance of adequate final design.**

Objective 2-B: Safe Conduct of Stockpile Stewardship. The Board will verify the safety of DOE's defense nuclear activities undertaken to ensure the continuing effectiveness of the nuclear weapons stockpile in the absence of underground nuclear testing. During the strategic planning period, the Board will review, at research and development sites, DOE's efforts to develop and implement safety management systems for stockpile stewardship activities, including system and process designs, safety bases, control schemes, administrative programs, and operational lessons learned. Needed enhancements identified will be communicated to DOE, and an adequate approach and schedule for their resolution will be established.

FY 2000 Performance Goal: The Board and staff will complete eight assessments of DOE's efforts to develop and implement safety management systems for stockpile stewardship activities. The Board will evaluate DOE's efforts to develop safety systems (e.g., system and process designs, safety bases, control schemes, and administrative programs) and to implement aspects of safety management systems. The Board's efforts in this area will also cover DOE's efforts to address safety issues of aging-related changes in nuclear weapon components, including research and modeling, for weapon systems and components in the enduring stockpile. These reviews will focus on activities at Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), Sandia National Laboratories (SNL), and the Nevada Test Site (NTS).

FY 2000 Performance: The goal was met. A description of FY 2000 results follows.

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

! **Worker Protection.** During an on-site review at LANL in 1999, the Board determined that improvements were needed in analyses of hazards and development of controls to protect workers during research and development activities. A letter from the Board to DOE noted that laboratory requirements for safe work practices imposed significant responsibilities on the workers, but did not contain sufficient guidance to enable them to carry out those responsibilities. During a follow-up review in April 2000, the Board found that these laboratory requirements had been improved, and more detailed guidance had been provided. Further, the Nuclear Materials Technology Division, which had previously operated under an exception to the laboratory requirements for safe work practices, revised its procedures to incorporate these requirements to the extent practicable, allowing for deviations only when absolutely necessary.
Outcome: strengthened worker safety program in place at LANL.

- ! **Improvement of Infrastructure for Authorization Bases.** The Board has consistently identified issues with LANL's authorization bases, including inadequate involvement of line management in their development. Under the leadership of DOE's Los Alamos Area Office, DOE and the University of California included in the LANL contract a requirement that the laboratory assess the quality of the 10 oldest authorization bases. The Board reviewed the self-assessment performed by LANL and found that it was a good example of how the feedback and improvement function of ISM can improve the effectiveness of authorization bases and enhance safety. **Outcome: The review team recommendations are being implemented at LANL, and contract modifications now require upgrading specific facilities on a well-defined schedule.**

- ! **Design and Construction.** In a letter to DOE in December 1997, the Board stressed the need to develop appropriate project management controls consistent with DOE Order 430.1A, *Life Cycle Asset Management*. While some progress in this regard has been made, an important upgrade project at LANL, the Technical Area (TA)-55 Fire Protection Yard Main Replacement Project, continues to experience difficulties. Contrary to accepted practice in the commercial nuclear industry, detailed project design criteria were not prepared at the outset of the project. The Board pursued these issues in a September 2000 site visit. **Outcome: design specifications have now been developed, and safety system quality requirements for this project are being addressed.**

- ! **Chemical Safety.** Large amounts of potentially explosive perchlorate salts had been found in the heating, ventilation, and air conditioning system of the Chemistry and Metallurgy Research (CMR) Facility. In April 2000, the Board reviewed the perchlorate issue at both CMR and the TA-48 Radiochemistry Facility and evaluated the newly issued laboratory requirements for chemical management. This review disclosed instances in which these revised requirements had not been completely implemented. **Outcome: LANL has now implemented chemical management requirements across the site, and legacy chemical occurrences have been reduced as a result of extensive cleanup activities.**

- ! **Dynamic Experiments.** LANL plans to conduct a series of experiments (termed DynEx) as part of the stockpile stewardship program. The Board has held numerous technical exchanges with DOE and LANL representatives regarding DynEx. In 1999, at the Board's request, a Blue Ribbon Panel was formed to provide independent advice and mentoring to LANL and DOE with respect to developing and implementing an adequate technical safety basis for these experiments. The Board facilitated discussions between its technical staff and representatives of DOE, LANL, and the Blue Ribbon Panel. These discussions led to a technically acceptable methodology that invokes the American Society of Mechanical Engineers Boiler and Pressure Vessel Code to design, fabricate, test, inspect, and document safety bases for the vessels to be used for these experiments. **Outcome: assurance that pressure vessels used in these**

experiments supporting the stockpile stewardship program comply with national consensus standards.

- ! **Responses to Cerro Grande Fire and Potential for Flooding.** After the Cerro Grande fire, the Board reviewed the potential for flooding as a result of the loss of the ability of soil to absorb water. The Board identified important areas in which DOE needed to be more thoroughly engaged in reviewing the adequacy and appropriateness of measures being taken to address flooding concerns. **Outcome: closer DOE management of the flood control problem.**

Lawrence Livermore National Laboratory. Lawrence Livermore National Laboratory (LLNL), located 45 miles southeast of San Francisco, California, is a nuclear weapons research and development laboratory. It provides technical expertise to support stockpile stewardship and management, including consultation on the surveillance and dismantlement of LLNL-developed nuclear weapons.

- ! **Safety Basis Improvements.** The Board's review of the safety bases of certain defense nuclear facilities at LLNL disclosed that in some cases, a systematic hazard analysis had not been performed to address all the hazards for nuclear activities. In a June 2000 letter to DOE, the Board observed that responsible laboratory and DOE officials did not have in-depth knowledge of the need for and purpose of authorization bases and their correlation with ISM, and that LLNL did not have a consistent and agreed-upon process for preparing, reviewing, and submitting authorization basis documents for approval. The Board also identified significant inconsistencies in the portrayal of hazards across the various safety and emergency hazard analyses at LLNL. **Outcome: LLNL prepared a corrective action plan and has begun establishing a centralized authorization basis group.**

- ! **Electrical and Instrumentation and Control Systems.** The Board wrote to DOE in December 1999, pointing out that the safety-class emergency power system at LLNL's plutonium facility was neither designed nor maintained to safety-class standards. **Outcome: LLNL has resolved the issue of seismic mounts for electrical components and switchgear, and is in the process of resolving the remaining issues related to safety-class system design.**

Sandia National Laboratories. Sandia National Laboratories (SNL), which manages research and development installations at several DOE sites, including Albuquerque, New Mexico, and Livermore, California, has a major responsibility for conducting engineering research on nuclear weapon systems and components.

- ! **Conversion of Annular Core Research Reactor to Defense Programs Missions.** In 2000, the ACRR was upgraded with a Fueled Ring External Cavity, which is neutronically coupled to the reactor core and is large enough to accommodate complete weapon subsystems. During 2000, the Board assessed authorization and safety basis changes and improvements and monitored readiness activities at the ACRR. Overall, the readiness activities were conducted in

a satisfactory manner. The ACRR, upgraded with the Fueled Ring External Cavity, began operations in 2000. **Outcome: assurance of adequate readiness review for startup.**

- ! **Startup of New Gamma Irradiation Facility.** The newly constructed GIF replaces the two existing SNL irradiation facilities, including the current GIF, which has been operational since 1962. It provides a single structure for performing a wide variety of gamma irradiation experiments with different test configurations, dose rates, and dose levels. The new GIF underwent Operational Readiness Reviews (ORRs) by both SNL and DOE in 2000. These ORRs addressed the implementation of controls defined by the GIF Final Safety Analysis Report and Technical Safety Requirements by focusing on facility design safety features, safety basis implementation, and training/qualification of GIF operators and other personnel responsible for operations and maintenance. The Board observed and provided oversight of the DOE ORR. The DOE ORR team adequately addressed the implementation of controls as defined by the GIF Final Safety Analysis Report and Technical Safety Requirements. **Outcome: assurance of adequate readiness review for startup.**

Nevada Test Site. The Nevada Test Site (NTS) covers 1,350 square miles in Southern Nevada, about 75 miles northwest of Las Vegas. NTS is a remote site and one of the largest secured areas in the United States. NTS is maintained should national security requirements demand the resumption of underground testing.

- ! **Subcritical Experiments.** During 2000, the Board reviewed the proposed operations for the Thoroughbred and Oboe subcritical experiments. The Oboe experiments, conducted by LLNL, used robust vessels for containment, allowing reuse of individual underground chambers. The Board found that the proposed experiments were adequately reviewed by DOE under the existing safety management program. **Outcome: assurance of adequate DOE safety review.**
- ! **Disposition of Damaged Nuclear Devices.** Responding to Board oversight, DOE took steps to preserve its capability to safely dispose of damaged or recovered nuclear devices, should such a contingency arise. In 2000, DOE conducted a series of exercises to develop procedures and requirements, but results were disappointing. In an August 2000 letter, the Board observed that DOE's efforts lacked adequate direction and resources. DOE acknowledged the importance of this mission and is now actively assessing the requirements for safely disposing of such a device. **Outcome: DOE is increasing its efforts to improve the infrastructure of personnel, facilities, and procedures.**

Goal 3: The Board will ensure that hazardous remnants of nuclear weapons production are appropriately characterized, stabilized, and stored; and legacy facilities are decommissioned in a manner that protects the workers and the public.

Objective 3-A: Material Stabilization. The Board and its staff will verify that DOE properly and safely characterizes, stabilizes, processes, and stores surplus plutonium, uranium, and other actinides, residues, spent fuel, and wastes from the nuclear weapons program, and that DOE provides for expeditious disposal of these materials, as needed. During the strategic planning period, the Board will determine whether DOE's efforts to expeditiously stabilize, process, and store plutonium, uranium, other actinides, wastes, and spent nuclear fuel are conducted safely and in a timely manner using appropriate technologies, and that new systems are designed and to appropriate standards. Needed enhancements will be communicated to DOE, and an adequate approach and schedule for resolution will be developed.

FY Performance Goal: The Board and its staff will complete nine 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 process operations, the safety of ongoing operations, and the suitability of long-term storage and disposal facilities.

FY 2000 Performance: The goal was met. A description of FY 2000 results follows.

Recommendation 2000-1. In Recommendations 94-1, 95-1, 96-1, 97-1, and 99-1, the Board urged DOE to correct numerous stabilization and storage problems resulting from the shutdown of many defense nuclear facilities, recognizing that degrading conditions would worsen with time. In response, DOE has mitigated some of the most immediate concerns, but much of the material has yet to be stabilized and packaged for long-term storage or prepared for ultimate disposition. On January 14, 2000, the Board issued Recommendation 2000-1, *Prioritization for Stabilizing Nuclear Materials*. This recommendation provides a risk-based prioritization for stabilizing the remaining legacy materials originally addressed in Recommendation 94-1.

Plutonium Stabilization and Storage

! **Los Alamos National Laboratory.** In response to a Board letter observing that stabilization of remnant materials at LANL had essentially come to a halt, LANL spent the year 2000 developing plans for stabilizing its excess plutonium. The Board's review of LANL's risk-based methodology for prioritizing these materials revealed numerous deficiencies, including the failure

to recognize that actinides in solution pose significant hazards. When the Board pointed out that some unstable materials were no longer scheduled for near-term processing, LANL agreed to expedite their stabilization. Under LANL's preliminary plans, however, stabilization of some materials will not occur until 2018. The Board found this timetable unacceptable. Outcome: DOE is working on a response to the safety issues identified by the Board.

! **Hanford Site.** In response to Board Recommendation 2000-1, DOE and its contractor made progress in stabilizing plutonium residues in the Plutonium Finishing Plant, even though a large inventory remains. In 2000, 150 liters of plutonium solution were stabilized, 88 kilograms of ash were repackaged, and approximately 50 metal items stored in food-pack cans were repacked in seal-welded containers. The Board has provided extensive oversight of DOE and its contractor at the Plutonium Finishing Plant to reduce the risks of continued storage of unstable plutonium. DOE modified processing parameters to ensure that polycube oxidation would not result in unsafe concentrations of flammable gases, repacked all plutonium metal items that were in contact with plastic to eliminate radiolytic generation of flammable gases and minimize the formation of pyrophoric plutonium hydrides, and accelerated the repackaging of plutonium metal that had become unstable as a result of excessive corrosion. **Outcome: enhanced safety in hazardous nuclear material operations.**

! **Rocky Flats Environmental Technology Site.** Although the Rocky Flats Environmental Technology Site (RFETS) has made progress toward responding to Board Recommendation 94-1, a substantial quantity of plutonium remains in various forms that will require stabilization and packaging before the materials can be shipped off site. Unfortunately, stabilization and packaging of the site's inventory of plutonium metal and oxides have been delayed because of problems with starting up the overly complex Plutonium Stabilization and Packaging System. DOE presently plans to start the system up in the first half of 2001 and expects to meet its commitment to the Board to have this material packaged by May 2002. **Outcome: the contractor repackaged substantial quantities of salt, ash, combustible, and dry residues for disposal at the Waste Isolation Pilot Plant.**

Plutonium Disposition

! **Pit Disassembly and Conversion Facility.** The Board scrutinized PDCF design concepts and provided technical guidance to DOE's Office of Fissile Materials Disposition on safety aspects of the design. In June 2000 the Board requested that DOE consider the advantages of using a sand filter as the final barrier against airborne release of radioactive contamination. A sand filter is physically robust and provides reliable protection during significant accidents, such as a facility fire. The Board believes that the additional up-front cost of a sand filter is reasonable relative to the benefits gained, which include reduced surveillance and maintenance costs throughout the life of the facility. **Outcome: DOE has decided to use sand filters for both PDCF and the Plutonium Immobilization Plant.**

Uranium Stabilization, Storage, and Disposition

- ! **Oak Ridge National Laboratory.** Uranium-233 (^{233}U) is a man-made radioisotope that contains uranium-232 (^{232}U) as an unavoidable contaminant; products of the decay of ^{232}U are highly radioactive. Most of this material is stored at Oak Ridge National Laboratory (ORNL) and Idaho National Engineering and Environmental Laboratory (INEEL), with a smaller quantity at LANL. Because most of the containers at ORNL have not been inspected for many years, there is uncertainty about their safety in their current condition. In Recommendation 97-1, the Board urged DOE to characterize, stabilize, and ensure safe storage of its ^{233}U materials expeditiously. DOE took a key step toward accomplishing these goals in 2000 with the issuance of a standard for stabilization, packaging, and storage of ^{233}U materials. During 2000, the Board reviewed ORNL's preparations for performing the ^{233}U inspection and repackaging program, as well as the laboratory's efforts to address problems with the program identified by the Board. In response, ORNL is upgrading the conduct of operations and formality of test controls for this activity, and has made improvements in the fire protection program and the ventilation systems in Building 3019, where the inspections will be conducted. **Outcome: increased safety for a hazardous nuclear operation in an aging facility.**

- ! **Idaho National Engineering and Environmental Laboratory.** The Unirradiated Fuel Storage Facility at INEEL contains approximately 23 metric tons of enriched uranium oxide. A review of the facility by the Board found that its structural behavior under seismic loading was uncertain. DOE reevaluated the response of this complex structure to potential seismic events, taking into account dynamic loading of the bermed soil surrounding the structure. **Outcome: in response to Board action, DOE improved the seismic analysis to demonstrate the seismic adequacy of a major nuclear storage facility.**

Special Isotopes

- ! **Americium/Curium Solutions.** In Recommendation 94-1, the Board stressed the need to expedite the stabilization of americium/curium solutions stored in the F-Canyon at SRS. In a 1995 Record of Decision, DOE selected vitrification as the preferred method for stabilization of these solutions. SRS has completed the design of the pretreatment system and has made the critical decision to begin construction activities. Development of the vitrification process is approximately 50 percent complete. Board review of system design revealed several deficiencies in the selection and implementation of safety controls. **Outcome: DOE is working to correct the deficiencies by strengthening the controls.**

Stabilization of Spent Nuclear Fuel. DOE's spent nuclear fuel program is designed to place spent nuclear fuel into safe interim storage. An additional goal of the program is to ensure that the canisters used for interim storage can be used for shipment and burial at a national repository without repackaging.

! **Hanford Site.** The Spent Nuclear Fuel Project at the Hanford Site is a high-priority action being conducted in response to Board Recommendation 94-1. That Recommendation focused on the need to remove and stabilize the spent fuel and sludge contained in the Hanford K-East Basin, which is adjacent to the Columbia River. Although the risk of continued storage of degrading fuel and sludge in the K-East Basin is greater than in the K-West Basin, the Board agreed that worker safety could be improved by gaining experience from first performing construction and fuel removal in the K-West Basin's less contaminated work environment. Reviews of this project performed by the Board have revealed numerous shortcomings, including a continued lack of sound project management, poor implementation of quality assurance requirements, and continuing difficulty in resolving emerging technical issues.

Outcome: strengthened safety management of this critical project.

! **Savannah River Site.** F- and H-Canyons at SRS are essential facilities, needed for stabilization of various nuclear materials from throughout the complex. DOE has evaluated numerous strategies for canyon utilization since 1995, including some that would limit DOE's ability to continue to stabilize remnant materials. To avert this outcome, the Board has consistently urged DOE to take a systematic approach in planning the utilization of the canyons to ensure that nuclear materials can be stabilized in a timely and cost-effective manner. During 2000, DOE continued to employ the SRS separation facilities to reduce the risk posed by remnant materials at SRS. Specific achievements included completing dissolution of Experimental Breeder Reactor II fuel elements and Mark 42 targets and continued processing of Mark 16/22 spent fuel. **Outcome: systematic use of the SRS canyons to carry out safely hazardous stabilization activities.**

High-Level Waste

! **Savannah River Site.** The Board issued Recommendation 96-1, *In-Tank Precipitation (ITP) System at the Savannah River Site*, to ensure that the generation of hazardous benzene associated with the ITP process would be adequately understood and controlled before operations commenced. Laboratory experiments confirmed the Board's concerns and led DOE to conclude that the ITP process, as designed, could not be operated productively and safely. DOE is currently evaluating treatment alternatives to ITP and conducting a related research and development program. While agreeing that each alternative being evaluated could be carried out safely, the Board has encouraged DOE to choose a salt-processing technology promptly to avoid impacts on other important SRS programs. In an effort to recover usable high-level waste storage space, DOE is returning Tank 49, formerly part of ITP, to a high-level waste storage

mission. The Board closely monitored this activity because of concerns related to the production and release of flammable benzene from the ITP remnants in Tank 49. The Board also reviewed safety controls related to potential explosions during the removal of high-level waste sludge from Tank 8, another high-level waste tank at SRS. The contractor modified the operating plan and installed an interlock to stop sludge mixing automatically upon detection of an elevated hydrogen concentration in that tank. SRS plans to take similar precautions in future waste retrieval activities. **Outcome: stronger safety controls on hazardous operations.**

! **Hanford Site.** In August 2000, the Board issued a letter to DOE concerning (1) the failure to maintain waste chemistry within specifications in four high-level waste tanks at Hanford, and (2) an inoperable annulus ventilation system believed to have led to significant corrosion of the primary liner surface within the annulus of another tank. These conditions were clearly inconsistent with the need to maximize tank life. In response, DOE has informed the Board that in 2001, a program to adjust the chemistry for the out-of-specification tanks will be undertaken, and inoperable annulus ventilation systems will be returned to service. DOE agreed to develop and implement safety-related controls for monitoring tank chemistry more closely and to develop action plans if out-of-specification conditions should occur in the future. **Outcome: stronger safety controls on high-level waste tanks.**

Low-Level Waste. In response to Board Recommendation 94-2, DOE had previously revised and reissued DOE Order 435.1, *Radioactive Waste Management*, to provide more comprehensive and effective requirements. During 2000 the Board discovered that DOE had informed the operating contractor at RFETS that several key provisions of the Order did not apply to that site because DOE did not consider it to be an operating facility. A letter from the Board led DOE to reverse this position. **Outcome: stronger safety controls on waste management.**

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. During the strategic planning period, the Board will evaluate proposed new technologies, review the application of Integrated Safety Management principles, and observe operations to confirm that decommissioning of excess defense nuclear facilities will be performed safely and in a timely manner. Board-identified issues will be resolved, or an adequate approach and schedule for resolution developed for these high-risk activities.

FY 2000 Performance Goal: The Board and its staff will conduct four assessments of the adequacy of plans, standards, procedures, and execution for four 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 activities are performed safely. Additionally, the Board and its staff will continue activities 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.

FY 2000 Performance: The goal was met. The Board continues to press DOE to safely decommission defense nuclear facilities posing a significant risk to workers or the public and no longer needed to fulfill national security missions. During 2000, the Board worked to achieve this key objective by reviewing a diverse set of disposition activities at sites across the defense nuclear complex.

A description of FY 2000 results follows.

Hanford Site. Board oversight has led to improved work planning, implementation, and hazard identification and analysis. Funding to support characterization of hazards in Building 224-T was provided as a direct result of the Board's discovery that no one had entered the process section of this facility in approximately 15 years and that the contents of the process cells were unknown. A Board letter issued in December 1999 caused DOE to form a multidisciplinary task force and hazard integration team. **Outcome: greater protection of workers in this facility.**

Rocky Flats Environmental Technology Site. To protect the safety of workers, the Board has urged DOE to develop engineered controls instead of relying on personal protective equipment. RFETS has recognized the need for improvement in this area. Development of ventilated chambers to reduce the airborne contamination hazard to workers represents significant progress in the use of enhanced engineered safety controls. Two generations of these "inner tent chambers" have been made operational in Building 771, and further advances are expected in 2001. **Outcome: greater protection of worker safety.**

Fernald Environmental Management Project. As a result of a March 2000 letter from the Board regarding weaknesses in waste characterization and hazard identification at Fernald Environmental

Management Project, the contractor has improved the safety of waste operations through more accurate waste characterization data and a more complete evaluation of hazards. **Outcome: improved operational safety.**

Decommissioning Activities at Miamisburg Environmental Management Project. The Board's review of the radiation protection program at the Miamisburg Environmental Management Project (MEMP) for decommissioning work in areas that may be contaminated with tritium compounds identified a need for additional training of the workforce. That training has since been provided. The Board's evaluation of MEMP's readiness to begin dismantling equipment potentially contaminated with tritium compounds led the site to upgrade the work packages for these operations and to commit to developing a new integrated work control program aimed at improving implementation of the ISM process. **Outcome: strengthened radiation protection and worker safety programs.**

LIST OF ABBREVIATIONS AND ACRONYMS

ACRR	Annular Core Research Reactor
APSF	Actinide Packaging and Storage Facility
CMR	Chemistry and Metallurgy Research
EUO	Enriched Uranium Operations
FEMP	Fernald Environmental Management Project
GIF	Gamma Irradiation Facility
GPRA	Government Performance and Results Act
HEPA	High-efficiency particulate air
INEEL	Idaho National Engineering and Environmental Laboratory
ISA	Instrument Society of America
ISM	Integrated Safety Management
ITP	In-Tank Precipitation
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
MEMP	Miamisburg Environmental Management Project
NNSA	National Nuclear Security Administration
NTS	Nevada Test Site
OPM	Office of Personnel Management
ORNL	Oak Ridge National Laboratory
ORR	Operational Readiness Review
PDCF	Pit Disassembly and Conversion Facility
RFETS	Rocky Flats Environment Technology Site
SNL	Sandia National Laboratories
SRS	Savannah River Site
SS-21	Seamless Safety for the 21st Century
TA	Technical Area
TEF	Tritium Extraction Facility
TRU	Transuranic
WIPP	Waste Isolation Pilot Plant
Y-12	Y-12 National Security Complex