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**ELEVENTH ANNUAL REPORT  
TO CONGRESS**

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**DEFENSE NUCLEAR FACILITIES  
SAFETY BOARD**



**FEBRUARY 2001**

26 February 2001

To the Congress of the United States:

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

As required by statute, the Board's report summarizes activities during calendar year 2000, assesses improvements in the safety of DOE defense nuclear facilities, and identifies remaining safety problems.

Respectfully submitted,

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## PREFACE

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

The Board is required to review and evaluate the content and implementation of health and safety standards, including DOE's Orders, rules, and other safety requirements, practices, and events relating to system design, construction, operation, and decommissioning of DOE's defense nuclear facilities. The Board then makes recommendations to the Secretary of Energy that the Board believes are necessary to ensure adequate protection of public health and safety. The Board must consider the technical and economic feasibility of implementing the recommended measures. The Secretary may accept in whole or in part or disapprove the recommendations. The Secretary must report to the President and Congress if implementation of a recommendation is impracticable because of budgetary considerations. Upon determining that an imminent or severe threat to public health or safety exists, the Board must transmit its recommendations to the President, and the Secretaries of Energy and Defense.

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

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



## EXECUTIVE SUMMARY

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

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

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

The most significant safety improvements follow.

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

- ! In response to the Board's Recommendation 99-1, *Safe Storage of Fissionable Material called "Pits,"* DOE repackaged 1014 plutonium pits into inert and safe environments.
- ! With Board oversight, DOE revised the Implementation Plan for Recommendation 98-2, *Safety Management at the Pantex Plant*, to enhance substantially the safety of all nuclear weapon-related work at the Pantex Plant.
- ! In response to the Board's efforts, DOE completed the reengineering of the operation used to disassemble and inspect the W76 warhead, to make it a safer, more efficient, and higher-quality process.
- ! In response to the Board's efforts, DOE began upgrading lightning protection at Pantex for all nuclear explosive operations.
- ! As a result of the Board's action at Pantex, DOE committed to accelerating replacement of a deteriorating plant-wide fire alarm system, upgrading the fire detection system, formalizing

fire protection controls, and improving the analytical methodology used in fire hazard analyses.

- ! In response to correspondence from the Board, DOE implemented interim compensatory controls for handling of certain canned subassemblies to ensure the safety of nuclear explosive operations at the Pantex Plant.
- ! As a result of the Board's action, DOE is developing policy and direction for the infrastructure of personnel, facilities, and procedures needed to dispose of damaged or recovered nuclear devices.
- ! As a result of the Board's efforts, DOE is pursuing corrective actions for the Lithium Hydride Production Facility at the Y-12 National Security Complex to address deficiencies in the process for identification and analysis of chemical hazards.
- ! To correct seismic vulnerabilities identified by the Board, DOE committed to implement additional safety features for the Y-12 National Security Complex Hydrogen Fluoride Supply System.
- ! To correct safety basis deficiencies identified by the Board, DOE developed a complete and defensible technical basis for safe operation of the Y-12 uranium chemical reduction process.
- ! In response to the Board's action, DOE developed a standards-based methodology for the design of containment vessels for a series of experiments at Los Alamos National Laboratory.

## **SAFE DISPOSITION OF THE HAZARDOUS REMNANTS OF NUCLEAR WEAPONS PRODUCTION**

- ! The Board issued Recommendation 2000-1, *Prioritization for Stabilizing Nuclear Materials*, urging DOE to expedite the stabilization of highest-risk remnant nuclear materials. This recommendation, in combination with the Board's Recommendation 94-1, *Improved Schedule for Remediation*, has led to substantial risk reduction.
- S At the Rocky Flats Environmental Technology Site, more than 28 tons of plutonium-bearing residues was packaged in a stable configuration, ready for shipment to the Waste Isolation Pilot Plant.
- S At the Hanford Site, stabilization of plutonium-bearing solutions and ash is underway, deteriorating plutonium metal items have been repackaged into a more stable configuration, and removal of fuel from the K-West spent fuel basin has begun.

- S At the Savannah River Site, dissolution of damaged and deteriorating targets and spent nuclear fuel continues, plutonium-bearing residues are being characterized and stabilized, and plutonium metal items are being packaged in seal-welded containers.
- S At the Los Alamos National Laboratory, DOE is working to improve its schedule and expedite the stabilization of its remnant nuclear material.
  
- ! In response to the Board's Recommendation 97-1, *Safe Storage of Uranium-233*, DOE finalized a standard for the stabilization, packaging, and storage of highly radioactive uranium-233 materials.
  
- ! In response to correspondence from the Board, DOE is reevaluating the selection and implementation of safety controls for the americium/curium vitrification system at the Savannah River Site.
  
- ! In response to correspondence from the Board, DOE will use a robust sand filter as the final barrier to the release of airborne contamination from the Pit Disassembly and Conversion Facility and the Plutonium Immobilization Plant at the Savannah River Site.
  
- ! As a result of the Board's action, DOE implemented enhanced controls to preclude the possibility of a hydrogen explosion during retrieval of high-level waste at the Savannah River Site.
  
- ! To correct deficiencies identified by the Board, DOE committed to implementing Technical Safety Requirements to control the high-level waste tank chemistry at the Hanford Site, correct the chemistry in four tanks, and return inoperable tank ventilation systems to service.
  
- ! Responding to a Board inquiry, DOE confirmed that the Rocky Flats Environmental Technology Site is subject to key provisions of DOE Order 435.1, *Radioactive Waste Management*.
  
- ! As a result of correspondence from the Board and subsequent self-assessments by the deactivation contractor, DOE implemented an improved process for identification and analysis of the hazards of deactivation activities at the Hanford Site.
  
- ! In response to the Board's findings, DOE took actions to improve the waste characterization and hazard evaluation of waste handling operations at the Fernald Environmental Management Project.
  
- ! Responding to the Board's emphasis on engineered controls for deactivation work, DOE has enhanced engineered controls for size reduction of contaminated equipment at the Rocky Flats Environmental Technology Site.



## COMPLEX-WIDE HEALTH AND SAFETY ISSUES

- ! The Board issued Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, seeking to reverse the degrading condition of vital safety systems and calling for actions to maintain the configuration and reliability of these systems.
- ! The Board issued technical report DNFSB/TECH-25, *Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities*, identifying deficiencies in software quality assurance and their root causes.
- ! The Board issued technical report DNFSB/TECH-26, *Improving Operation and Performance of Confinement Ventilation Systems at Hazardous Facilities of the Department of Energy*, identifying the degrading condition of nuclear material confinement systems at DOE's defense nuclear facilities.
- ! The Board issued technical report DNFSB/TECH-27, *Fire Protection at Defense Nuclear Facilities*, setting forth the technical concepts and principles important to fire safety.
- ! The Board issued technical report DNFSB/TECH-28, *Safety Basis Expectations for Existing Department of Energy Defense Nuclear Facilities and Activities*, to provide additional guidance for upgrading safety bases and implementing DOE's revised nuclear safety rule.
- ! The Board provided technical oversight to DOE in drafting and revising 41 directives to improve the content, clarity, and consistency of DOE's safety guidance.
- ! The Board issued a letter to DOE on the need to include appropriate safety requirement clauses in defense nuclear facility operating contracts.
- ! In response to the Board's Recommendation 95-2, *Safety Management*, DOE completed its Integrated Safety Management (ISM) System verifications and declared ISM fully implemented at all sites except the Los Alamos National Laboratory, the Y-12 National Security Complex, and the Nevada Test Site. DOE now has more than 140 Authorization Agreements in place, defining safety controls for hazardous work.
- ! In response to the Board's Recommendation 98-1, *Integrated Safety Management*, DOE developed a formal process and Web-based tracking system for addressing safety issues identified by DOE's Office of Independent Oversight.
- ! In response to correspondence from the Board, several sites began implementing a standards-based approach to the design of safety-significant instrumentation and control systems.

## OUTSTANDING SAFETY PROBLEMS OF DEFENSE NUCLEAR FACILITIES

Although many safety improvements were achieved in 2000, continued effort is needed to further reduce the risks associated with the mission of the nuclear weapons program. The most significant safety improvements being pursued by the Board during the next year are summarized below:

- ! *Maintain the direction and momentum of the ISM program.* In 1995, the Board issued Recommendation 95-2, *Safety Management*, urging DOE to integrate work planning and safety planning more effectively. The methodology that evolved from this recommendation and DOE's Implementation Plan is termed "Integrated Safety Management." The term "integrated" is used to indicate that all aspects of safety and work planning and performance are integrated into a single process under the responsibility of line management. ISM is a structured, comprehensive, common-sense approach to performing work safely. Through ISM, the Board has encouraged DOE to capture the essence of good practices developed for each of the sectors to be protected—the public, workers, and the environment—as well as for the major types of hazards—nuclear, chemical, and physical—and to effect these practices as an integrated whole. The basic tenets of ISM are expressed in the Implementation Plan, DOE Policy 450.4, *Safety Management System Policy*, and DOE Acquisition Regulations (DEAR) 48 CFR § 970.5204-2, *Integration of Environment, Safety and Health into Work Planning and Execution*. DOE's commitment to ISM has been affirmed by Secretaries O'Leary, Peña, and Richardson.
  
- ! *Maintain as serviceable and effective the protective features of defense nuclear facilities.* Most of the facilities of interest to the Board were constructed many years ago, and are encountering age deterioration. 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 take action to assess the current condition of vital safety systems, to strengthen system expertise, and to improve the self-assessment processes that should be used to continually evaluate the condition of these systems.
  
- ! *Stabilize and confine nuclear materials and waste stored in degrading conditions.* The shutdown of many defense nuclear facilities has led to numerous storage problems and steadily degrading storage conditions. Much of the nuclear material in these facilities has not been stabilized and packaged for long-term storage or prepared for ultimate disposition. In Recommendations 94-1, 95-1, 96-1, 97-1, and 99-1, the Board urged DOE to correct numerous storage problems resulting from the shutdown of many defense nuclear facilities. On January 14, 2000, the Board issued Recommendation 2000-1, *Prioritization for Stabilizing Nuclear Materials*, setting forth the Board's determination of the relative risk for certain materials remaining to be stabilized.

- ! *Apply the process known as Seamless Safety for the 21<sup>st</sup> Century (SS-21) to all warhead systems to improve the safety of processes and controls for nuclear weapon assembly, disassembly, and inspection.* The Board’s reviews of nuclear explosive program activities at Pantex reveal safety-related issues in areas such as the adequacy of safety analyses and controls, the flowdown of controls into operating-level procedures, and the readiness of activities to operate safely. These issues were particularly substantial in programs to which the SS-21 process had not been fully applied. In contrast, the final tooling, processing, facility layout, and control suite that ultimately resulted from the W76 SS-21 project are substantially improved and safer than the versions they replaced. Although the W76 SS-21 program involved numerous delays in implementation, the final results are outstanding. The Board urged DOE to duplicate and apply these results to similar warhead systems, thus substantially reducing the time and resources required to achieve the same objectives for other systems and amortizing the resources already expended on the W76. The expedited application of the SS-21 process to other warhead systems, and actions to improve and simplify the application of this process, have been captured in the revised Implementation Plan for the Board’s Recommendation 98-2.
  
- ! *Strengthen DOE’s technical competence.* Congress expected the Board “to raise the technical expertise of the Department substantially.” S. Rep. No. 232, 100<sup>th</sup> Cong., 1<sup>st</sup> Sess., 10 [1987]. The Board has encouraged DOE to develop and maintain a corporate program to recruit, develop, deploy, and retain technically capable personnel at defense nuclear facilities. DOE has made significant improvements through its implementation of Recommendation 93-3, *Improving DOE Technical Capability in Defense Nuclear Facilities Programs*. The challenge to attract, retain and effectively use top talent is never-ending, however, and is not restricted to DOE: it is an endemic federal recruitment problem. In a June 2000 letter to DOE, the Board again pointed out the need for increased attention on the part of senior line management at the DOE Headquarters level to improving 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.

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# 1. INTRODUCTION

## 1.1 BACKGROUND

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

Congress expected the Board to be an independent, expert agency capable of understanding the complexity of nuclear weapons facilities and operations. For that reason, Members of the Board are required by statute to be experts in the field of nuclear safety. The Board has, in turn, assembled a permanent staff with broad nuclear industry experience and competence in all major aspects of nuclear safety: nuclear, mechanical, electrical, chemical, and structural engineering, as well as physics and metallurgy. Currently, 92 percent of the Board's technical staff hold advanced degrees, of which 22 percent are at the Ph.D. level.

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

During the 11 years of the Board's operation, its priorities have evolved with changes in the nuclear weapons program. The Board uses its Strategic Plan under the Government Performance and Results Act (GPRA) to ensure that its limited resources remain focused on the most significant safety challenges, keeping pace with shifts in those challenges from year to year. All of the Board's safety activities are closely tied to goals and objectives embodied in this plan.

This Annual Report summarizes the Board's work during calendar year 2000. Sections 2, 3, and 4 describe progress in the three major areas of the Board's operations: safe management and stewardship of nuclear weapons, safe disposition of hazardous nuclear materials and facilities, and complex-wide safety issues. Section 5 addresses the Board's interactions with the public. Appendices A through E provide additional material, including the two formal recommendations issued by the Board during 2000 (Appendix A), an overview of the Board's four technical reports issued during 2000 (Appendix B), a listing of the Board's major correspondence issued during 2000 (Appendix C), a summary of administrative activities (Appendix D), and a list of abbreviations and acronyms used in this report (Appendix E).

## 1.2 GOALS AND OBJECTIVES OF THE BOARD'S STRATEGIC PLAN

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

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

With hazards from these activities and materials in mind, the Strategic Plan sets forth the Board's statutory mission, divided logically along the lines established by three general goals:

- ! *Safe stewardship of the nuclear weapons stockpile and components*—Nuclear weapons stockpile support and defense nuclear research activities continue to be planned and executed safely at DOE's defense nuclear facilities.
- ! *Safe disposition of hazardous remnants of weapons production*—Hazardous remnants of nuclear weapons production are appropriately characterized, stabilized, and stored, and legacy facilities are decommissioned in a manner that protects workers and the public.
- ! *Complex-wide health and safety issues*—Integrated Safety Management (ISM) (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.

As required by GPRA, the Strategic Plan breaks these three general goals down further into specific objectives to be accomplished. In its GPRA report for fiscal year 2000, the Board will describe progress made toward those specific objectives.

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

### 2.1 SAFE CONDUCT OF STOCKPILE MANAGEMENT

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

#### 2.1.1 Pantex Plant

The Pantex Plant, located near Amarillo, Texas, serves a central role in stockpile management. Operations at the site include the assembly, disassembly, dismantlement, and surveillance of nuclear weapons,<sup>1</sup> as well as interim storage of plutonium removed from retired weapons. Because of its importance, Pantex was the first site at which the Board placed a resident Site Representative in 1992, and two positions have been staffed there continuously since 1993.

**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. Based on the Board's understanding of the fiscal year 2001 budget for Pantex, however, several commitments appear already to be at risk of not being fulfilled, and DOE's commitment to completing operational improvements is weakening. In October the Board urged DOE to sustain its efforts and demonstrate that it has issued the direction necessary to complete its commitments.

**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.<sup>2</sup> 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. Continuing funding and personnel shortages have plagued this program, however, and the committed repackaging rate is not scheduled to be achieved until late fiscal year 2001.

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<sup>1</sup> The terms "disassembly" and "dismantlement" are not synonymous. Disassembly refers to the activities associated with taking apart a weapon for purposes of inspecting or testing its components, while dismantlement is a permanent action to render the weapon no longer usable.

<sup>2</sup> A pit is a central component of a nuclear weapon, typically containing plutonium.



**Specific Nuclear Explosive Program Activities.** During the past year, 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 21<sup>st</sup> Century (SS-21) W76 Disassembly & Inspection Program. The reviews revealed safety-related issues in areas such as the adequacy of safety analyses and controls, the flowdown of controls into operating-level procedures, and the readiness of activities to be conducted safely. These issues were particularly substantial in programs to which the SS-21 process had not been fully applied. In contrast, the final tooling, processing, facility layout, and control suite that ultimately resulted from the W76 SS-21 project are substantially improved and safer than the versions they replaced. Although the W76 SS-21 program involved numerous delays in implementation, the final results are outstanding. DOE would do well to consider adapting the W76 SS-21 program to similar warhead systems, thus substantially reducing the time and resources required to achieve the same objectives for other systems and amortizing the resources already expended on the W76. The application of the SS-21 process to other warhead systems has been captured in the revised Implementation Plan for the Board's Recommendation 98-2.

**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. However, the Board continues to identify issues associated with implementation and management of the safety-class controls defined at Pantex, including safety-class lightning protection controls.

**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.

**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.

### **2.1.2 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. Since September 1994, when DOE shut down all Y-12 nuclear production activities to address various safety issues, actions at the site have been focused on sequentially restarting operations. Operations have been restarted in Receipt, Storage, and Shipment; Depleted Uranium Operations; Quality Evaluation; the Disassembly and Assembly Facility; and selected processes in Enriched Uranium Operations (EUO). Actions are now under way to begin a new dismantlement campaign and several processes in EUO.

**Dismantlement.** Early in 2000, Y-12 began preparations for the first new weapon dismantlement campaign in more than 5 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. As the year ended, DOE and the contractor were progressing toward correcting these deficiencies prior to authorizing startup of the campaign.

**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. Startup is currently planned for spring 2001.

**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.

**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. By April 2000, DOE had developed and begun to implement a corrective action plan for addressing these issues. In July 2000, however, DOE and the contractor claimed that financial constraints had forced them to suspend much of the implementation of the plan and to focus management resources on developing project-specific solutions for the new Y-12 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 latter facility did not include high-efficiency particulate air

(HEPA) filters on the heating, ventilation, and air conditioning system for protection of the public from accidental release of hazardous materials from the building; 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. With the recent replacement of the Y-12 operating contractor, the Board has urged the site to refocus and reinvigorate efforts to resolve these issues.

**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. As a result of the Board's identification of these issues, Y-12 has proposed corrective actions for the Lithium Hydride Production Facility to address the root cause of the facility's poor safety history: complacency concerning the hazards inherent in handling the materials in the facility.

**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. At present, however, this action remains incomplete.

**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. As a result of these reviews, DOE responded with a letter that committed to improving the analysis and control of hazards at Y-12.

### 2.1.3 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). The Tritium Area Office Manager reports directly to NNSA's Deputy Administrator for Defense Programs.

**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.

**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*.

## 2.2 SAFE CONDUCT OF STOCKPILE STEWARDSHIP

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

### 2.2.1 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 analysis 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.

**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. The review team's recommendations are being implemented at LANL, and contract modifications now require upgrading specific facilities on a well-defined schedule. In a March 2000 letter, the Board advocated that similar assessments be performed across the complex.

**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. As a result of the Board's efforts, 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. LANL has now implemented the 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. LANL has indicated that the Blue Ribbon Panel has been effective in helping the laboratory make the transition from an expert-based approach for developing and implementing safety requirements to a standards-based approach. Late in 2000, 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.

### 2.2.2 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. Most defense nuclear activities are

conducted in the Superblock complex, which includes the Building 332 Plutonium Facility and the Tritium Facility.

**Safety Basis Improvement Program.** 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. In response, LLNL has prepared a corrective action plan and has begun establishing a centralized authorization basis group.

### **2.2.3 Sandia National Laboratories**

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

**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.

**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. Upon closeout of several pre-start and post-start findings identified during the DOE ORR, the new GIF is expected to become operational in 2001.

## 2.2.4 Nevada Test Site

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

**Subcritical Experiments.** DOE's subcritical experiments program is a vital research component of its stockpile stewardship program. 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.

**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. DOE is devising a path forward for developing an infrastructure of personnel, facilities, and procedures.

### 3. SAFE DISPOSITION OF HAZARDOUS REMNANTS OF WEAPONS PRODUCTION

#### 3.1 STABILIZATION AND STORAGE OF REMNANT MATERIALS

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 the 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. The Board believes the need to stabilize and confine unsafe material has the utmost urgency. On January 14, 2000, the Board issued Recommendation 2000-1, *Prioritization for Stabilizing Nuclear Materials*, setting forth the Board's determination of the relative risk for the materials remaining to be stabilized. This Recommendation also cited Atomic Energy Act provisions requiring the Secretary of Energy to report situations in which timely implementation of a Board Recommendation is impracticable because of budget constraints.

##### 3.1.1 Plutonium

With the end of active weapons production, plutonium was left throughout the DOE weapons complex in many unstable forms and in packaging suitable only for short-term storage. If plutonium-bearing materials are allowed to remain in unstable forms or unsafe storage configurations, the materials and their containers will continue to degrade. The resulting hazards include storage container failure and fires/explosions caused by pyrophoric plutonium hydrides and hydrogen gas.

**Savannah River Site.** A major goal of Recommendation 94-1 was to encourage DOE to fully implement its standard for long-term storage of plutonium within a reasonable period of time, which the Board expected to be about 8 years. The storage standard requires the material to be stabilized and then packaged into specially designed seal-welded inner and outer containers. DOE's Implementation Plan for Recommendation 94-1 included a commitment to meet this standard within the recommended time by performing stabilization and packaging operations in the proposed Actinide Packaging and Storage Facility (APSF). In late 1998, DOE decided to delay the APSF project, and the project was subsequently canceled. The cancellation of APSF left SRS with no capability to meet the long-term storage standard for plutonium and eliminated 5,000 planned storage locations. Recognizing these problems, the Board wrote to DOE in July 2000 suggesting that, at a minimum, interim packaging at SRS should be upgraded by 2002 to meet DOE's interim safe storage criteria for plutonium. The Board also suggested that DOE accelerate its stabilization and packaging efforts at SRS by installing (in the FB-Line facility) packaging equipment similar to that already designed by SRS for use at the Hanford Site. DOE is presently studying this issue. The Board expects that DOE will identify a cost-effective approach to accelerated risk reduction in early 2001.

Despite these delays, SRS continued to make progress in reducing risk using existing facilities. Characterization and stabilization of plutonium-bearing residues continued in FB-Line and HB-Line, and packaging of plutonium metal items in seal-welded containers resumed in FB-Line.



**Los Alamos National Laboratory.** Responding to letters from the Board identifying 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. DOE is currently developing its response to the issues identified by the Board.

**Hanford Site.** In response to the Board's 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 was stabilized, 88 kilograms of ash was 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 unstabilized plutonium. In response to the Board's admonitions, 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 to minimize the formation of pyrophoric plutonium hydrides, and accelerated the repackaging of plutonium metal that had become unstable as a result of excessive corrosion.

**Rocky Flats Environmental Technology Site.** Although the Rocky Flats Environmental Technology Site (RFETS) has made progress toward responding to the Board's 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.

During 2000, the contractor repackaged approximately 7.5 metric tons of salt residues, 11 metric tons of ash residues, 6 metric tons of wet combustible residues, and more than 4 metric tons of dry residues for disposal at the Waste Isolation Pilot Plant.

### **3.1.2 Uranium**

**Savannah River Site.** DOE's strategy for stabilization, storage, and disposition of the highly enriched uranium solutions at SRS in response to the Board's Recommendations 94-1 and 2000-1 is to blend down the solution to low enrichment (less than 5 percent uranium-235) and transfer the material to a vendor for fabrication of commercial reactor fuel. The Tennessee Valley Authority, DOE's partner in this venture, plans to use the fuel in its electric power reactors. DOE expects to ratify an interagency agreement for this approach by early 2001 and to complete stabilization and transfer of the

downblended material to the Tennessee Valley Authority in 2005. The Board continues to press DOE to stabilize these materials, eliminating the hazards of storage of highly enriched uranium in liquid form.

**Oak Ridge National Laboratory.** Uranium-233 ( $^{233}\text{U}$ ) is a man-made radioisotope that contains uranium-232 ( $^{232}\text{U}$ ) as an unavoidable contaminant; products of the decay of  $^{232}\text{U}$  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  $^{233}\text{U}$  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  $^{233}\text{U}$  materials.

During 2000, the Board reviewed ORNL's preparations for performing the  $^{233}\text{U}$  inspection and repackaging program, as well as the laboratory's efforts to address problems with the program identified by the Board. As a result of the Board's findings, 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.

DOE is currently exploring a new option for  $^{232}\text{U}$  disposition. Congressman Joseph Knollenberg of Michigan wrote to Secretary Richardson on January 31, 2000, urging DOE to consider turning over this material to the private sector for use in clinical studies of cancer treatment. DOE accepted this suggestion and has issued a request for bids from the private sector. Proper safety controls will still be required for successful implementation of this  $^{232}\text{U}$  Medical Use Program.

**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. During 2000, DOE reevaluated the response of this complex structure to potential seismic events, taking into account dynamic loading of the bermed soil surrounding the structure. This reanalysis demonstrated that the structure is capable of withstanding the postulated seismic loading without roof collapse. In parallel with this analytical effort, DOE is considering expediting the packaging and transfer of this material to SRS for processing and disposition.

### 3.1.3 Special Isotopes

The Board's Recommendation 2000-1 highlighted the hazards of storing nuclear materials in solution form, especially solutions of special isotopes stored in the SRS canyon facilities.

**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. Review by the Board of the system design revealed several deficiencies in the selection and implementation of safety controls, and DOE is currently working to resolve them.

**Neptunium.** SRS has 6,000 liters of neptunium-237 nitrate solution in the H-Canyon. In its current Implementation Plan for Recommendation 94-1, DOE commits to stabilizing and packaging this material by December 2006. SRS is preparing to start the HB-Line Phase 2 process, which has never operated, in late 2001. After stabilization of plutonium solutions, DOE plans that this process will be used to stabilize neptunium solutions. Eventually, this neptunium is to be irradiated to produce plutonium-238 for radioisotopic thermoelectric generators for future missions of the National Aeronautics and Space Administration. The Board has begun reviewing the design and safety basis for HB-Line Phase 2, and will thoroughly assess the safety of these operations before they commence in 2001.

## **3.2 PLUTONIUM DISPOSITION**

On September 2, 2000, the United States and Russia signed an agreement regarding the disposition of surplus weapon-grade plutonium. One result of this agreement is a plan to construct three new facilities at SRS. The Pit Disassembly and Conversion Facility (PDCF) is planned to convert up to 34 metric tons of weapon components and plutonium metal to unclassified plutonium oxide. Most of the plutonium oxide produced in PDCF would be sent to the Mixed-oxide Fuel Fabrication Facility, planned to be operated at SRS subject to Nuclear Regulatory Commission licensing. The Plutonium Immobilization Plant would immobilize 13 metric tons of plutonium. In the Plutonium Immobilization Plant, plutonium would be processed into ceramic pucks, which would then be encased in vitrified high-level waste at the SRS Defense Waste Processing Facility for storage on site at SRS, awaiting eventual disposal in a geological repository.

### **3.2.1 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. In December 2000, DOE completed its analysis of this issue and decided to use sand filters for both PDCF and the Plutonium Immobilization Plant.

### **3.2.2 Plutonium Immobilization Plant**

The ceramic pucks produced at the Plutonium Immobilization Plant are a titanate-based ceramic with gadolinium and hafnium added for criticality safety. Approximately 300,000 pucks will be produced during the plant's planned 10-year operational life. LLNL is currently performing design, development, and testing of the process; detailed facility design is expected to begin in July 2001.

To meet stringent specifications on radioisotopes and impurities, precise blending of the various feed streams will be required. The blending scheme depends heavily on process knowledge for the characterization of feed streams, and requires the timely availability of specific types of material from geographically diverse sources. Furthermore, the blending must be accomplished in small batches because of criticality considerations. The Board is currently reviewing the design and development data, and expects to perform additional reviews of the blending requirements and safety controls for handling and processing operations.

### **3.3 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.

#### **3.3.1 Hanford Site**

The Spent Nuclear Fuel Project at the Hanford Site is a high-priority action being conducted in response to the Board's 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. These safety reviews are being summarized in a Board technical report. Increased attention on the part of DOE and contractor management throughout the year and continued oversight by the Board culminated in the start of spent fuel removal from the K-West Basin in December 2000.

Recently, the project determined that the current strategy for fuel removal cannot meet the commitments in DOE's Implementation Plan for Recommendation 94-1 without the addition of new equipment, a reevaluation of existing safety controls, and improvements in operating efficiency. A revised strategy, which accelerates the removal of K-East fuel, was proposed to reduce the risks associated with moving this fuel, but was not developed sufficiently to allow adequate evaluation by DOE and was subsequently withdrawn. The Board recognizes that storage of fuel in the K-East Basin beyond the dates currently established in DOE's Implementation Plan will further increase the risk of releasing this material. DOE and its contractor must evaluate existing operations, gain needed experience, make improvements in operating efficiency, and develop strategies necessary to safely remove and stabilize the spent fuel currently stored in these basins as rapidly as practicable.

#### **3.3.2 Savannah River Site**

**Canyons.** 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. Accomplishments included completing dissolution of Experimental Breeder Reactor II fuel elements and Mark 42 targets, and continuing processing of Mark 16/22 spent fuel.

Section 3137 of the fiscal year 2001 Defense Authorization Act requires DOE to submit a plan to Congress by February 15, 2001, on the use of the SRS canyons. The act also requires DOE and the Board to certify jointly that "all materials present in the F-Canyon facility as of the date of certification are safely stabilized" before decommissioning of F-Canyon may begin. A complete and accurate inventory of material potentially requiring processing in the canyons must be assembled before these matters can be determined. The Board has pressed DOE to complete the inventory, but DOE is not yet able to demonstrate that its list is complete, particularly with regard to material not presently managed by DOE's Office of Environmental Management. Much work remains to be done before DOE will be in a position to choose stabilization pathways for each type of remnant material and to develop a plan for future utilization of the F- and H-Canyon facilities.

**L-Area Experimental Facility.** A large inventory of non-defense-related spent nuclear fuel is in wet storage in defense nuclear facilities at SRS. This inventory is expected to increase steadily for approximately 10 years before leveling off, as more civilian research reactor programs are terminated. This aluminum-clad fuel cannot be left in wet storage indefinitely and will likely require treatment before ultimate disposal. DOE currently plans to melt the fuel, dilute it with depleted uranium, and cast it into ingots for disposal.

To validate its melt-and-dilute treatment concept, DOE has constructed and operated a simulator and has completed the final design for the L-Area Experimental Facility. The facility is scheduled to be built in a wing of the L-Reactor Building at SRS, and to melt six to eight spent nuclear fuel assemblies, one at a time, during an 18-month period. The Board has reviewed the final design of the L-Area Experimental Facility, and will review the safety documentation for the facility once it has been completed. Operation of a full-scale melt-and-dilute facility was initially planned for 2005, but has slipped to 2008. The Board previously issued DNFSB/TECH-22, *Savannah River Site Spent Nuclear Fuel*, which questioned the overall feasibility of the melt-and-dilute concept.

## 3.4 WASTE MANAGEMENT

### 3.4.1 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 (e.g., the Defense Waste Processing Facility, canyon operations, and tank farm operations).

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. In response to issues identified by the Board, 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.

**Hanford Site.** In August 2000, the Board issued a letter to DOE concerning the failure to maintain waste chemistry within specifications in four high-level waste tanks at Hanford, and 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.

### 3.4.2 Low-Level Waste

In response to the Board's 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.

### **3.4.3 Transuranic Waste**

With the opening of the Waste Isolation Pilot Plant (WIPP) in March 1999 for the receipt and permanent disposal of transuranic (TRU) waste, the various DOE sites began preparations to process and ship TRU wastes to WIPP. As of the close of 2000, LANL, RFETS, INEEL, and Hanford were sending TRU waste shipments to WIPP; SRS, ORNL, and a number of “small-quantity sites” were undertaking preparations for future shipments. To support these activities, plans were under way at WIPP to perform on-site characterization of wastes from the small-quantity sites and to modify systems and equipment in anticipation of proposed disposal of remote-handled TRU. Elsewhere, safety-related TRU waste activities being evaluated by the Board included the startup of construction of the Advanced Mixed Waste Treatment Project at INEEL and completion of the design for the Melton Valley Transuranic Waste Treatment Project at ORNL. The Board’s oversight of these activities included reviews of the safety bases for these projects, as well as the ramp-up of disposal operations and preparations to receive remote-handled TRU at WIPP.

## **3.5 FACILITY DECONTAMINATION AND DECOMMISSIONING**

The Board continues to urge DOE to pursue aggressively the safe decommissioning of those defense nuclear facilities that pose a significant risk to workers or the public and are 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. These reviews included evaluations of site programs used to identify, prioritize, plan, and implement facility disposition activities at Hanford, INEEL, SRS, and Y-12; and the planning, preparation, and/or implementation of selected work activities at RFETS, Hanford, Miamisburg Environmental Management Project (MEMP), Fernald Environmental Management Project (FEMP), and Y-12. Examples of the Board’s oversight activities in this area are highlighted below.

### **3.5.1 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.

### **3.5.2 Hanford Site**

Hanford’s environmental restoration contractor has improved work planning and implementation. Actions this year by a multidisciplinary task force and hazard integration team have resulted in a new hazard identification and analysis process. These actions respond to the Board’s December 1999 letter identifying work planning issues and to a January 2000 contractor self-assessment for ISM verification.

Funding to support characterization of hazards for Hanford’s Building 224-T has been provided as a direct result of the Board’s continuing interest. Last year, the Board discovered 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. The Board will continue its oversight of DOE's development of plans for entry and characterization of hazards in 2001.

### **3.5.3 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. The development of ventilated chambers to reduce the airborne contamination hazard to workers performing size reduction of gloveboxes and other equipment 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.

### **3.5.4 Y-12 National Security Complex**

Building 9206 at Y-12 is a Hazard Category 2 nuclear facility currently functioning in a standby mode as an in-process storage building. Deactivation and material stabilization have resulted in some risk reduction, but the hazards of most concern to the Board persist. In a letter sent to DOE in May 2000, the Board addressed inadequacies in DOE's actions to accelerate stabilization of fissile materials in Building 9206 and the need to commit adequate resources to this task. In a follow-up letter in October 2000, the Board restated the importance of rendering unstable materials safe as soon as possible, and proposed that DOE reevaluate the findings and suggestions provided in the Board's May letter. The Board will continue to urge DOE to pursue more timely hazard reduction in Building 9206.





## 4. COMPLEX-WIDE HEALTH AND SAFETY ISSUES

During 2000, the Board undertook a broad range of activities to address health and safety issues across the defense nuclear complex. These issues fall into three general areas: implementation of ISM, improvement and implementation of health and safety directives, and improvement and maintenance of technical competence among DOE personnel.

### 4.1 IMPLEMENTATION OF INTEGRATED SAFETY MANAGEMENT

#### 4.1.1 Complex-wide Implementation of Integrated Safety Management

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

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

Since the Board's initial recommendation, the implementation of ISM has progressed through three phases: (I) developing necessary guidance documents; (II) establishing the infrastructure for implementing ISM at individual sites and facilities, including instructing leaders and workers in the application of ISM; and (III) confirming that ISM Systems are effective and being applied to all stages of each facility's life cycle—design and construction, startup, operation, and decommissioning. At the end of 1999, the implementation of ISM was well into the second phase. With the successful completion of the ISM System Verification Reviews at most sites during 2000, the Board's ISM implementation efforts have begun to shift to the third phase.

Throughout 2000, the Board encouraged DOE to look beyond Phase II implementation to determine what actions will be required to ensure that ISM programs continue to improve. As a result, in a letter dated September 28, 2000, the Deputy Secretary outlined actions that will focus DOE's attention on ensuring that ISM provides a central, enduring framework for protecting the public, workers, and the environment.

To foster complex-wide ISM implementation for design and construction activities, the Board established a dialogue with DOE and several of its contractors during 2000, offering its views on how ISM principles should be applied at this early stage in a facility's life cycle. DOE responded by incorporating significant guidance in this regard in its interim manual, *Program and Project Management*. This guidance is based on the premise that ISM is an integral part of project

management. The Board's reviews of specific design and construction projects, focused on evaluating whether safety has been adequately addressed, are described in Sections 2 and 3.

#### **4.1.2 Site-specific Implementation of Integrated Safety Management**

The Board has monitored and guided DOE's implementation of ISM on a continuing basis since Recommendation 95-2 was issued. Initial efforts focused on 53 facilities involving the most significant nuclear hazards. More than 140 facilities or major activities are now operating within the bounds of signed Authorization Agreements. This accomplishment is a notable outcome of the Board's ISM initiative and a substantial measure of DOE's safety management improvements.

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 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.

#### **4.1.3 Feedback and Improvement**

The Board issued Recommendation 98-1, *Integrated Safety Management*, to address weaknesses with the feedback and improvement element of ISM. The Board was concerned that safety issues being identified by DOE's Office of Independent Oversight (EH-2) were not being addressed by DOE's line managers. In response to the Recommendation, DOE completed development of a formal corrective action management process for addressing safety issues in a systematic manner. Also in 2000, DOE completed the incorporation of this corrective action management process into its directives system. The process includes a Web-based system for tracking the status of corrective actions.

Throughout 2000, the Board worked with DOE to improve the corrective action management process. This effort included holding two public meetings and issuing subsequent reporting requirements on February 16, 2000, and July 20, 2000, to focus on issues associated with the process. The final step in DOE's implementation of Recommendation 98-1 was to perform a review to verify that the process was fully implemented. The Board worked closely with DOE to ensure that the team composition and review criteria were adequate. The review showed that good progress had been made toward incorporating the process into DOE's way of doing business. Despite this substantial

progress, however, two issues identified by the review need to be addressed. First, the documentation of roles, responsibilities, authorities, and procedures covering the program needs to be completed and strengthened to ensure that the program will continue to function as intended. Second, a process is required for proactively incorporating lessons learned from corrective actions into other programs and activities. Further efforts by the Board and DOE will be needed to resolve these issues.

## **4.2 IMPROVEMENT AND IMPLEMENTATION OF HEALTH AND SAFETY DIRECTIVES**

### **4.2.1 Review and Improvement of New or Revised Health and Safety Directives**

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. Specific examples follow.

**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.

**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. At year's end, several open issues remained, and consultation between the Board and DOE is continuing.

**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*.

**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. This handbook should provide an excellent resource in the area of chemical safety at defense nuclear facilities and could serve as a model for future handbooks.

**Adequate Contractual Requirements.** The Board's 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.

#### **4.2.2 Implementation of Health and Safety Directives**

During 2000, the Board provided oversight of DOE's implementation of its health and safety directives. Where needed, the Board took actions to improve this implementation. Several examples follow.

**Authorization/Safety Basis Upgrades.** In a March 2000 letter, the Board emphasized the need to upgrade safety basis documents as part of the post-September 2000 implementation of ISM at defense nuclear facilities. In line with this effort, the Board transmitted DNFSB/TECH-28, *Safety Basis Expectations for Existing Department of Energy Defense Nuclear Facilities and Activities*, for consideration by DOE and its contractors in upgrading authorization/safety bases in response to the recently amended nuclear safety rule.

**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). 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. The Board's 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.

**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, which are expected to occur in early 2001.

**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. Ensuring the validity and proper application of such software is essential to safety management. 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 overall assessment in DNFSB/TECH-25 and agreed to provide a report outlining a corrective action plan. In October 2000, DOE submitted this corrective action plan, but the Board noted that the proposed actions would not fully resolve the issues raised. DOE has proposed that a Safety Analysis Software Group be convened promptly to address this matter.

**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 dated February 7, 2000, 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. Several DOE sites have since adopted the ISA 84.01 standard, and other sites are reviewing it for possible use. This represents a reasonable first step toward implementing a standards-based approach to the design of these systems.

#### **4.3 IMPROVEMENT AND MAINTENANCE OF TECHNICAL COMPETENCE**

The Board has encouraged DOE to develop and maintain a corporate program to recruit, develop, deploy, and retain technically capable personnel at defense nuclear facilities.<sup>3</sup> DOE made

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<sup>3</sup> Congress expected the Board "to raise the technical expertise of the Department substantially." S. Rep. No. 232, 100<sup>th</sup> Cong., 1<sup>st</sup> Sess., 10 [1987].

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 improving 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.

The Board's Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, discussed earlier, 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.

During 2000, DOE worked toward completing the remaining commitments made in response to the Board's Recommendation 97-2, *Continuation of Criticality Safety*. Recommendation 97-2, in addition to providing the focus and emphasis for a broad base of analytical and experimental criticality safety analyses, provided direction for training and qualification of criticality safety specialists. The remaining commitments in DOE's Implementation Plan for this Recommendation would improve site-specific criticality safety training and qualification programs for contractors and ensure the qualification of federal criticality safety personnel. Although these commitments had not been completed by year's end, they are expected to be completed by spring 2001.

## **5. INFORMING THE PUBLIC**

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

### **5.1 PUBLIC MEETINGS**

During 2000, the Board conducted five public meetings. Two meetings held in the Board's Washington, D.C., headquarters centered on the Board's follow-up of DOE's Implementation Plan for Recommendation 95-2, *Safety Management*. In the first of these meetings, testimony from the Director of DOE's Safety Management Implementation Team; the Office of Environment, Safety and Health; and representatives of the Idaho and Albuquerque Operations Offices focused on implementing ISM, sharing lessons learned, and institutionalizing ISM. In the second meeting, testimony on DOE-wide ISM implementation and management of corrective actions was provided by the Principal Assistant Deputy Administrator for Operations; DOE's Director of the Office of Safety, Health, and Security; the Director of DOE's Safety Management Implementation Team; and representatives of the Richland and Oak Ridge Operations Offices.

Nearly 200 members of the public participated in three informal open meetings held in conjunction with the Board's visits to DOE's defense nuclear facilities. Informal meetings offer the public and employees of both DOE and its contractors an opportunity to provide comments and information directly to the Board regarding any matters affecting health and safety. The first of these meetings, focused on worker safety, was held in February in Amarillo, Texas, as part of the Board's visit to the Pantex Plant. The second meeting was held in Oak Ridge, Tennessee, to address safety concerns related to the Y-12 National Security Complex. For the third meeting, the Board met with citizens in Aiken, South Carolina, to discuss the Savannah River F- and H-Canyon facilities, stabilization and storage of uranium and plutonium, and management of high-level waste.

### **5.2 RESPONSE TO PUBLIC REQUESTS**

The Board responded to numerous public requests for documents and information during 2000. Some of these requests were satisfied by inviting members of the public to use the Board's Public Reading Room in Washington, D.C. Other informal requests were handled by promptly sending written materials. The Board responded to 42 requests filed under the Freedom of Information Act. The average response time was 4 days as compared with the statutory requirement of 20 working days. The Board has posted on its website a complete list of such requests received since the beginning of 1997.



### **5.3 INQUIRIES INTO HEALTH AND SAFETY ISSUES**

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

During 2000, the Board directed inquiries into health and safety issues at DOE headquarters, LLNL, Hanford, SRS, ORNL, FEMP, and MEMP. The SRS inquiry led to improvements in the positive isolation of potentially asphyxiating gas. The MEMP inquiry resulted in improved technical qualifications for certain supervisors and strengthened radiological work controls. The LLNL inquiry brought about a review by the Board of the electrical distribution system.

### **5.4 SITE REPRESENTATIVE OUTREACH ACTIVITIES**

The Board has established site offices at five major DOE sites: the Savannah River Site, the Y-12 National Security Complex, the Pantex Plant, the Hanford Site, and the Rocky Flats Environmental Technology Site. Members of the Board's technical staff are assigned to these site offices as resident representatives of the Board. One important function of these Site Representatives is to serve as the Board's liaison with the local community. This function is accomplished through a variety of interactions with local citizens and organizations. These interactions include attendance and presentations at citizen advisory board meetings; presentations to leaders of local organized labor and to city, county, and federal elected officials or their staffs; discussions with state regulatory officials; and responses to inquiries from local citizens and the media.

### **5.5 WEBSITE**

The Board's website ([www.dnfsb.gov](http://www.dnfsb.gov)) provides immediate access to the Board's Recommendations, letters, technical reports, press releases, testimony, speeches, legislation, rules, and annual reports. The site also provides guidance on how to request documents from the Board under the Freedom of Information Act. An upgrade of the website is planned for calendar year 2001 to make it more user-friendly. The website is fully compliant with Section 508 of the Rehabilitation Act of 1973, as amended.

**APPENDIX A**

**RECOMMENDATIONS 2000-1 and 2000-2**



public interests underlying both the Sunshine Act and the Board's enabling legislation.

**MATTERS TO BE CONSIDERED:** The Board is visiting the Pantex Plant as a part of its oversight of the Department of Energy's (DOE) defense nuclear facility safety management program. The Board's enabling legislation requires health and safety oversight encompassing design, construction, operation and decommissioning activities.

The Board wishes also to avail itself of the opportunity of this visit to meet with the stakeholders and local members of the public. The session is intended to be informal and to provide an opportunity for members of the public, DOE, and its contractor employees or their representatives to comment on or provide information directly to the Board regarding matters affecting health or safety at Pantex.

**CONTACT PERSON FOR MORE INFORMATION:**

Richard A. Azzaro, General Counsel, Defense Nuclear Facilities Safety Board, 625 Indiana Avenue, NW., Suite 700, Washington, DC 20004, (800) 788-4016. This is a toll-free number.

Dated: January 24, 2000.

**John T. Conway,**  
*Chairman.*

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**BILLING CODE 3670-01-M**

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

**[Recommendation 2000-1]**

**The Need to Stabilize and Safely Store Large Amounts of Fissionable and Other Nuclear Material That for Safety Reasons Should Not Be Permitted to Remain Unremediated**

**AGENCY:** Defense Nuclear Facilities Safety Board.

**ACTION:** Notice, recommendation.

**SUMMARY:** The Defense Nuclear Facilities Safety Board has made a recommendation to the Secretary of Energy pursuant to 42 U.S.C. § 2286a(a)(5) concerning the need to stabilize and safely store large amounts of fissionable and other nuclear material that for safety reasons should not be permitted to remain unremediated.

**DATES:** Comments, data, views, or arguments concerning this recommendation are due on or before February 25, 2000.

**ADDRESSES:** Send comments, data, views, or arguments concerning this recommendation to: Defense Nuclear Facilities Safety Board, 625 Indiana Avenue, NW, Suite 700, Washington, DC 20004-2901.

**FOR FURTHER INFORMATION CONTACT:**

Kenneth M. Pusateri or Andrew L. Thibadeau at the address above or telephone (202) 694-7000.

Dated: January 20, 2000.

**John T. Conway,**  
*Chairman.*

**Recommendation 2000-1**

It is now almost six years since the Defense Nuclear Facilities Safety Board (Board) transmitted to the Secretary of Energy its Recommendation 94-1 entitled, "Improved Schedule for Remediation in Defense Nuclear Facilities Complex." That Recommendation pointed to the existence of large quantities of unstable fissionable material and other radioactive material that had been left in the production pipeline following termination of nuclear weapons production. These materials required prompt conversion to more stable forms, to prevent deterioration leading to inevitable spread of radioactive contamination. Further, some of the material was in such a state that serious safety problems could be expected in a very short period of time if remediation did not take place.

The Recommendation identified safety problems posed by plutonium both as metal and in chemical compounds, and plutonium-bearing materials such as residues and spent nuclear fuel. Most of this material was and still is at three sites: Savannah River, Hanford, and Rocky Flats Environmental Technology Site (RFETS). A substantial amount of spent nuclear fuel also existed at the Idaho National Engineering and Environmental Laboratory. In the Implementation Plan responding to the Recommendation, the Department of Energy (DOE) justifiably saw fit to add to the sources of concern the enriched uranium solution stored at the Savannah River Site, accumulated from processing of spent nuclear fuel, and the highly radioactive uranium-233 in the decommissioned Molten Salt Reactor Experiment (MSRE) at the Oak Ridge National Laboratory. The highly enriched uranium solution, amounting to many thousands of gallons of liquid, is stored outside the H-Canyon in large tanks where over a period of time precipitation resulting from freezing, chemical changes, or evaporation of liquid could produce sediments posing a threat of accidental

criticality. The MSRE has been shut down for many decades, and deterioration, the onset of which had already been detected, could in time release its radioactive material into the environment.

**Materials Stabilized Since the Recommendation**

In the years since the Recommendation, progress has been made at defense nuclear facilities in remediating the most hazardous material. Most sites have repackaged plutonium metal and oxides that had been left in containers in contact with plastic that could become a source of hydrogen gas. Deteriorating spent nuclear fuel elements stored in the 603 Basin at the Idaho National Engineering and Environmental Laboratory have been moved to the 666 Basin where control of water purity is much better. Substantial amounts of spent nuclear fuel elements and nuclear targets stored in basins at the Savannah River Site have been chemically processed and plutonium and other radioactive material so extracted have been stored. Most of the plutonium in solution at the Savannah River Site has been converted to metal and along with other plutonium metal at the Site has been packaged in seal-welded containers with inert atmospheres by means of the bagless transfer system. Almost all of the plutonium-bearing solutions in facilities at the RFETS have been chemically treated to remove the plutonium, which has then been stored as more stable oxide. Numerous drums containing radioactive residues, mostly at the RFETS, have been vented to prevent buildup of pressure by gas liberated through chemical reactions and by effects of radioactive decay. Though non-technical problems continue to plague actions to store nuclear waste in the Waste Isolation Pilot Plant (WIPP) facility in New Mexico, some storage at that site has taken place, and presumably momentum will build toward highly important shipment of more material to that disposal site. In these ways, most of the very immediate concerns prompting the Recommendation have been eased.

Furthermore, after a long period when it seemed that little was being accomplished, progress has been made toward cleanup of the important K-East and K-West fuel storage basins at the Hanford Site. Remediation of many of the cleanup problems at the RFETS has taken on momentum after a long initial period when little was accomplished. Some of the most notable advances have been made by arrangements to ship plutonium-bearing material to the Savannah River Site and to WIPP.

Approximately 300,000 liters of plutonium solution in the F-Canyon at

the Savannah River Site have now been converted to metal in the FB-Line. This material is stored in approximately 80 welded stainless steel cans that will serve as the inner containers to meet DOE-STD-3013. Plutonium solutions resulting from stabilization of Mark-31 spent nuclear fuel have also been converted to metal, and along with the preexisting metal items in the FB-Line, are also stored in similar DOE-STD-3013 inner containers.

#### Problems Remaining

Severe problems continue to impede other remedial measures that had been promised in the original Implementation Plan issued by the Secretary of Energy in response to Recommendation 94-1, and in Revision 1 to that Plan as issued on December 28, 1998. For a variety of reasons, many of them stated below, most of the remaining milestones in the Implementation Plans will not be met. Among the remaining problems are the following:

- Approximately 34,000 liters of plutonium-bearing solution remain in the H-Canyon at the Savannah River Site. Originally this material was to have been stabilized by March 2000 in the HB-Line Phase 2 facility; however, preparing that facility for operation was not funded in FY 1999. The revised Implementation Plan deferred stabilization until June 2002. The contractor has provided an unofficial revised estimate of completion by December 2002, but that date is alleged to be at risk because the resources (mainly technical personnel) are not available to support development of procedures and Authorization Basis documents. There is at present no high confidence startup schedule.

- In the F-Area at the Savannah River Site are approximately 800 kilograms of plutonium oxide. This oxide was to have been fired at high temperature in accordance with DOE-STD-3013 and packaged in 3013-compliant containers by May 2002. So far there has been no appreciable action toward these objectives. The stated reason has been deferral of a decision to build the Actinide Packaging and Storage Facility (APSF), though as the Board noted in an earlier letter to the Assistant Secretary for Environmental Management, a decision not to build the facility appears already to have been made. This activity is at present not funded, nor is any funding planned for a facility which could be used in stabilizing and storing this material. Though Implementation Plans had originally set target dates for accomplishment of the actions, no dates

based on revised plans have been established.

- In the F-Area at the Savannah River Site are also about 400 kilograms of plutonium in the form of miscellaneous residues. Several paths for processing the residues have been proposed, depending on their characteristics, but all the plutonium should end up as metal or oxide fired at high temperature according to DOE-STD-3013. Originally all were to occur by May 2002. Other than startup of the FB-Line for characterizing the material, there has been no appreciable action so far toward the final objectives. As for the oxides referred to above, stabilization and packaging of this material were to be accomplished in the APSF, and are now being delayed.

- One tank in the F-Canyon at Savannah River contains approximately 14,400 liters of a solution of americium and curium. These elements, which are highly radioactive, are raw materials for production of californium-252 (Cf 252) in the High Flux Isotope Reactor at Oak Ridge. There are continuing needs for Cf 252. Dispersal of the americium and curium material through loss of integrity of the tank and its appendages, such as might be caused by corrosion or seismic action, would create an almost insurmountable problem of spread of radioactive contamination. The original Implementation Plan foresaw conversion of the dissolved elements by November 1999 to a vitreous form suitable for storage until use. Difficulties with the melter planned for the operation caused deferral of the operation to September 2002 according to the revised Implementation Plan. At present the activity is alleged to be under-funded, though a Request for Proposal has been issued seeking a commercial contract for the action. The most optimistic estimate of a completion date is November 2004. About 6,000 liters of a solution of neptunium-237 (Np 237) are in tanks in the H-Canyon at the Savannah River Site. This isotope is the raw material for production of plutonium-238 (Pu 238), which has such uses as a heat source for production of electricity for some NASA missions. Initial plans were to vitrify this material by September 2003. The revised Implementation Plan stated that instead it was to be converted to oxide through use of the HB-Line Phase 2 facility. The revised Implementation Plan deferred the estimated date of completion to December 2005. An additional six-month delay is now foreseen, though that view may still be optimistic since adequacy of funding so far in the future cannot be assured.

- About 230,000 liters of highly-enriched uranyl nitrate solution are held in tanks outside the H-Canyon at the Savannah River Site. The quantity of solution will continue to increase as a result of stabilization of spent Mark 16/22 fuel elements. This solution is a hazard because freezing, evaporation, or chemical change could lead to a uranium concentration and a threat of accidental criticality. The intent has been to add depleted uranium to this solution, reducing the enrichment to a range suitable for use in fuel elements for Tennessee Valley Authority's light water reactors. Though the Tennessee Valley Authority has concurred in principle with the arrangement, an agreement to proceed has been held up by allegedly insufficient out-year funding by DOE to execute its share of the agreement. Meanwhile, the estimated costs have been increasing. An original date of December 1997 had been set for conversion of the uranium to oxide. The revised Implementation Plan delayed that date by six years to December 2003. There is no credible date for removal of the hazard. Assigned storage space for the solution is now nearly full.

- About seven tonnes of heavy metal, principally highly-enriched uranium, is still in irradiated Mark 16/22 fuel elements at the Savannah River Site. A campaign to process Mark 16/22 fuel elements was to have been completed by December 2000, according to the original Implementation Plan. The revised Plan changed that date to December 2001. The processing is now only about 25% complete, because of an alleged shortage of personnel and some technical issues delaying restart of the H-Canyon second solvent extraction cycle. Mark 16/22 fuel element processing stopped in September 1999 and will not resume until startup of second cycle operations, which is now scheduled for April 2000. The stated completion date is now about May 2003, though processing may have to be halted again in the future because of inadequate additional space for storage of uranium solutions (see the previous item).

- The Plutonium Finishing Plant (PFP) at the Hanford Site contains more than 300 kilograms of plutonium in 4,300 liters of solution. This was to have been stabilized by January 1999 through use of a vertical denitration calciner. Technical problems and allegedly insufficient financial resources hampered completion of the vertical calciner and treatment of the solution by that date, and attempts to improve the schedule through use of a prototype calciner were also inadequate. The plan has recently been changed,

and it is now intended that the plutonium will be precipitated and thermally stabilized by December 2001, by means of the magnesium hydroxide process. Although this process has already been used to stabilize thousands of liters of solution at the RFETS, DOE and its contractor at Hanford are still trying to prove it will work with the PFP solutions. The story of inability to treat plutonium solutions at PFP has been typical of a sequence of ineffective activities at that Plant, generally the result of poor management.

Approximately 700 kilograms of plutonium exist at PFP in the form of metal or alloys. The facility has spent a significant amount of time pursuing various alternative strategies for processing and packaging this material and now plans to brush loose oxide from the metal and package it in welded double containers in accordance with DOE-STD-3013 by March 2001, a noteworthy improvement over the original Implementation Plan's date of May 2002. The oxide from brushing and some severely corroded metal would be thermally stabilized to oxide as called for by the standard and added to the material in the following item.

About 1,500 kilograms of plutonium exist at PFP in the form of oxide. About one year ago the staff at PFP began stabilizing this material through use of two muffle furnaces. The throughput of two furnaces was not enough to deal with the quantity of material in existence, but it was initially claimed that available funds were inadequate for installation of additional furnaces. It is now planned that three additional furnaces are to be brought on line by February 2000, and four more double capacity furnaces in May 2002. The oxide will be packaged to meet DOE-STD-3013 after stabilization. The original Implementation Plan proposed completion of packaging by May 2002. The present plan would accomplish the job by about May 2004.

Several dozen kilograms of plutonium exist at the PFP dispersed in approximately 1,600 polystyrene cubes, called polycubes. This material was used in the past in criticality studies. The polycubes have become friable through the effects of radiolysis and have become a contamination dispersal hazard. The method of treatment and stabilization of this material was under discussion for some time with various alternatives being considered. At present it is planned to oxidize the material in the muffle furnaces with the polystyrene converted to gas and the plutonium converted to stable oxide and then packaged as above. The original Implementation Plan proposed completion of treatment by some

method by January 2001. Although the current goal is treatment by August 2002, this date may be delayed when the throughput of the muffle furnaces is determined in February 2000.

Hundreds of kilograms of plutonium are in residues of various forms at PFP. These were to have been packaged and disposed of by different methods by May 2002 according to the original Implementation Plan. Cementation of sand, slag, and crucible materials began, but that process was shut down several years ago after only 240 kilograms had been treated. It is now planned that the activity will be completed by April 2004.

The K-East and K-West fuel storage basins at the Hanford Site contain approximately 2,100 tonnes of spent uranium fuel from past operation of the N-Reactor. At one time this material was to have been chemically processed in the Purex plant, but it was left stranded when DOE decided about ten years ago to decommission Purex. The spent fuel at these basins has been corroding for some decades and since the Basins are very near the Columbia River and have been known to leak during the past, remediation of this situation has been high on the Board's priority list. Progress toward remediation had seemed adequate some time ago, but with the change of contractors at Hanford a few years ago progress appeared to stall. Resumption of progress has recently been noted, but years of schedule loss have occurred. This activity has consumed a large part of the financing that had been planned for other activities at the Hanford Site such as cleanup of PFP. The planned date of cleanup of the Basins had been December 1999 according to the original Implementation Plan. It is now anticipated that removal of fuel from the Basins will be completed by December 2003, and removal of sludge from oxidation will have been accomplished by August 2005. By that time cleanup of these Basins will have cost between one and two billion dollars.

About one tonne of plutonium metal and oxide at the Los Alamos National Laboratory was recently declared to be excess to the needs of the defense program, and it awaits repackaging in accordance with DOE-STD-3013. According to the original Implementation Plan repackaging should take place by May 2002. At present there is no plan for repackaging any of the material.

More than one tonne of plutonium exists in residues at the Los Alamos National Laboratory. The original Implementation Plan estimated that all would have been stabilized and repackaged by May 2002. All high risk items have been processed at this time.

Although newly produced residues are being properly packaged, little work is being done at this time to take care of legacy residues. The estimated date for dealing with the legacy materials is now September 2005.

The above are not all of the materials referred to in Recommendation 94-1, but they are the major ones for which remediation schedules have fallen well behind those contemplated by the Recommendation and by the original Implementation Plan.

#### **Fiscal Problem**

The most common reason given for failure to meet schedules has been insufficient financial support. That being so, the Board does not understand why the Department of Energy has not obeyed the statutory requirement in the Atomic Energy Act as amended in 42 U.S.C. § 2286d(f)(2), (2) If the Secretary of Energy determines that the implementation of a Board recommendation (or part thereof) is impracticable because of budgetary considerations, or that the implementation would affect the Secretary's ability to meet the annual nuclear weapons stockpile requirements established pursuant to section 91 of this Act [42 U.S.C. § 2121], the Secretary shall submit to the President, to the Committees on Armed Services and on Appropriations of the Senate, and to the Speaker of the House of Representatives a report containing the recommendation and the Secretary's determination.

In any case, simultaneous implementation of all elements of Recommendation 94-1 to schedules previously committed seems to be impossible under present circumstances allegedly because of budgetary constraints. Given this fiscal reality, DOE is faced with the need to:

1. advise Congress and the President of the shortfall in funds to satisfy all the safety enhancements to meet Recommendation 94-1, and

2. prioritize and schedule tasks to be undertaken with available funds according to consideration of risks.

#### **Recommendation**

In the Board's view, material remaining in liquids generally poses the greatest hazard, because of higher possibility of dispersal and because of potential criticality. Among these liquids the highly enriched uranium solutions stored in tanks outside the H-Canyon at the Savannah River Site require the most attention because of criticality concerns. Following the solutions in importance are unstabilized

plutonium oxides and plutonium metal remaining in containers with normal atmosphere, especially at locations in moist climates. Closely following in importance are various plutonium-bearing residues which are not as well isolated or packaged as they should be. Accordingly, the Board recommends the following technical actions in descending order of priority.

1. Stabilize the uranium solution in tanks outside the H-Canyon at the Savannah River Site, to remove criticality concerns. This should not await plans to convert the uranium to fuel for Tennessee Valley Authority's nuclear reactors.

2. Remediate the highly-radioactive solutions of americium and curium in the F-Canyon at the Savannah River Site. The currently-planned deferral of vitrification of this material is highly undesirable.

3. Remediate the solution of neptunium now stored in H-Canyon at the Savannah River Site.

4. Convert remaining plutonium solutions to stable oxides or metals, and subsequently package them into welded containers with inert atmosphere. The principal remaining solutions are in H-Canyon at the Savannah River Site, and the Plutonium Finishing Plant at the Hanford Site.

5. Treat the plutonium-bearing polycubes at PFP to remove and stabilize the plutonium.

6. Continue stabilization of spent nuclear fuel at Savannah River.

7. Stabilize and seal within welded containers with an inert atmosphere the plutonium oxides produced by various processes at defense nuclear facilities, and which are not yet in states conforming to the long-term storage envisaged by DOE-STD-3013. These oxides are found at the F Area of the Savannah River Site, the RFETS, the Plutonium Finishing Plant at the Hanford Site, the Lawrence Livermore National Laboratory, and the Los Alamos National Laboratory.

8. Enclose existing and newly-generated legacy plutonium metal in sealed containers with an inert atmosphere. Removal of loose oxide should of course take place just before sealing.

9. Remediate and/or safely store the various residues which are found at all three of the production sites, as well as the Lawrence Livermore National Laboratory and the Los Alamos National Laboratory. It is assumed that the schedule for remediation of the spent fuel in the K-Basins at the Hanford Site will continue as currently planned.

The ordering of priorities should not be understood as implying a lack of

importance attached to those lower in the sequence. It is simply a recognition that under the circumstances the greater hazards should be addressed first and with greatest firmness. All elements of the original Recommendation 94-1 retain their importance and none are to be considered unessential.

Also, the Board's staff has been discussing with DOE staff an ordering of tasks subject to Recommendation 94-1 in accordance with ease of their performance. Those actions which can readily be conducted within present resources should certainly go forward, as long as items of high safety priority receive the proper attention.

The severity of the problems which are the subject of this Recommendation and Recommendation 94-1 and the urgency to remediate them argue forcefully for the Secretary to avail himself of the authority under the Atomic Energy Act to "implement any such Recommendation (or part of any such Recommendation) before, on, or after the date on which the Secretary transmits the implementation plan to the Board under this subsection." See, 42 U.S.C. § 2286d(e). The Board suggests that the Secretary avail himself of this provision.

In addition, because stabilization of materials remaining from the Weapons Production Program continues to be of such importance, the Board recommends that:

10. An estimate be made of the total funding shortfall for timely completion of all 94-1 commitments according to the accepted Implementation Plans, and

11. Congress and the President be notified of the shortfall in accordance with statutory requirements.

**John T. Conway,**  
*Chairman.*

**Appendix—Transmittal Letter to the Secretary of Energy, Defense Nuclear Facilities Safety Board**

January 14, 2000.

The Honorable Bill Richardson, Secretary of Energy, 1000 Independence Avenue, SW, Washington, DC 20585-1000.

Dear Secretary Richardson: On May 26, 1994, the Defense Nuclear Facilities Safety Board (Board) submitted to the Secretary of Energy Recommendation 94-1, dealing with the need to stabilize and safely store large amounts of fissionable and other nuclear material that for safety reasons should not be permitted to remain unremediated. The Board was especially concerned about specific liquids and solids in spent fuel storage pools, reactor basins, reprocessing canyons,

processing lines and various defense facilities remaining in the manufacturing pipeline when pit production was terminated in 1988. On August 31, 1994, Secretary O'Leary agreed with and accepted the recommendation. On February 28, 1995, Secretary O'Leary forwarded to the Board the Department of Energy's (DOE) plan for implementation of the Board's recommendation on this issue. Subsequently, on December 28, 1998, you forwarded to the Board a revision to Secretary O'Leary's original Implementation Plan for Recommendation 94-1.

During the past year, the Board and its staff have been closely following and noting further slippage in the time table for meeting the dates set forth in the Implementation Plan. While a great deal has been accomplished in meeting the safety objective set forth in Recommendation 94-1 particularly with regard to those materials that constituted the most imminent hazards, the Board is concerned that severe problems continue to exist and delay the implementation of Recommendation 94-1.

After careful consideration, the Board has concluded that the progress being made in certain of the stabilization activities addressed by Recommendation 94-1 does not reflect the urgency that the circumstances merit and that was central to the Board's recommendation.

The Board will continue to follow and urge DOE to implement Recommendation 94-1. In addition, the Board, on January 14, 2000, unanimously approved Recommendation 2000-1 which is enclosed for your consideration.

42 U.S.C. § 2286d(a) requires that after your receipt of this recommendation, the Board promptly make it available to the public in DOE's regional public reading rooms. The Board believes the recommendation contains no information that is classified or otherwise restricted. To the extent this recommendation does not include information restricted by DOE under the Atomic Energy Act of 1954, 42 U.S.C. §§ 2161-68, as amended, please arrange to have it promptly placed on file in your regional public reading rooms. The Board will also publish this recommendation in the **Federal Register**.

Sincerely,

**John T. Conway,**  
*Chairman.*

[FR Doc. 00-1743 Filed 1-25-00; 8:45 am]

**BILLING CODE 3670-01-U**

**DEPARTMENT OF DEFENSE****Department of the Air Force****Notice of Appointment to Selected Non-Federal Entity Boards**

**AGENCY:** Office of The Judge Advocate General, USAF; DoD.

**ACTION:** Notification of appointment of Air Force officials to selected non-Federal entity boards.

**SUMMARY:** The Office of The Judge Advocate General, in accordance with 10 U.S.C. 1033 and 10 U.S.C. 1589, announces the appointment of certain Air Force officials to provide limited management support to certain non-Federal entities authorized by statute and by DoD regulation (DoD 5500.7-R, Standards of Conduct, section 3-202). Federal statutes (10 U.S.C. 1033 and 10 U.S.C. 1589) authorize the Service Secretaries to authorize a member of the armed forces or an employee under the Secretary's jurisdiction to serve without compensation as a director, officer, or trustee, or to otherwise participate in the management of certain military welfare societies. In the Air Force, the designated military welfare society is the Air Force Aid Society, Inc. Additionally, 10 U.S.C. 1033 and 10 U.S.C. 1589 permit the Service Secretaries to make appointments to other non-profit non-Federal entities that fall within certain categories. Those categories include entities that regulate and support the athletic programs of the service academies (including athletic conferences) and entities that accredit service academies and other schools of the armed forces (including regional accrediting agencies.) Non-Federal entities in these categories must be pre-designated by the Secretary of Defense. The Secretary of Defense's authority for such designations was delegated to the Department of Defense General Counsel, who has designated all of the organizations, and concurred in all of the appointments, listed below. Appointments made under this authority extend to the named officials, as well as to their successors. The authority granted pursuant to these appointments is limited to providing oversight, advice to, and coordination with, the designated entity. Authorization does not extend to participation in day-to-day operations of the entity, nor to the expenditure of appropriated funds (except in direct support of the employee). Expenditures will not include travel and transportation allowances incurred by the employee in a travel status. Finally, participation in the management of the non-Federal entity

may not constitute the employee's primary duty.

The Secretary of the Air Force has made the following appointments with the concurrence of the Department of Defense General Counsel:

- (1) To the Board of Trustees of the Air Force Aid Society, Inc.: Secretary of the Air Force, F. Whitten Peters; Chief of Staff of the Air Force, General Michael E. Ryan; Deputy Chief of Staff, Personnel, Lieutenant General Donald L. Peterson, The Surgeon General of the Air Force, Lieutenant General Paul K. Carlton, Jr.; The Judge Advocate General of the Air Force, Major General William A. Moonman; Deputy Assistant Secretary of the Air Force (Budget), Major General Larry Northington; and Chief Master Sergeant of the Air Force, Chief Master Sergeant Frederick J. Finch.
- (2) To the Mountain West Conference Board of Directors: The United States Air Force Academy Superintendent, Tad J. Oelstrom.
- (3) To the Southern Association of Colleges and Schools: Division Chief for Academic Affairs, Air University, Dr. Dorothy Reed; Commandant, School of Advanced Airpower Studies, Colonel Steve Chiabotti; Commander, Community College of the Air Force, Colonel James McBride.
- (4) To the Middle States Association of Colleges and Schools: Commander, Air Force Institute of Technology, Colonel George Haritos.

**FOR FURTHER INFORMATION, CONTACT:**

Questions should be mailed to HQ USAF/JAG, 1420 Air Force Pentagon, Washington DC 20330-1420, Attn: Jane Love. Ms Love can be reached by telephone at 703-614-4075, by fax at 703-614-2205, or by e-mail to [jane.love@af.pentagon.mil](mailto:jane.love@af.pentagon.mil).

**Janet A. Long,**

*Air Force Federal Register Liaison Officer*  
[FR Doc. 00-6521 Filed 3-15-00; 8:45am]  
**BILLING CODE 5001-05-U**

**DEPARTMENT OF DEFENSE  
Department of the Army, Corps of Engineers****Final Notice of Issuance and  
Modification of Nationwide Permits**

**AGENCY:** Army Corps of Engineers, DoD.

**ACTION:** Correction.

**SUMMARY:** This document contains corrections to the final notice of issuance and modification of Nationwide Permits (NWP) which was published in the **Federal Register** on Thursday, March 9, 2000 (65 FR 12818-

12899). On pages 12818, 12819, 12822, 12841, and 12861 the date "June 5, 2000" is to be replaced with "June 7, 2000." June 7, 2000, is the correct effective date for the new and modified NWPs, as well as the correct expiration date for NWP 26.

In summary, NWP 26 will expire on June 7, 2000. The new and modified NWPs, including the new and modified NWP general conditions, will become effective on June 7, 2000. States and Tribes must make their Section 401 Water Quality Certification and Coastal Zone Management Act consistency determinations by June 7, 2000.

In addition, there were some inconsistencies concerning the economic and workload cost estimates in the March 9, 2000, **Federal Register** notice. The 1/2 acre alternate replacement NWP package in the Institute for Water Resources (IWR) report is similar to the new NWPs published in the March 9, 2000, **Federal Register** notice. We have concluded that the economic impacts and costs are approximately the same for both. On page 12820, we correctly stated that the IWR report indicated that the 1/2 acre alternative replacement NWP package would result in direct compliance costs that are approximately 30% less than the \$46 million in direct compliance costs that would be incurred by permit applicants due to the July 21, 1999, proposal. Based on these assumptions, the alternate replacement NWP package would result in approximately \$32 million in direct compliance costs incurred by permit applicants. However, on page 12819 we incorrectly indicated an increase in direct costs to permit applicants of approximately \$20 million; the correct amount is approximately \$32 million.

Dated: March 10, 2000.

Approved by:

**Charles M. Hess,**  
*Chief, Operations Division, Office of Deputy Commanding General for Civil Works.*  
[FR Doc. 00-6498 Filed 3-15-00; 8:45 am]  
**BILLING CODE 3710-92-P**

**DEFENSE NUCLEAR FACILITIES  
SAFETY BOARD**

**[Recommendation 2000-2]  
Configuration Management, Vital Safety Systems**

**AGENCY:** Defense Nuclear Facilities Safety Board.

**ACTION:** Notice, recommendation.

**SUMMARY:** The Defense Nuclear Facilities Safety Board has made a



recommendation to the Secretary of Energy pursuant to 42 U.S.C. 2286a(a)(5) concerning configuration management, vital safety systems.

**DATES:** Comments, data, views, or arguments concerning this recommendation are due on or before April 17, 2000.

**ADDRESSES:** Send comments, data, views, or arguments concerning this recommendation to: Defense Nuclear Facilities Safety Board, 625 Indiana Avenue, NW, Suite 700, Washington, DC 20004-2901.

**FOR FURTHER INFORMATION CONTACT:**

Kenneth M. Pusateri or Andrew L. Thibadeau at the address above or telephone (202) 694-7000.

Dated: March 13, 2000.

**John T. Conway,**  
*Chairman.*

**Recommendation 2000-2**

The Defense Nuclear Facilities Safety Board (Board) continues a strong interest in safety systems and their effectiveness at defense nuclear facilities. These systems are at the heart of safety at the facilities. Department of Energy (DOE) Standards 3009 and 3016 provide guidance for the identification of safety systems and associated Technical Specifications as important elements of maintaining safety of facilities and operations. In addition, the implementation guide to DOE Order 420.1, Facility Safety, provides guidance on design and procurement of safety systems to attain and sustain reliability in performance.

Most of the facilities of interest to the Board were constructed many years ago, and are undergoing the deterioration attached to aging. It is important that their protective features be maintained serviceable and effective. In the following, the Board recommends measures necessary to ensure reliable performance of the safety systems of both the older facilities and the ones that are relatively new, and in particular stresses the actions required to ensure viability of confinement ventilation

systems. Confinement ventilation systems are relied on almost everywhere by DOE as the principal system to protect the public and collocated workers at its more hazardous facilities.

**Previous Issuances by the Board on Safety Systems**

In May 1995, the Board issued DNFSB/TECH-5, Fundamentals for Understanding Standards-Based Safety Management of Department of Energy Defense Nuclear Facilities, which

stressed the importance, among other things, of functions that preserve those structures, systems, and components that are relied upon to protect the public, workers, and the environment (e.g., configuration management, training, and maintenance). In October 1995, the Board issued DNFSB/TECH-6, Safety Management and Conduct of Operations at the Department of Energy's Defense Nuclear Facilities. The report underscored the importance of conduct of operations as the body of practice, or operational formality, that implements the Safety Management System for a defense nuclear facility. Operational formality includes "Supervision by highly competent personnel who are knowledgeable as to the results of the safety analysis and operating limits for the facility or activity." Key aspects of facility Safety Management Systems discussed in these two reports are central to the issues addressed herein.

In 1996, in response to Recommendation 95-2, Safety Management, DOE provided the Board a plan for upgrading safety management of its defense nuclear facilities. DOE Orders 5480.22, Technical Safety Requirements, and 5480.23, Nuclear Safety Analysis Reports, established requirements for identifying design features important to safety and the conditions/controls to ensure safe operation. DOE authorized its contractors to grade facilities by hazard category and to tailor the comprehensive safety assessments according to hazard potential and operational future. This upgrade effort has reaffirmed the important safety role played by confinement ventilation systems. (See enclosed Appendix B of DNFSB/TECH-26). In general, these systems have been designated as important to safety, making them subject to more stringent quality assurance, maintenance, surveillance, and configuration management programs in recognition of their safety functions. Commitments to such programs are typically made in the Authorization Agreements that capture the contractor-DOE agreed upon conditions for performing the work.

**Issuances Concerning Confinement Ventilation Systems**

Some of the Board's analyses concerning safety systems focused on confinement ventilation systems in particular. In March 1995, the Board issued DNFSB/TECH-3, Overview of Ventilation Systems at Selected DOE Plutonium Processing and Handling Facilities, which addressed the design of confinement ventilation systems. In its June 15, 1995, letter forwarding that report, and in subsequent

correspondence in July 1995, the Board requested that DOE evaluate the design, construction, operation, and maintenance of ventilation safety systems in terms of applicable DOE and industry standards.

In a letter dated October 30, 1997, the Board pointed out the problem of wetting high efficiency particulate air (HEPA) filters during tests of fire sprinkler systems, and the need for complex-wide guidance from DOE concerning the relationship between maintaining filter integrity and fire fighting strategies. HEPA filters are key components of confinement ventilation systems. In its June 8, 1999, letter concerning HEPA filters installed in confinement ventilation systems, the Board requested a report outlining the steps DOE plans to take to resolve those issues. In recent weeks, individual Board members and the Board's staff have met informally with DOE representatives to resolve differences concerning DOE's proposed response to the Board's request.

**Current Status of Ventilation Systems**

As a part of its continuing oversight of these vital safety systems, the Board's staff has recently completed a review of the operational data on confinement ventilation systems as reported in DOE's Operational Reporting and Processing System (ORPS). The data reviewed covered the period July 1998 to December 1999. An analysis of these data is documented in report DNFSB/TECH-26. This review indicates that the reliability of these systems, for reasons not readily evident, may not be adequate, given the vital safety function they serve.

The operational data reveal deficiencies in areas of test and surveillance, quality assurance (replacement components), maintenance, configuration management, training and qualification, and conduct of operations. One can reasonably deduce from such observations that there exists no single entity assigned responsibility for the configuration and operational state of these systems as a whole.

The Board recognizes that many confinement ventilation systems now require less air flow and permit more particulate loading than in original designs. This allows for more extended useful life than might otherwise be tolerable, particularly with adequate preventive care. However, the operational data suggest that less than optimum care is being given to these systems, considering their age.

**Status of Safety Systems in General**

Many of DOE's nuclear facilities were constructed years ago and are approaching end-of-life status. Under these circumstances, some degradation of reliability and operability of systems designed to ensure safety can reasonably be expected. To some extent, the effects of aging can be offset by increased surveillance and maintenance. A point occurs, however, where costs for upkeep justify major upgrades or replacement, particularly where mission needs are projected well into the future. While a considerable number of high-hazard defense nuclear facilities have such long-term missions (greater than 10 years, for example), others undergoing phase-outs and decommissioning do not. Some facilities must continue to rely on operational safety systems, such as ventilation systems, to serve a safety function even after their operational mission has ended and well into the decommissioning process. Long-term or short-term, however, the performance required for safety must be ensured. It has been a long-standing practice in the nuclear business to designate a "system engineer" for each major system vital to successful operation of hazardous processes. Some DOE contractors have done so on occasions (e.g., the Defense Waste Processing Facility at the Savannah River Site), but this practice is not as prevalent as it should be. The Board believes that having specific individuals outside the operational forum, tasked with the configuration management (design and operational constraints) of systems designated as important to safety, would go a long way to ensuring the dependable service such systems must provide.

**Recommendation**

Considerable upgrading of programs for ensuring reliable and effective performance of confinement ventilation systems has occurred during the years 1995–1999. However, the frequency and variety of off-normal occurrences that continue to be reported clearly indicate that more attention to these vital systems is needed. Likewise, other systems serving equally vital safety functions might well benefit from similar attention. Towards such an end, the Board recommends that the Department of Energy:

1. Establish a team, expert in confinement ventilation systems, to survey the operational records during the past 3 years and the current operational condition of all confinement ventilation systems now designated or that should be designated as important to safety in defense nuclear facilities (i.e., safety class, safety significant, defense-in-depth). In so doing:
  - a. Assess the root cause or causes for less than

satisfactory operational history of these systems and recommend an action plan to address the causes. In so doing evaluate such programs as may exist to ensure reliable system performance. These should include surveillance, maintenance (including quality assured inventory of replacement parts), configuration management (system descriptions, drawings and specifications), and requisite training and qualification of operators.

- b. Estimate the remaining system lifetime with and without refurbishing as a function of reliability; (e.g., 1 year—95%, 10 years—50%) and recommend such upgrades or compensating measures as may be appropriate to ensure reliability, current or future, commensurate with the safety functions being served.

2. Include key elements of the plan for addressing the HEPA filters issues identified in the Board's June 8, 1999, letter in any plan developed in response to this recommendation.

3. Amend appropriate directives and associated contract requirements documents (e.g., DOE Order 430.1A, Life Cycle Asset Management, DOE Order 420.1, Facility Safety), to require for the confinement ventilation system and every other major system designated as important to safety:
  - a. The development and maintenance of documentation that captures key design features, specifications, and operational constraints to facilitate configuration management throughout the life cycle.
  - b. The designation of a "system engineer" during each facility life cycle—design, construction, operation and decommissioning with:
    - (1) The requisite knowledge of the system safety design basis and operating limits from the safety analysis; and
    - (2) The lead responsibility for the configuration management of the design.

- c. The education and training of successor "system engineers" as may be required because of contractor organizational changes, facility life cycle change, or other causes for reassignments.

4. Task the Federal Technical Capability Panel established in response to Board Recommendation 93–3 to:
  - a. Survey the availability and sufficiency of personnel in DOE with expertise in these vital safety systems.
  - b. Recommend to DOE senior management such actions as may be appropriate to augment, redeploy or otherwise bring such expertise more effectively to bear in the life-cycle-management of vital safety systems.

- c. Add to DOE's technical staff qualification program the requisites for qualifying as subject matter experts for

these vital systems.

- d. Develop descriptions of functions and responsibilities for inclusion in the Function and Responsibilities Authorities Manual for individuals serving as subject matter experts on vital safety systems.

5. Make the scrutiny of the status of all systems serving to protect the public, workers and the environment a regularized part of the assessments performed as required by DOE P 450.5, Line Environment, Safety and Health Oversight. Include in such review the programs, such as quality assurance, maintenance, configuration management and conduct of operations, that contribute much to ensuring these systems will operate as intended.

**John T. Conway, Chairman.**

**Appendix—Transmittal Letter to the Secretary of Energy, Defense Nuclear Facilities Safety Board**

March 8, 2000

The Honorable Bill Richardson  
Secretary of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585–1000

Dear Secretary Richardson: Designs of the Department of Energy's (DOE's) high hazard defense nuclear facilities typically include systems whose reliable operation is vital to the protection of the public, workers and the environment. Operations are constrained by technical safety requirements and operational limits established by analyzing the hazards of the operations and the capability of design features to prevent or mitigate consequences of potential mishaps or operational disruptions caused by either man or natural phenomena. The availability and operability of such systems and the conditions specifying operational limits are included in the written agreements established by DOE with its contractors as conditions for authorizing performance of work.

Ventilation systems installed in many defense nuclear facilities are among those that provide vital safety functions. Such systems contribute much to the safe environment for workers and serve a vital confinement function should work process upsets and mishaps result in airborne releases of hazardous materials.

The Defense Nuclear Facilities Safety Board (Board) has advised DOE in various ways during the past several years of the need to increase attention to ventilation systems and of the steps we believe would lead to more certain performance of their important safety functions. Although DOE has responded to some extent, the

upgrade efforts to date have been less comprehensive and effective than the matter merits.

The Board further believes that DOE's upgrades of ventilation systems could well serve as a model for implementing similar programs for other vital safety systems that may be needed in defense nuclear facilities.

The Board believes this matter requires additional DOE attention. More explicitly, the Board recommends for your consideration an action plan structured to address the elements set forth in the enclosed Recommendation 2000-2, Configuration Management, Vital Safety Systems.

The Board's recommendation is directed explicitly at systems for ensuring nuclear safety. This is in keeping with the Board's enabling legislation. However, the concepts advocated could be applied to good advantage to systems designed for safety management of hazardous material and processes of non-nuclear nature as well. In the spirit of Integrated Safety Management (ISM) to which DOE is committed, DOE is encouraged to do so. Recommendation 2000-2, Configuration Management, Vital Safety Systems, was unanimously approved by the Board, and is submitted to you pursuant to 42 U.S.C. § 2286a(a)(5), which requires the Board, after receipt by you, to promptly make this recommendation available to the public. The Board believes the recommendation contains no information which is classified or otherwise restricted. To the extent this recommendation does not include information restricted by the Department of Energy under the Atomic Energy Act of 1954, 42 U.S.C. §§ 2161-68, as amended, please arrange to have this recommendation promptly placed on file in your regional public reading rooms.

The Board will publish this recommendation in the **Federal Register**.

Sincerely,

John T. Conway, *Chairman*.

[FR Doc. 00-6571 Filed 3-15-00; 8:45 am]

**BILLING CODE 3670-01-P**

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**DEPARTMENT OF ENERGY  
Environmental Management Advisory Board; Meeting**

**AGENCY:** Department of Energy.

**ACTION:** Notice of open meeting.

**SUMMARY:** This notice announces a meeting of the Environmental Management Advisory Board. The Federal Advisory Committee Act (Pub. Law No. 92-463, 86 Stat. 770) requires that public notice of these meetings be announced in the **Federal Register**.

**DATES:** Thursday, April 13, 2000 and

Friday, April 14, 2000.

**ADDRESSES:** U.S. Department of Energy, Forrestal Building, 1000 Independence Avenue SW, (Room 1E-245), Washington, DC 20585.

**FOR FURTHER INFORMATION CONTACT:**

James T. Melillo, Executive Director of the Environmental Management Advisory Board, (EM-10), 1000 Independence Avenue SW, (Room 5B-161), Washington, DC 20585. The telephone number is 202-586-4400.

The Internet address is

[james.melillo@em.doe.gov](mailto:james.melillo@em.doe.gov).

**SUPPLEMENTARY INFORMATION:**

**Purpose of the Board:** To provide the Assistant Secretary for Environmental Management (EM) with advice and recommendations on issues confronting the Environmental Management Program from the perspective of affected groups, as well as state, local, and tribal governments. The Board will contribute to the effective operation of the Environmental Management Program by providing individual citizens and representatives of interested groups an opportunity to present their views on issues facing the Office of Environmental Management and by helping to secure consensus recommendations on those issues.

**Tentative Agenda**

Thursday, April 13, 2000

Public Meeting Opens (1:00 P.M.)

—Approve Minutes of September 22-23, 1999 Meeting

Opening Remarks

Budget Update

Worker Health & Safety Committee Report

—Integrated Safety Management

Implementation\*

—Environment, Safety and Health in

Technology Development\* Contracting and

Management Committee Report

—Shared Savings\*

—Project Management\* Long-Term

Stewardship Committee Report

—Institutional Controls\*

—Next Steps for Stewardship Technology

Development & Transfer Committee Report

—Environmental Management Science &

Technology Performance Measures\* Science

Committee Report Integration and

Transportation Committee Report

Public Comment Period and Adjournment

(5:15 P.M.)

Friday, April 14, 2000

Opening Remarks (8:30 A.M.)

Board Discussion

Public Comment Period

Board Business

—Votes on EMAB Findings & Resolutions

—New Business

—Set Date for Next Board Meeting (October

2000)

Public Comment Period Meeting Adjourns

(12:00 P.M.) \*The Board anticipates

recommendations to be presented on this topic. **Public Participation:** This meeting is open to the public. If you would like to file a written statement with the Board, you may do so either before or after the meeting. If you would like to make an oral statement regarding any of the items on the agenda, please contact Mr. Melillo at the address or telephone number listed above, or call the Environmental Management Advisory Board office at 202-586-4400, and we will reserve time for you on the agenda. You may also register to speak at the meeting on April 13-14, 2000, or ask to speak during the public comment period. Those who call in and or register in advance will be given the opportunity to speak first. Others will be accommodated as time permits. The Board Chairs will conduct the meeting in an orderly manner. **Transcript and Minutes:** We will make the minutes of the meeting available for public review and copying by approximately May 13, 2000. The minutes and transcript of the meeting will be available for viewing on the Internet at <http://www.em.doe.gov/emab/products.html> and at the Freedom of Information Public Reading Room (1E-190) in the Forrestal Building, U.S. Department of Energy, 1000 Independence Avenue, SW, Washington, DC 20585. The Room is open Monday through Friday from 9:00 a.m.-4:00p.m. except on Federal holidays.

Issued in Washington, D.C. on March 10, 2000.

**Rachel M. Samuel,**

*Deputy Advisory Committee Management Officer.*

[FR Doc. 00-6503 Filed 3-15-00; 8:45am]

**BILLING CODE 6450-01-P**

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**DEPARTMENT OF ENERGY  
International Energy Agency Meeting**

**AGENCY:** Department of Energy.

**ACTION:** Notice of Meeting.

**SUMMARY:** The Industry Advisory Board (IAB) to the International Energy Agency (IEA) will meet on March 23, 2000, at the headquarters of the IEA in Paris, France in connection with a meeting of the IEA's Standing Group on Emergency Questions (SEQ).

**FOR FURTHER INFORMATION CONTACT:**

Samuel M. Bradley, Assistant General Counsel for International and National Security Programs, Department of Energy, 1000 Independence Avenue, SW, Washington, DC 20585, 202-586-6738.

**SUPPLEMENTARY INFORMATION:** In accordance with section 252(c)(1)(A)(i) of the Energy Policy and Conservation

## **APPENDIX B BOARD TECHNICAL REPORTS**

The Board issued four technical reports in 2000. The Board's technical reports provide guidance and critical analysis of major safety issues. In many cases the reports are the culmination of extensive complex-wide reviews or in-depth examinations of DOE's safety practices, and may form the technical basis for a Board Recommendation. The Board provides these reports to DOE and makes them available to the public via the Board's website or upon request.

**DNFSB/TECH-25**, *Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities*, identifies deficiencies in computer software used in support of both safety analyses and equipment control at DOE's defense nuclear facilities. The Board asked DOE to provide a report describing actions to address the weaknesses disclosed in the report and a schedule for completing those actions. In a February letter to the Board, the Deputy Secretary of Energy concurred with the overall assessment by the Board and agreed to provide a report outlining a corrective action plan. The Board received the DOE plan on October 3, 2000, and formally responded on October 23, noting that the proposed actions did not fully address the issues. At year's end, DOE was developing a more substantive response to the Board's request for action.

**DNFSB/TECH-26**, *Improving Operation and Performance of Confinement Ventilation Systems at Hazardous Facilities of the Department of Energy*, provides an analysis of operating experience associated with filter installations designed to prevent release of hazardous materials from air exhausted from ventilation systems at defense nuclear facilities. The report is a major reference cited in the Board's Recommendation 2000-2, issued in March 2000. The Secretary accepted this Recommendation in April 2000. Following a September 2000 letter from the Board clarifying the scope of the Recommendation, DOE provided an Implementation Plan, which the Board accepted in December 2000.

**DNFSB/TECH-27**, *Fire Protection at Defense Nuclear Facilities*, explores a variety of fire safety topics. Fire is often the dominant public-risk accident at DOE's defense nuclear facilities. The Board has closely monitored the development and implementation of DOE's fire protection standards and requirements at new and existing facilities. While in recent years DOE has had a good record on fire safety, the Board identified recent instances in which fire protection standards and practices at defense nuclear facilities had fallen below acceptable levels. The report was forwarded to DOE for its consideration in improving fire protection at defense nuclear facilities.

**DNFSB/TECH-28**, *Safety Basis Expectations for Existing Department of Energy Defense Nuclear Facilities and Activities*, reviews current practices and activities involved in the preparation of authorization bases, presents observations by the Board's staff, and provides suggestions for improving the development of authorization bases. The Board has consistently emphasized the need for DOE to define and institutionalize a process for both safety and work planning in an Integrated Safety Management program. This subject has been addressed in numerous letters from the Board and in earlier technical reports, including Recommendation 95-2, DNFSB/TECH-5 and -19, and a March 2000 letter from the Board to the Deputy Secretary.



**APPENDIX C**  
**MAJOR BOARD CORRESPONDENCE DURING 2000**

**COMPLEX-WIDE ISSUES**

January 13 letter to the Assistant Secretary for Environment, Safety, and Health providing comments associated with DOE-STD-3009-94, *Preparation Guide for US DOE Non-Reactor Nuclear Facility Safety Analysis Reports*; DOE-G-420.1-X; and DOE-G-420.1-Y.

February 16 letter to the Director of the Safety Management Implementation Team requesting additional information and clarification of material presented at the January 20, 2000, public meeting of the Board.

March 7 letter to the Secretary of Energy encouraging support of expanded research regarding the effects of low radiation doses.

April 7 letter to the Secretary of Energy regarding DOE's Implementation Plan for the Board's Recommendation 99-1.

May 23 letter to the Secretary of Energy on DOE's Contract Reform Measures.

May 25 letter to the Deputy Secretary of Energy forwarding a staff issue report on the April 5-6 meeting of the DOE Society for Effective Lessons Learned Sharing.

June 30 letter to the Deputy Secretary of Energy commenting on findings set forth in a recent report by DOE's Federal Technical Capability Panel.

July 10 letter to the Deputy Secretary of Energy on aspects of Integrated Safety Management.

July 14 letter to the Secretary of Energy on DOE's May 31 Implementation Plan for the Board's Recommendation 2000-1, *Prioritization for Stabilizing Nuclear Materials*, and Recommendation 94-1, *Improved Schedule for Remediation*.

July 20 letter to the Director of the Safety Management Implementation Team forwarding additional questions regarding material presented at the May 31 public meeting of the Board.

August 29 letter to the Deputy Secretary of Energy commenting on DOE-STD-3028-2000, *Criteria for Packaging and Storing Uranium-233-Bearing Materials*, and commending DOE's Recommendation 97-1 Technical Team.

September 8 letter to the Secretary of Energy clarifying the intent of the Board's Recommendation 2000-2 and urging more aggressive implementation actions.

October 23 letter to the Secretary of Energy on DOE's September 27, 2000, proposal to close certain commitments in the Implementation Plan for the Board's Recommendation 2000-1, *Prioritization for Stabilizing Nuclear Materials*.

October 23 letter to the Deputy Secretary of Energy commenting on a report, *Department of Energy Quality Assurance for Safety-Related Software at Defense Nuclear Facilities*, transmitted to the Board on October 2, 2000.

November 1 letter to the Assistant Secretary for Environment, Safety, and Health commenting on proposed methodologies for preparation of safety bases for defense nuclear facilities.

November 7 letter to the Secretary of Energy providing comments on DOE's interim final rule on Nuclear Safety Management, 10 Code of Federal Regulations Part 830, published in the *Federal Register* on October 10.

November 14 letter to the Deputy Secretary of Energy forwarding a staff issue report on DOE's June 2000 Integrated Nuclear Materials Management Program.

December 14 letter to the Secretary of Energy accepting DOE's Implementation Plan for the Board's Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, predicated on provision of adequate funding, and urging additional senior management attention.

December 14 letter to the Secretary of Energy commenting favorably on the recent workshop on Integrated Safety Management, commending the Deputy Secretary's initiatives, and pointing out related subject areas needing added management emphasis.

## **FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

March 7 letter to the Project Director, Fernald Environmental Management Project, forwarding a staff issue report on chemical safety aspects of handling and packaging radioactive waste.

## **HANFORD SITE**

February 29 letter to the Assistant Secretary for Environmental Management on the Spent Nuclear Fuel Project.

March 23 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on Phase I and II Integrated Safety Management Verification Reviews at the Plutonium Finishing Plant.

July 10 letter to the Secretary of Energy forwarding a staff issue report on procurement and testing of HEPA filters.

August 29 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on the high-level waste tank integrity program.

September 20 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on the Spent Nuclear Fuel Project.

December 5 letter to the Assistant Secretary for Environmental Management on Operational Readiness Reviews for the Spent Nuclear Fuel Project, calling for continuous DOE management oversight of operations during handling and processing of multi-canister overpacks.

### **IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY**

January 11 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on a review of work planning.

### **LAWRENCE LIVERMORE NATIONAL LABORATORY**

January 14 letter to a private citizen forwarding a December 21, 1999, staff issue report on electrical, instrumentation and control, and fire protection systems.

June 26 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on the status of authorization bases.

### **LOS ALAMOS NATIONAL LABORATORY**

March 2 letter to the Deputy Secretary of Energy forwarding a staff issue report on the quality of authorization bases.

March 2 letter to the Deputy Secretary of Energy forwarding a staff issue report on the Integrated Safety Management program.

May 24 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on recovery from the Cerro Grande fire.

July 10 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on worker protection practices.

August 29 letter to the Deputy Administrator for Defense Programs forwarding a staff issue report on flood mitigation measures.



December 15 letter to the Deputy Administrator for Defense Programs commenting on the methodology to be applied to the design and construction of confinement and safety vessels for certain dynamic experiments and asking to be kept informed on progress.

## **NEVADA TEST SITE**

December 6 letter to the Deputy Administrator for Defense Programs forwarding a staff issue report on the Nevada Test Site Phase II Integrated Safety Management Verification review.

## **OAK RIDGE**

January 14 letter to the Acting Assistant Secretary for Defense Programs forwarding a staff issue report on the uranium-233 inspection program at Oak Ridge National Laboratory.

March 30 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on instrumentation and control for the Hydrogen Fluoride Supply System at the Y-12 Plant.

May 15 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on the Enriched Uranium Operations Furnace.

May 15 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on safety bases for the Y-12 Plant.

May 15 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on timely reduction of hazards in Building 9206 at the Y-12 Plant.

May 15 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on the status of implementation of corrective actions for emergency management.

June 5 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on the status of the Oak Ridge chemical safety action plan and chemical safety issues at the Y-12 Plant.

July 10 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on preparations for stabilization of materials at the Molten Salt Reactor Experiment.

August 18 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on the fire protection program at the Y-12 Plant.

August 30 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on readiness to resume the reduction process for Enriched Uranium Operations at the Y-12 Plant.

October 31 letter to the Administrator of the National Nuclear Security Administration forwarding a staff issue report on the August 14–28 Phase II Integrated Safety Management Verification at the Y-12 Plant.

October 31 letter to the Deputy Administrator for Defense Programs forwarding a staff issue report on Building 9206 deactivation and risk reduction activities at the Y-12 Plant.

## **PANTEX**

January 11 letter to the Acting Assistant Secretary for Defense Programs forwarding a staff issue report on lightning protection for nuclear explosive operations.

March 8 letter to the Deputy Secretary of Energy forwarding a staff issue report on the Dismantlement and Inspection program for the W-62.

March 29 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on the Pantex fire protection program.

April 21 letter to the Program Director of Serious Texans Against Nuclear Dumping forwarding a response to questions posed in its February 9, 2000, letter to the Board.

May 2 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on fire protection for Dismantlement and Inspection of the W-76.

May 23 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on the Pantex tooling design, manufacturing, and procurement program.

May 23 letter to the Acting Deputy Administrator for Defense Programs forwarding a staff issue report on hazard analysis and derivation of controls for the Dismantlement and Inspection of the W-76 and the W-88.

July 7 letter to the Secretary of Energy urging adequate funding for meeting schedule commitments in DOE's Implementation Plan for Recommendation 99-1, *Safe-Storage of Plutonium Pits at the Pantex Plant*.

July 20 letter to the Deputy Administrator for Defense Programs on fire hazards associated with the W-76 program.

August 29 letter to the Deputy Administrator for Defense Programs forwarding a staff issue report on a follow-up technical exchange regarding DNFSB/TECH 24, *Safe Handling of Insensitive High Explosive Weapon Subassemblies at the Pantex Plant*.

October 23 letter to the Deputy Administrator for Defense Programs forwarding a staff issue report on the Basis for Interim Operation under lightning conditions.

October 23 letter to the Secretary of Energy requesting additional detail on the revised Implementation Plan for the Board's Recommendation 98-2, *Safety Management at the Pantex Plant*, forwarded to the Board on September 25, 2000.

## **ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**

January 14 letter to the Deputy Secretary of Energy commending the Rocky Flats Operations Office for citing the contractor for inadequate implementation of Technical and Operational Safety Requirements.

April 25 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on the integrated work control program.

April 25 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on the plutonium stabilization and packaging system.

May 15 letter to the Rocky Mountain Peace and Justice Center responding to questions regarding plutonium-bearing material being prepared for shipment from Rocky Flats posed in the Center's April 24, 2000, letter.

June 13 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on implementation of DOE Order 435.1, *Radioactive Waste Management*.

## **SAVANNAH RIVER SITE**

February 7 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on distributed control systems.

March 9 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on the K-Area Material Storage project.

May 23 letter to the Chairman of the Savannah River Site Citizens' Advisory Board on DOE's preparation of its Implementation Plan for the Board's Recommendation 2000-1.

May 23 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on the FB-Line recovery effort.

May 23 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on high-level waste tank space management and selection of an alternative salt treatment process.

June 7 letter to the Acting Deputy Administrator for Defense Nuclear Nonproliferation on the design of the Pit Disassembly and Conversion Facility.

June 29 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on safety controls for Tank 8 waste mobilization.

July 17 letter to the Chairperson of the Savannah River Site Citizens' Advisory Board responding to her letter dated March 29, 2000, and enclosing a copy of the Board's July 14 letter to the Secretary of Energy.

August 18 letter to the Assistant Secretary for Environmental Management forwarding a staff issue report on stabilization of americium/curium solutions.

## **APPENDIX D ADMINISTRATIVE ACTIVITIES**

### **HUMAN RESOURCES**

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

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

The Board expects its engineers and scientists to maintain the highest level of technical knowledge, encouraging them to improve their skills continually through academic study. Currently, 92 percent of the staff hold advanced degrees, 22 percent of which are at the Ph.D. level. Younger technical staff members have been recruited through the Board's professional development program. Entry-level employees recruited into this 3-year program receive graduate-school education and intensive on-the-job training guided by experienced technical mentors. Currently, there are four entry-level employees in this program, and by summer 2001, two of these individuals should be awarded a masters degree in an engineering discipline. The Board's professional development program remains extremely useful in attracting and retaining high-quality entry-level engineers and preparing them for challenging assignments in their fields.

The success of the Board's program to attract and retain a highly qualified workforce is underscored in a report issued by the Office of Personnel Management (OPM) in August 2000. In early March, OPM conducted an oversight review of the Board's human resources systems and how these systems support accomplishment of the Board's mission. OPM focused on training, performance management and recognition, staffing, and human resources accountability. As part of this review, OPM also surveyed the Board's staff for its feedback in these areas. Survey results indicated that employees have a high degree of job satisfaction, and believe the Board values them and is committed to creating and maintaining a positive, motivating work environment. Overall, the OPM report rated the Board exemplary in human resources management.

### **INFORMATION TECHNOLOGY AND SECURITY**

The Board has made state-of-the-art upgrades to system hardware and software throughout the year to ensure that its information and communications capabilities remain at the highest possible levels. These initiatives included improvement and protection during the Federal Telecommunications System transition, purchase of an Integrated Services Digital Network phone system with voice mail capabilities, and conduct of an agency-wide pilot study on the use of handheld computer technology.

The Board expanded its intranet page to assist the staff in the sharing of information for scheduling, and began using video streaming technology. The latter upgrade allows new employees to view mandatory orientation videos from their desktop computers at their convenience. Future plans for media streaming services include annual refresher training for employees and coverage of Board activities for the public. The use of videoconferencing increased to reduce travel costs and conserve valuable staff time.

The Board also reviewed its information security policies and practices and strengthened them to protect against the rapidly changing threats posed by e-government. In the coming year, an external assessment of the Board's information security posture will be performed to help guide further improvements.

## **STAFF**

As of December 31, 2000, the Board employed 89 full-time staff in addition to the five Board Members. The Board continued its aggressive recruitment program to attract the brightest engineering students from colleges and universities across the country, as well as experienced engineering professionals. This year, technical recruiters visited 15 campuses and five career fairs, and the Board expanded its outreach program to include recruitment efforts through the Hispanic Association of Colleges and Universities.

## **DISPUTE RESOLUTION PROGRAMS**

The Board, like other federal agencies, is required by the Administrative Dispute Resolution Act of 1996 to provide an alternative dispute resolution program for use in resolving appropriate disputes. During 2000, the Board's staff established such a program, making innovative use of cooperative agreements with other agencies to provide alternative dispute resolution services for the resolution of disputes most economically.

## **TEMPORARY ASSIGNMENT**

At the request of the NNSA, the Board has detailed its General Manager for 120 days to assist in NNSA's reorganization efforts. This loan of the Board's experienced General Manager should also enhance NNSA's ability to staff its operation with technically competent, highly qualified personnel.

**APPENDIX E**  
**LIST OF ABBREVIATIONS AND ACRONYMS**

ACRR	Annular Core Research Reactor
APSF	Actinide Packaging and Storage Facility
Board	Defense Nuclear Facilities Safety Board
CMR	Chemistry and Metallurgy Research
DOE	Department of Energy
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
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