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ANNUAL REPORT  
TO CONGRESS

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DEFENSE NUCLEAR FACILITIES  
SAFETY BOARD



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FEBRUARY 1994

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## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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February 10, 1994

To the Congress of the United States:

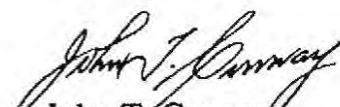
The Defense Nuclear Facilities Safety Board is pleased to submit to the Congress its fourth annual report, covering activities of the Board during calendar year 1993.

An independent executive branch establishment, the Board provides advice and recommendations to the President and the Secretary of Energy regarding public health and safety issues at Department of Energy (DOE) defense nuclear facilities. The Board also reviews and evaluates the content and implementation of health and safety standards, as well as other requirements, relating to the design, construction, operation, and decommissioning of DOE defense nuclear facilities.

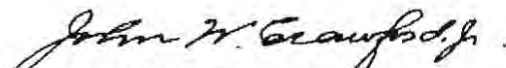
As required by statute, the Board's report to Congress summarizes activities during the past year, assesses improvements in the safety of DOE defense nuclear facilities, and identifies remaining safety problems at DOE defense nuclear facilities.


During this reporting period, the Board made progress in discharging its health and safety review responsibilities while addressing the many managerial issues associated with the operation of a relatively new agency.

Respectfully submitted,

  
John T. Conway  
Chairman

  
A. J. Eggenberger  
Vice-Chairman

  
John W. Crawford, Jr.  
Member

  
Herbert John Cecil Kouts  
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## I. INTRODUCTION

### A. OVERVIEW OF BOARD FUNCTIONS

The defense nuclear complex was operated by the Department of Energy (DOE) for decades without independent external oversight. Because of the increasing number of public health and safety issues that accumulated at aging defense nuclear facilities, Congress determined that external oversight of those facilities was necessary. Congress created the Defense Nuclear Facilities Safety Board (Board) in 1988 as an independent oversight organization within the Executive Branch to provide advice and recommendations to the Secretary of Energy regarding public health and safety at DOE's defense nuclear facilities. The President nominated the initial five members of the Board in the summer of 1989, and the Senate confirmed those nominations in October of that same year. This is the Fourth Annual Report provided to Congress by the Board, and it covers activities during calendar year 1993.

Broadly, the Board reviews operations, practices, and occurrences at DOE's defense nuclear facilities and makes recommendations to the Secretary of Energy that are necessary to protect public health and safety. The Board also assesses safety management and personnel effectiveness both within DOE and the various operation and management (O&M) contractor organizations. If, as a result of its reviews, the Board determines that an imminent or severe threat to public health or safety exists, the Board is required to transmit its recommendations directly to the President, as well as to the Secretaries of Energy and Defense.

The Board's enabling statute, 42 U.S.C. § 2286, requires the Board to review and evaluate the content and implementation of health and safety standards, including DOE's Orders, rules, and other safety requirements, relating to the design, construction, operation, and decommissioning of DOE's defense nuclear facilities. The Board must then recommend to the Secretary of Energy any specific measures, such as changes in the content and implementation of those standards, that the Board believes should be adopted to ensure that the public health and safety are adequately protected. The Board is also required to review the design of new defense nuclear facilities before construction begins, as well as modifications to older facilities, and to recommend changes necessary to protect health and safety. Board review and advisory responsibilities continue throughout the construction, testing, and operation of new facilities.

The Board is authorized to conduct special studies pertaining to adequate protection of public health and safety at defense nuclear facilities. It may seek the assistance of the federal agencies, organizations outside the government, and private experts to discharge its duties.

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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. These ancillary functions of the Board and its staff all relate to the accomplishment of the Board's primary function, which is to assist DOE in identifying and correcting health and safety problems at defense nuclear facilities. The Secretary of Energy and contractors at defense nuclear facilities are required to cooperate fully with the Board.

## **B. THE FORMAT OF THE ANNUAL REPORT TO CONGRESS**

By statute, the Board must submit an annual report to the Committees on Armed Services and on Appropriations of the Senate and to the Speaker of the House of Representatives at the same time that the President submits the budget to Congress. The report must include a review of the activities of the Board during the preceding year, including all recommendations made by the Board. An assessment is required of the improvements in safety at DOE defense nuclear facilities during the previous year. The report must also identify safety problems remaining at DOE defense nuclear facilities.

In past years the Board's annual reports contained three sections which separately addressed these mandatory topics established by Congress. This led to duplication and overlap in the reports.

This Fourth Annual Report to Congress is structured to provide Congress with the statutorily required information in a more concise and readable format. In the next section of the Report, the Board describes the status of DOE's defense nuclear facilities complex as it relates to the Board's statutory functions (Section II.A.). Immediately following that description is a summarization of the Board's principal health and safety activities during 1993 (Section II.B.). That section combines a discussion of the Board's activities related to Recommendations with an assessment of improvements in safety within the complex. It also preliminarily identifies major unresolved health and safety issues requiring continuing attention by the Board and DOE. Section II.B., which contains most of the statutorily required information, is organized into narratives which reflect the principal themes of the Board's safety activities.

Section III of the Report covers formal health and safety investigations conducted during 1993. Section IV of the Report presents, in tabular form, information regarding the ten Board Recommendations that have been closed. A summary of the Board's management activities, litigation, and public hearings is presented in Section V. Finally, the Board identifies in Section VI those health and safety issues that are expected to be the focus of 1994 activities by the Board.

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## II. TRANSITIONS IN THE DOE DEFENSE NUCLEAR COMPLEX AND THE BOARD'S 1993 HEALTH AND SAFETY ACTIVITIES

### A. 1993 STATUS OF THE DOE DEFENSE NUCLEAR WEAPONS COMPLEX

The Board's activities during the past year have been strongly influenced by a defense nuclear complex in the throes of downsizing and mission change. This transformation has had, and will continue to have, a significant effect on national security, health, safety, and environmental priorities, as well as the Board's oversight mission. As a matter of national policy, nuclear weapons production has stopped and disassembly of a large fraction of the nuclear weapons stockpile is underway. The United States is maintaining the remainder of the nuclear weapons stockpile with continuing efforts to ensure the safety and reliability of the nuclear weapons that remain operational. A moratorium has been placed on nuclear weapons testing. The federal government is providing the required secure and safe storage of nuclear components and special nuclear materials removed from the stockpile. Sites for production of weapons components are being shut down and operations required for stockpile maintenance are being consolidated at fewer locations. Thus, the nuclear weapons complex is being reconfigured.

In the meantime, safe management must be provided for large amounts of radioactive, hazardous, and mixed wastes that have accumulated at the many weapons production sites over the years. Many former production facilities that were shut down contain radioactive materials in process lines, tanks, storage vaults, and storage pools. Safe standby or shutdown conditions must be maintained until the facilities are readied for clean out of the radioactive residues and decommissioning. Systems are now being designed and readied for operation to treat and process the radioactive and hazardous residues of the weapons production program. In shutdown facilities, radioactive residues are being inventoried, characterized, and readied for greater stabilization and re-packaging for safer waste management pending final disposal.

A mammoth, multiple-site cleanup of previously contaminated sites is underway, requiring a substantially different set of technological solutions and technical resources than are needed for weapons design, construction, and disassembly. DOE, the Environmental Protection Agency, the Board, and other federal departments and agencies, together with their state counterparts and public interest groups, all play a role in this complex cleanup effort. Federal Court decisions and consent agreements by parties to litigation heighten the need for oversight and effective management of these cleanup efforts. In this setting, assurance of public and worker safety remains highly dependent upon recruitment

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and retention of a well-educated and trained workforce by both DOE and support contractors, and a disciplined conduct of operations.

## **B. THE BOARD'S HEALTH AND SAFETY ACTIVITIES IN 1993**

In keeping with its enabling legislation, Board activities during 1993 focused upon seven basic areas related to health and safety at defense nuclear facilities. These seven areas are: (1) the content and implementation of standards, including DOE Orders, regulations, and other safety requirements; (2) safety aspects of design and construction of defense nuclear facilities; (3) recruitment, retention, education, and training of qualified technical personnel; (4) safety aspects of conduct of operations; (5) safety aspects of the assembly, disassembly, and testing of nuclear weapons, (6) safe management of special nuclear material, waste, and residues; and (7) decontamination, decommissioning, and restoration of DOE sites. Since commencing operations in October 1989, the Board has made 26 formal sets of Recommendations to the Secretary of Energy, totaling 111 specific Recommendations. In 1993, the Board issued six sets of recommendations to the Secretary of Energy, totalling 26 individual public health and safety recommendations for the year. The Secretary of Energy has responded to and accepted all 26 sets of the Board's Recommendations. These Recommendations form the primary bases for the Board's activities last year.

### **1. Content and Implementation of Standards, Including DOE Orders, Regulations, and Other Safety Requirements**

Congress explicitly set forth in the legislation establishing the Board that: "The Board shall review and evaluate the content and implementation of the standards relating to the design, construction, operation, and decommissioning of defense nuclear facilities of the Department of Energy (including all applicable Department of Energy Orders, regulations, and requirements) at each Department of Energy defense nuclear facility." Congress, in the Board's authorizing legislation, clearly showed its intent that DOE's self-regulating and oversight activities be based upon the safe practices embodied in DOE Orders and other standards. The Board's enabling statute emphasizes the pivotal role standards play in ensuring public health and safety at defense nuclear facilities. Congress listed the Board's standards responsibilities first in the enabling statute; standards are then repeatedly referred to in other sections of the statute, including the provisions for investigations, Board recommendations, and evaluation of scientific information.

Basic radiation protection policies and requirements for DOE defense nuclear facilities are set forth in various DOE directives, Orders, and standards. To a considerable extent, many of these codes of practice parallel those developed and implemented by the Nuclear Regulatory Commission (NRC). The large difference,

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however, is that DOE and its contractors, with few exceptions, have never used DOE Orders, standards and guides to establish a hard core set of practices which define "how safe is safe enough." Adherence to Orders has been a condition of O&M contracts, but compliance has not been rigorously enforced. Without a well-defined set of Orders and standards to measure the safety of operations against, it is difficult to demonstrate that public health and safety are adequately protected.

The Board considers the establishment and implementation of applicable safety-related Orders, regulations, and requirements at defense nuclear sites and facilities to be strong indicators that public health and safety are adequately protected. However, DOE has not yet brought the defense nuclear complex around to fully embracing this basic concept. Despite four years of persistent effort by the Board, and repeated avowals of intent to improve by DOE management, the overall program for the identification of safety requirements, Order compliance assessments, and safety requirements implementation by DOE line organizations and contractors continues to drag. Exacerbating this situation, DOE "oversight" of defense nuclear facilities does not include effective compliance assessments based upon safety requirements set forth in Orders, standards, and related documents. Furthermore, DOE is not yet organized and staffed to perform effectively this oversight function.

**a. Board and DOE Activities Pursuant to Board Recommendation 90-2 Regarding Safety Standards**

In discharging its responsibilities, the Board determined early in its existence that many of DOE's Orders and standards were not being used effectively or uniformly. In its previous Annual Reports, the Board has discussed its ongoing efforts to encourage DOE's standards program, including development, promulgation, implementation, and compliance with suitable safety standards. Those efforts continued during 1993.

Most importantly, the Board continued to encourage DOE to fully implement one of the Board's first Recommendations. That Recommendation, 90-2, called for DOE to (1) identify the DOE Orders, standards, and other safety requirements applicable at defense nuclear facilities; (2) assess the adequacy of such requirements; and (3) determine the status of compliance with such requirements at defense nuclear facilities. Almost four years after the Board issued Recommendation 90-2, DOE has still failed to adequately implement this Recommendation complex-wide. Indeed, a fully satisfactory Departmental implementation plan for Recommendation 90-2 has yet to be developed. The Board's reviews at a wide spectrum of sites continue to show that DOE Orders and standards are often not adequately used as the basis for ensuring safe operations.

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Major elements of DOE's Revision 4 to the Implementation Plan and, in particular, the Plan's compliance schedules were rejected by the Board on September 3, 1993. Some schedules for completing identification, assessments for adequacy, and compliance with standards at specified defense nuclear facilities were either lax, or absent from the plan altogether. It was not apparent that DOE and its contractors were committed to taking required actions at a number of defense nuclear facilities in a timely and effective manner. Although the Secretary wrote to the Board on September 23, 1993, and committed to submitting a fully acceptable Plan, DOE has not yet submitted Revision 5 to the Board. The general problem is that some spotty progress has been made at DOE and its facilities toward full and beneficial use of Orders and standards. However, a single, coherent DOE program for development and use of safety requirements as a fundamental base for self-regulation has not emerged.

Because DOE has not fully developed a standards-based approach to safety, major deficiencies exist in the implementation of some important DOE-wide safety initiatives, such as those related to Radiological Protection Orders, Regulations, and the Radiological Control Manual. Radiation protection standards and practices, along with trained and competent personnel to implement them, are essential to providing a safe and healthy work environment at a site where radioactive material is found. Recommendation 91-6, which has been discussed in detail in earlier Annual Reports, focused DOE's attention on radiation protection management and leadership, standards and practices, training and competency of personnel, identification and analysis of deficiencies, and correction of those deficiencies. In June 1993, DOE submitted a second revised Implementation Plan for Recommendation 91-6, which the Board found generally acceptable. However, the Board stated that commitment dates for full compliance with Radiological Protection Orders at some facilities were unacceptable. The Board's position was that these facilities should be brought into compliance more rapidly, particularly since the key features of DOE's Radiological Protection Orders have been enforceable against contractors for decades.

During 1993, the Board reviewed radiation protection compliance at several facilities. These reviews identified numerous deficiencies, as well as some improvements in DOE's radiation protection program, including an expanded program for the DOE Radiological Control Manual (RCM).

The Department's development and implementation of its Order and standards on the subject of Operational Readiness Reviews, in response to Board Recommendation 92-6, stand in contrast as excellent examples of the use of a standards-based approach. Other advances in the standards domain were made by DOE in 1993. The Office of Environmental Restoration and Waste Management (EM) exerted substantial effort to develop adequate Requirement Identification

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Documents (RIDs), and DOE's Office of Defense Programs focused much of its 90-2 related effort on assessing compliance with DOE's safety Orders. Also, the Department issued and is beginning to implement several new safety Orders and standards, as well as revisions to existing Orders.

The Board continued its scrutiny of development of RIDs by DOE and its contractors. RIDs will identify the laws, regulations, Orders, standards, and other requirements applicable to DOE activities pursuant to Recommendation 90-2. As part of its implementation of Recommendation 90-2, DOE and its O&M contractors have developed RIDs in several areas. When they are all completed, RIDs will cover eighteen functional areas, including, among other things, engineering and design, safety documentation, training and qualification, conduct of operations and maintenance. Each functional area will contain three levels of requirements: (1) generic ; (2) site specific; and (3) facility specific.

During 1993, DOE submitted to the Board several RIDs covering sites managed by DOE's Office of Environmental Restoration and Waste Management (EM). Some of these RIDs were quite comprehensive. For example, the Fire Protection RID for the Defense Waste Processing Facility (DWPF) contains a significant number of standards which represent the fire protection safety envelope. DOE has provided this particular RID to other sites and facilities as a model for a complete RID.

Some DP facilities and sites made substantial progress toward compliance with DOE Orders and standards. For example, the Westinghouse Savannah River Company (WSRC), a major O&M contractor, was responsible for some of the most significant improvements. In reviewing WSRC's compliance with DOE Orders in 1993, the Board's staff noted the development of several new procedures to implement the requirements contained in DOE Orders, a process the Board refers to as "administrative compliance." Also noteworthy was the documentation of administrative compliance for the Replacement Tritium Facility (RTF). WSRC personnel at RTF established a program to ensure that the procedures developed to implement DOE requirements are complied with and adhered to during plant operations and maintenance. When a contractor achieves compliance with safety requirements while conducting operations and activities, the Board refers to the facilities as having achieved "adherence compliance." DOE and the contractors conduct "performance-based" compliance assessments to measure the level of adherence compliance. RTF currently serves as a model of Order compliance for other defense nuclear facilities. The Board considers WSRC's actions encouraging, not only because of observed improvements, but also because the personnel responsible for these improvements have been placed in positions to positively affect other facilities at that site.

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There has been progress at some other sites as well. In the summer of 1992, the Board identified several non-compliance issues at the Oak Ridge Y-12 Plant. A follow-up review in May 1993, found that the status of compliance with DOE's Orders at Y-12 had not improved substantially. The Board pursued this issue further at a public Board hearing at Oak Ridge in August 1993. DOE and the Oak Ridge O&M contractor responded by committing to compliance with DOE's Orders and standards and a reporting requirement to document progress. The progress reports submitted by the end of 1993 indicate that the Order compliance effort at Y-12 has improved significantly.

In its ongoing review of compliance with DOE's Orders and standards at DOE sites and facilities, the Board used as a reference, and encouraged DOE to use, DOE's *Order Compliance Self Assessment Instruction* issued by the Office of Defense Programs (DP). This instruction provided DP's sites and facilities with detailed requirements regarding compliance with DOE's Orders, and instructions concerning how sites and facilities should evaluate their compliance.

**b. Board Recommendation 93-1 Concerning Standards Utilization in Defense Nuclear Facilities**

The addition of nuclear weapons assembly, disassembly, and testing to the Board's oversight responsibilities required that additional attention be directed to compliance with standards and other safety requirements at those types of facilities.

On January 21, 1993, the Board issued Recommendation 93-1, "Standards Utilization in Defense Nuclear Facilities." In that Recommendation, the Board noted that its "ongoing review of the use of standards in defense nuclear facilities has disclosed a number of potential inconsistencies in the manner in which DOE Orders related to nuclear safety are applied at facilities that produce and process nuclear materials and those that assemble, disassemble, and test nuclear weapons. ...The Board considers that certain safety principles apply to the handling of fissile materials, regardless of the form the material is in." Accordingly, the Board recommended that DOE review the Orders and directives applicable to facilities involved in the assembly, disassembly, and testing of nuclear weapons and determine whether they provide safety assurance at least as rigorous as that which applies to other DOE nuclear facilities, and comparable to the safety assurance provided to the public and site workers by commercial nuclear material processing facilities. A verbatim copy of Recommendation 93-1, as it appeared in the *Federal Register*, is contained in Appendix 1 to this Report.

DOE's Implementation Plan for Recommendation 93-1 established bimonthly reporting requirements, provided an analytical method for accomplishing the objectives of the Recommendation, and set milestones that would drive DOE's

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implementation of the Recommendation to completion by June 1, 1994. The Board and its staff are closely monitoring DOE's implementation of Recommendation 93-1 through regular meetings with DOE, review of the status reports, and detailed technical evaluations of other DOE documents. The Board intends to follow DOE's actions until all analyses are complete and the required changes to Orders and directives have been promulgated and satisfactorily implemented.

c. **Adequacy of DOE Orders and Standards**

In 1993, the Board focused on the adequacy of those Orders, standards, and guides that set forth the requirements for safety systems, structures, and components and that provide guidance as to how to satisfy them. Principal among these are DOE Orders 5480.21, *Unreviewed Safety Questions*; Order 5480.22, *Technical Safety Requirements*; Order 5480.23, *Nuclear Safety Analysis Reports*; and the supporting DOE Standards 1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*; 3005-93 (Draft), *Definitions and Criteria for Accident Analysis*; 3009-93 (Draft), *Preparation Guide for U.S. Department of Energy Non-Reactor Nuclear Facility Safety Analysis Reports*; and Draft Standard SAFT-0019, *Guidance for preparation of DOE 5480.22 (TSR) and 5480.23 Implementation Plans*.

Taken as a set, this group of Orders, standards, and guides is particularly important because it represents DOE's attempt to address key safety issues such as:

- The specification of technical requirements that are conditions of operations as derived from safety analysis.
- Use of relative hazards classification to prioritize the complex-wide upgrading of Safety Analysis Reports.
- Use of probabilistic techniques and reference radiation exposure limits to evaluate need for and/or adequacy of safety systems, structures, and components.

The Board is concerned that the concept of "defense-in-depth" as prudent guidance for facility design and operations is not being fostered in relevant DOE standards, many of which have established very mechanistic procedures which leave little room for appropriate engineering judgment. This concern led to the formation of a Safety Analysis Report/Probabilistic Hazards Analysis review team within the Board's technical staff in the latter part of 1993, to focus on DOE's approach to safety criteria, accident analyses, and protection of workers and the public.

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Some current DOE Orders and standards do not provide the necessary margins of protection for public health and safety because they have not been updated to meet current consensus and industry guidance. Furthermore, some important safety areas are not covered by any DOE Order or standard. For example, DOE does not have adequate Orders or standards in place for configuration management, decontamination and decommissioning, backfitting safety improvements to existing facilities, or site cleanup. It should be noted that DOE has drafted a standard for configuration management, but has not yet issued it. In addition, some existing DOE Orders and standards may be too detailed and prescriptive, causing unnecessary difficulties with compliance.

However, since the issuance of Recommendation 90-2, the Board has observed some improvement in the development of new DOE Orders to adequately protect public health and safety. Most of the recently published DOE Orders contain appropriate requirements and guidance from consensus and industry standards. One of the first Orders to rely on commercial standards was DOE Order 4330.4A, *Maintenance Management Program*. More recently, DOE Order 5480.26, *Trending Analysis of Operational Information Using Performance Indicators*, contains several references to performance indicators used in the commercial nuclear and other industries.

**d. Summary Assessment of Standards Issues Requiring Resolution**

While significant progress has been made at some of the DOE facilities, too many O&M facility managers and DOE personnel simply do not yet understand the importance of conscientiously implementing Orders and standards that define requirements and practices that provide reasonable assurance of no undue risk to the public and workforce and environmental protection. The Board still hears claims that compliance with Orders and standards is too resource-intensive to justify the effort. Some personnel have stated that compliance with Orders and standards is not important at all. Overcoming these attitudinal hurdles is a continuing challenge to DOE.

A case in point is DOE Order 5480.23, *Nuclear Safety Analysis Reports*, which was issued by DOE in the spring of 1992. This Order is reasonably complete, and compares favorably with commercial nuclear requirements. However, some of the implementing standards drafted to support the Order are not consistent with the guidance found in analogous commercial nuclear industry documents and in fact often degrade the Order's requirements. In general, many safety analysis reports in the complex do not currently meet the requirements of DOE Order 5480.23 or the implementing standards. While the commercial nuclear industry standards can provide a model for DOE's approach to safety documentation, their verbatim adoption is not possible, because of the diversity of DOE facilities, their age and

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condition, and the state of their records. The challenge is for DOE to accelerate development of a meaningful set of safety documents for its facilities.

Those defense nuclear facilities coming under the control of the Office of Environmental Restoration and Waste Management (EM) for clean-up, site remediation, or decontamination and decommissioning will have sets of Orders and standards (many just being developed) different from those of production facilities. Even though the Board has emphasized the importance of determining the status of compliance with requirements in existing Orders and safety standards, EM elected to develop more encompassing RIDs first, rather than to perform preliminary self assessments for compliance with the existing DOE Orders. EM asserted that its decision was based on the more limited number of DOE Orders relevant to the functional areas of importance to EM, and the numerous sources for environmental, safety, and health requirements for EM's facilities -- environmental statutes, regulations, consent decrees, and court decisions.

The Board has accepted this approach in principle. However, the Board has communicated its expectation that the safety requirements which are to be the framework for EM activities will be clearly defined and will be made mandatory for both DOE line managers and support contractors.

Although some O&M contractors operating EM's sites and facilities had developed RIDs by the end of 1993, neither DOE nor the O&M contractors had made those RIDs mandatory through contract modifications and had not developed implementing procedures. Furthermore, once the procedures that implement RIDs are written and approved, the Department and its contractors must ensure that they are properly used and complied with by workers on the line. This process may prove to be especially difficult for EM, because the EM staff has limited experience translating standards requirements and guidance into meaningful procedures and practices.

## **2. Safety Aspects of Design and Construction of Defense Nuclear Facilities**

### **a. Systems Engineering**

Congress explicitly set forth in the legislation establishing the Board that: "The Board shall review the design of a new Department of Energy defense nuclear facility ... During the construction of any such facility, the Board shall periodically review and monitor the construction ... to ensure adequate protection of public health and safety." This provision recognizes that the design, construction, operation, and decommissioning of defense nuclear facilities form a complete life cycle for defense nuclear facilities which form a single complete system. These elements and the manner of their interaction are described by a process called systems engineering.

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Each element depends on and is linked to the others. If this is not recognized, the end result can be a facility that is inoperable within desired safety and economic envelopes. Facilities have been constructed within the DOE weapons complex that have not displayed recognition of this. The elements of this life cycle system are as follows.

Facility design is initiated and controlled by a mission statement that describes the purpose of the facility, the process or processes that will be used to accomplish the mission, and the justification of the mission. Conceptual design and design bases are prepared which outline the basic configuration, the process systems that constitute the facility, and the safety requirements (Codes and Standards). If a facility is a component of a larger complex, the interface requirements (input and output) are defined and controlled. Then a series of progressively more detailed design iterations are prepared that ultimately lead to documents (drawings and specifications) used for construction and operation. The design bases serve as the underpinning for the requirements of construction, as well as the starting point for development of conduct of operations.

Construction is initiated by executing the content and instruction in the drawings and specifications, and then assembling the structures and components of the systems accordingly. This is accomplished according to the requirements of the design. Once startup and testing are complete, operational requirements identified, operational procedures readied, and personnel trained, the facility is then ready to operate.

Operations embody using the facility systems to achieve mission requirements in a manner consistent with the design safety envelope and the operational safety requirements derived from the design bases. Once the facility has fulfilled its mission and is no longer required, decommissioning begins.

Decommissioning is the process of emptying a facility of feedstock, the disassembly of the components of the systems within the facility, and the removal of the structure that housed the facility. This is done using a systems engineering process that maintains a facility safety envelope, consistent with the changed mission, until the decommissioning process is complete. It also requires that special requirements be developed to handle and dispose of any waste products resulting from actual dismantlement.

The above discussion demonstrates that the mission and life cycle of DOE defense nuclear facilities may be thought of as a straight forward system. Had the existing facilities been developed and operated in accordance with these principles of systems engineering, many of the safety issues and concerns that the Board is currently addressing would not exist. However, the weapons complex was not

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constructed nor has it evolved using these principles. Consequently, many safety-related concerns and issues at these facilities result from the lack of development of the complex as an integrated whole. Using a systems approach, any action related to one part of the system must be evaluated for its potential effect on the other parts of the system. Examples of such actions are those described above and include design, construction, maintenance, operations, and decommissioning. The activities which comprise these processes or actions are linked and are interactive. The Board has encouraged, through several separate sets of recommendations, that DOE employ a systems engineering approach to addressing the numerous technical issues facing the nuclear weapons complex.

One of the most influential parts of the systems approach is the effect that the adequacy of the design has on the safety of facilities. The Board continues to devote attention to the design bases of defense nuclear facilities. This attention reflects the conviction that properly conceived and executed designs provide a defense-in-depth and the foundations for safe operation and decommissioning of facilities.

Previous Annual Reports to Congress have discussed the technical assessments conducted by the Board and its staff to evaluate the safety bases for operations at a number of facilities. During 1993, extensive reviews were undertaken of the adequacy of seismic and systems engineering designs at the H-Area Waste Tank Farms, the Defense Waste Processing Facility, and the Replacement Tritium Facility at the Savannah River Site. Examinations are currently being continued of the design adequacy of existing facilities at the Savannah River Site, the Hanford Site, and the Idaho Chemical Processing Plant for safe storage of spent nuclear fuel, and the facility modifications necessary to store additional spent fuel in these existing facilities.

The Board issued its Recommendation 92-4 in 1992, urging adoption of a systems approach in the project for new high level nuclear waste tanks at the Hanford Site. In February 1993, DOE submitted an implementation plan for Board Recommendation 92-4. The Board rejected the plan, noting that the systems approach and systems engineering for the Tank Waste Remediation System (TWRS) at Hanford, which were called for in Recommendation 92-4, could be considerably strengthened through appropriate requirements in the implementation plan. During the past year, the Board has worked with DOE to ensure that the revised implementation plan properly addresses the systems approach. Prior to the end of 1993, considerable progress had been made in the development of an adequate plan. Implementing the needed actions will involve modification of long-standing practices, such as segregation of the design processes, construction, and operation of facilities.

Many DOE facilities previously managed by the Office of Defense Programs (DP) are being transferred to DOE's Office of Environmental Restoration and Waste Management (EM). The status of these facilities needs to be well-characterized to

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determine which measures are required to ensure safety during a state of operation, standby, or decontamination and decommissioning.

**b. Seismic and Other Hazards Mitigation**

The Board continues to devote significant attention to reviewing the adequacy of design bases of defense nuclear facilities. A significant portion of the review of design bases encompasses subject areas associated with mitigation of natural and man made hazards. Included are effects due to seismicity, wind, tornado, and flood, as well as potential hazards resulting from processes utilized, and materials contained, in facilities. These hazards are often the most significant threats to the safety and integrity of a facility.

During 1993, part of the Board's review effort was focused on the design adequacy of facilities to resist natural and man-made phenomena at a number of facilities across the weapons complex. Review of H-Area Waste Tank Farms at the Savannah River Site (SRS), the fuel basins at the Idaho National Engineering Laboratory (CPP-603, CPP-666), the Chemistry and Metallurgy Research Laboratory (TA-3) and the Plutonium Facility (TA-55) at Los Alamos National Laboratory, and the Materials Staging Facility at the Pantex Plant were either begun or continued throughout 1993.

Review of the design adequacy of the Replacement Tritium Facility (RTF) at the Savannah River Site was completed. Questions were raised concerning seismic ground motion and structural and geotechnical engineering. The Board could not conclude that the RTF would adequately resist extremes of seismic ground motion without its design limits being exceeded, due to the potential for liquefaction of soils directly beneath the main building. However, the facility was considered to pose an acceptable risk after it had been established that the tritium inventory in the facility would be limited.

The Board initiated review of analyses that DOE and its contractors performed to assess potential aircraft crash accidents for certain DOE defense nuclear facilities. The review and evaluation indicated that the methodologies employed in these studies are not always consistent. Areas of inconsistencies noted include assessment of the probability of an aircraft crash, aircraft impact analytical methodology, and analysis of the consequences of the crash. The Board is closely examining the accident analyses covering possible aircraft crashes at the storage magazines at the Pantex Plant. This review will continue in 1994.

Comparison has been made of the characterization studies of seismic ground motion performed at the Savannah River Site, the Idaho National Engineering Laboratory, the Los Alamos National Laboratory, and the Rocky Flats Plant in

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previous years. The Board has concluded that the methods used to characterize ground motion may not be appropriately conservative for use in evaluating the safety of existing facilities and the design of new facilities. This topic will be the subject of continued review and discussion in 1994. The interest of the Board in seismic issues is motivated by the fact that among the natural and man-made phenomena, seismic events can have wide-ranging consequences. This observation was recently reconfirmed by the extensive area of damage associated with the Northridge, California, earthquake.

**c. Other Systems Engineering Activities**

In addition to the Recommendations discussed above, eight of the Recommendations issued in earlier years have dealt with systems engineering concepts, improved design basis knowledge, or enhancement of safety through design improvements or modifications. These eight include: 90-3 (Safety at the Hanford Waste Tanks); 90-5 (Systematic Evaluation Program at Rocky Flats Plant); 90-6 (Criticality Safety at Rocky Flats Plant); 90-7 (Safety at the Hanford Waste Tanks); 91-2 (Closure of Safety Issues at the K-Reactor); 91-5 (Power Limits for K-Reactor Operation); 92-4 (Multi-Function Waste Tank Facility at Hanford); and 92-5 (Discipline of Operation in a Changing Defense Nuclear Facilities Complex).

While not directly tied to specific Board recommendations, several activities have been initiated on a broad basis to review other issues related to systems engineering, design bases, and safety enhancement. The issues covered include: (1) spent fuel handling by DOE; (2) treatment of waste and other chemical processing matters; (3) methodologies for storage of special nuclear material; (4) storage of tritium; (5) methods used for safety analyses and for risk-based analyses and prioritization; (6) practices for planning work so as to maintain exposures as low as is reasonably achievable; and (7) approaches for decommissioning and decontamination.

**3. Recruitment, Retention, Education, and Training of Qualified Technical Personnel**

**a. Recruitment, Education, and Training**

The technical capabilities of DOE and contractor personnel have been an on-going concern of both the Congress and the Board for a number of years. The United States Senate Report accompanying the Board's enabling legislation states that the "Board is expected to raise the technical expertise of the Department substantially...." The health and safety of the public and workers rest on a properly trained workforce accomplishing tasks in a formal, deliberate fashion in accordance with reviewed and approved procedures. Implementation of effective training and

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qualification programs and disciplined conduct of operations are essential to establishing a technically competent work force. As a result, many of the Board's recommendations have stressed training and conduct of operations.

Recommendation 90-1, the first formal Recommendation promulgated by the Board, called for implementation of effective training and qualification at the K-Reactor at the Savannah River Site. DOE action resulted in a successful training program. During 1993, the staff of the Replacement Tritium Facility at the Savannah River Site used the lessons learned at the K-Reactor and subsequently became the first DOE facility to have a fully accredited technical training program. However, in most other cases, DOE has not extended this proven approach to other defense nuclear facilities at the Savannah River Site or to facilities at other sites.

Assessments in 1992 at the Hanford Site, the Pantex Plant, non-reactor facilities at the Savannah River Site, the Y-12 Plant at Oak Ridge, and the Rocky Flats Plant clearly demonstrated the need to strengthen training of technical personnel. As a result, Recommendation 92-7 proposed that DOE take strong actions to improve qualification and training at those sites. DOE's initial Implementation Plan, submitted in June 1993, was determined by the Board to be unacceptable as a means for achieving the needed improvements.

DOE did not correct the deficiencies in this Implementation Plan until the initiatives of Recommendation 92-7 were embraced by an even broader-based Board proposal (Recommendation 93-3) for improving recruitment, retention, education, and training of DOE's technical personnel. Previous Annual Reports have emphasized the importance of attracting and retaining technically educated and experienced personnel to provide the management, direction, and guidance essential to safe operation of the defense nuclear facilities. Nevertheless, in recent years there has been little noticeable improvement in the scientific and technical expertise in the defense nuclear facilities complex.

A significant cause is a major handicap imposed on DOE in the recruitment and advancement of technically-qualified personnel to positions of responsibility. Unlike other federal agencies which rely upon technical competency, such as the Nuclear Regulatory Commission, the National Science Foundation, and the Board, DOE does not have excepted appointment authority. It is seriously encumbered by antiquated Civil Service restrictions that discourage bright, technically-qualified persons from being initially hired and subsequently promoted to positions of responsibility.

The lack of sufficient numbers of qualified technical personnel in DOE's oversight and line organizations is a serious issue. In some instances, the Board has provided a level of technical review for DOE that goes beyond the traditional bounds

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of external oversight. This has occurred for a variety of reasons, including failure of DOE's internal oversight and line personnel in many instances to detect and correct safety problems as they arise. It also has adverse consequences for the Board, which has a limited number of staff. The ability of the Board to meet its responsibilities and to expand its coverage are directly related to DOE's performance in taking prompt and effective remedial action on safety problems which DOE itself identifies, or which are called to DOE's attention by the Board. The Board is sensitive to the need to ensure that its resources are not used as a substitute for DOE's personnel and capability, both in line and internal oversight organizations. Those organizations must be the first and second lines of defense for detecting and correcting safety problems. If the Board's personnel must make repeated assessments of a facility or activity in order to identify problems or to ensure that needed improvements are made, the Board's ability to fully execute its responsibilities may be limited.

Recommendation 93-3 urged DOE to take dramatic action to attract and retain scientific and technical personnel of exceptional qualities. The Recommendation addressed concerns of the Board regarding the technical capabilities of personnel within the Department, both at Headquarters and in the field. Among the steps the Board urged were the following DOE initiatives:

1. Establish the attraction and retention of scientific and technical personnel of exceptional qualities as a primary agency-wide goal.
2. Take the following specific actions promptly in the interest of achieving this goal.
  - a. Seek excepted appointment authority for a selected number of key positions for engineering and scientific personnel in DOE programmatic offices, in other line units, and in the oversight units responsible for the defense nuclear complex.
  - b. Establish a technical personnel manager within the Office of the Secretary to coordinate recruitment, classification, training, and qualification programs for technical personnel in defense nuclear facilities programs.
3. Develop a broad-based DOE program for improving qualification, education, and training of technical personnel including:
  - a. Review the performance appraisal system for technical employees for its effectiveness in determining basic pay, training needs, promotions, reductions in grade, and reassignment/removal.

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- b. Review and improve programs for training and assigning technical personnel. (This activity would be coordinated with actions taken, or planned to be taken, in response to Board Recommendations 90-2, 91-6, 92-2, and 92-7).
  - c. Explore with the Secretary of Defense the possibility of assigning to DOE defense nuclear facilities activities a number of outstanding officers with nuclear qualifications who may now be surplus to DOD needs.
  - d. Establish initiatives designed to take advantage of skills of marginal technical performers and retrain them.
  - e. Expand Headquarters/Field personnel exchange programs for highly qualified junior technical staff to promote understanding of all aspects of technical issues including their resolution.

Finally, the Recommendation called for a baseline and continuing assessments of DOE's technical personnel initiatives by groups internal and external to DOE. The Secretary of Energy accepted Recommendation 93-3 on July 23, 1993. A verbatim copy of Recommendation 93-3, as it appeared in the *Federal Register*, is contained in Appendix 1 to this report. Because of the importance the Board attached to the Recommendation, the Board established a task group of senior staff, chaired by the Board's General Counsel, to work with DOE's staff in the development of an adequate implementation plan.

To address several overlapping elements of Recommendations 92-7, which covered qualification and training of technical personnel, and Recommendation 93-3, the Secretary proposed, and the Board accepted, that a single Implementation Plan be developed for these two important and inter-related Recommendations. After extensive joint effort by the DOE and Board task groups, DOE submitted a comprehensive combined Implementation Plan that was accepted by the Board on November 5, 1993. All initiatives covered by the Implementation Plan are scheduled to be completed by December 1995.

Some of the actions recommended by the Board in Recommendation 93-3 were completed before the close of 1993. A senior and broadly experienced DOE technical management expert was named to coordinate all of the technical personnel initiatives and to manage implementation of the plan. The Secretary issued a policy statement emphasizing the important link between technical competence and safety at defense nuclear facilities. Unfortunately, DOE did not move expeditiously enough to request Congressional authorization for excepted service appointment authority for key technical personnel during 1993. The Board has informed the principal

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committees in Congress of the need. This Board Recommendation is a priority for 1994, and is consistent with the President's commitment to correct deficiencies existing in the government personnel system identified during the National Performance Review. Persistent and strong personal involvement at the highest levels within the Department will be required to ensure that the sweeping reforms embodied in the Secretary's implementation plan for Board Recommendation 93-3 are achieved.

For these technical personnel initiatives to work, DOE must clearly define and delineate the various roles and responsibilities for safety within the defense nuclear complex. During the past year the Secretary instituted a major reorganization of the Department. As DOE implemented these new arrangements, it became evident to the Board that nuclear safety responsibilities among the many organizations involved require more explicit written delineation than has been provided. The Board also brought the need for such definition to the attention of DOE and has been told that it is being developed.

The Board and its staff continued making assessments of existing training and qualification programs at defense nuclear facilities during 1993. The Board's observations and staff reviews were often forwarded to DOE pursuant to the Board's Policy Statement Number 2, which governs transmittal of technical information to the Department of Energy in these circumstances where a Board recommendation is inappropriate. For example, many of the deficiencies in training and qualification observed during a July visit to the F-Area of the Savannah River Site, transmitted in a Board letter to the Assistant Secretary for Defense Programs, had been observed in earlier reviews. The lack of corrective action was cause for concern, particularly in view of the approaching restart of the facilities. DOE and its contractor thereafter initiated significant improvements in the deficient programs.

In a letter from the Board to the Principal Deputy Assistant Secretary for Defense Programs dated July 6, 1993, the Board transmitted information regarding technical reviews at the Pantex Plant conducted during March and June 1993. The Board noted that the Pantex O&M contractor's training and qualification programs for maintenance and technical support divisions lacked uniformity and that progress in improving these programs varied noticeably among the involved divisions. The Board also found a lack of proactive line management and asked for a formal report from DOE indicating its plan for corrective action. Thereafter, DOE and its contractor committed to accelerating the schedule to correct the deficiencies.

As shown by these two examples and the results of several other reviews conducted in 1993, inadequate progress was being made in effecting broad-based improvement in training and qualification across the complex. In September, the Board urged the Secretary's continued and direct leadership in timely and effective

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implementation of needed improvements. Shortly thereafter, DOE committed to the wide-ranging Implementation Plan for Recommendations 92-7 and 93-3 noted above.

A key element in DOE's ability to ensure proper training, qualification, and conduct of operations by its contractors is the assignment of Facility Representatives by DOE. A Facility Representative is assigned to each major facility, or group of lesser facilities, to oversee the day-to-day conduct of operations there. These individuals are DOE's primary contact with the contractors, and they play a vital role in ensuring adequate protection of public health and safety at the defense nuclear facilities.

The Board had noted and informed DOE that the Facility Representative Program lacked centralized control and that qualifications, duties, and responsibilities of the representatives varied from facility to facility, even at the same site. Recommendation 92-2 addressed the need for a comprehensive analysis of the Facility Representative program and for establishment of a formal program of training, qualification, and definition of duties and responsibilities. In April 1993, the Secretary forwarded a plan to review the status of existing programs and develop: (1) a plan to establish and maintain an effective program at each field organization; (2) recruitment and retention techniques and incentives; (3) training; and (4) a standard for the Facility Representative program.

Subsequently, in August 1993, DOE issued DOE-STD-1963-93, *Establishing and Maintaining a Facility Representative Program at DOE Nuclear Facilities*, to provide guidance concerning selection, training, qualification, coverage, duties, responsibilities, and authorities of the Facility Representative. In the first quarterly status report of the Action Plan for Recommendation 92-2, the Secretary reported the results of a review of the current status of Facility Representatives at each defense nuclear facility, and committed to completing all proposed actions by May 1994.

DOE's Technical Standards Program has issued various documents which amplify DOE's Orders 5480.19 and 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities*, and which provide valuable recommendations and suggestions for implementing requirements established by the Order. Guides have been issued for two-thirds of the chapters in DOE Order 5480.19. Numerous guides have also been prepared to provide information concerning the conduct and evaluation of various aspects of training and qualification programs. Although issuance of these guides is commendable, the Board's staff has found during site visits that DOE field organizations and contractors are often unfamiliar with the DOE-STD Guide series and have failed to implement programs of quality comparable to that of the ones set

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forth in the guidelines. The Board intends to stress the implementation of these guides in its facility reviews in the forthcoming year.

The shift of several of the defense nuclear facilities toward environmental restoration, and the resulting abruptly changing missions of these facilities, present new and formidable challenges to DOE in developing and maintaining effective training, qualification, and operational programs. Many of the DOE Orders and standards were developed for facilities engaged in long term processing or reactor operations. Developing specific programs for facilities engaged in short-duration, singly performed operations, such as the Fernald Environmental Management Project, will require careful planning and innovative approaches. Moreover, in some cases, such as at Building 771 at the Rocky Flats Plant and the Hanford Site Plutonium Finishing Plant, the lack of a well-defined mission has prevented implementation of an effective training program. The Board and its staff will continue their vigilance of DOE's training, qualification, and operational programs, particularly those that are rapidly changing. For example, the Board is currently conducting an expanded review of performance in regard to conduct of operations across the complex to determine additional actions required to improve the quality of compliance in this critical area.

**b. Retention of Critical Technical Expertise**

The Board has been concerned with the loss of unique talents from DOE and the contractor organizations operating defense nuclear facilities. This concern is particularly acute for the weapons laboratories and the facilities involved in assembly, disassembly and testing of weapons, where budget pressures and other constraints are leading to severe erosion of the talent pools on which much of the weapons program has rested for many years. In Recommendation 93-6, issued in December 1993, the Board urged DOE to:

- develop a formal program to identify the skills and knowledge needed to develop safe weapons dismantlement and modification procedures for all remaining nuclear weapons, and to safely conduct nuclear testing;
- institute a practice whereby personnel losses from the complex are reviewed to assess their impact on required safety-related capabilities;
- develop means to ensure continued access to necessary capabilities through the use of personnel retention, new hires and consulting arrangements, programs to document the knowledge of highly expert personnel, and the development of detailed procedures to guide people who will follow;

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- develop an integrated program to maintain nuclear weapons testing expertise at the Nevada Test Site (NTS); and
  - reevaluate the traditional reliance on administrative controls to ensure nuclear explosive safety at NTS, given the ongoing loss of personnel.

A verbatim copy of Recommendation 93-6, as it appeared in the *Federal Register*, is contained in Appendix 1 to this report. The Secretary of Energy accepted Recommendation 93-6 on February 2, 1994.

The Board's concern for maintaining vital facilities and expertise to conduct criticality experiments resulted in issuance of Recommendation 93-2 on March 23, 1993. A verbatim copy of Recommendation 93-2, as it appeared in the *Federal Register*, is contained in Appendix 1 to this report.

#### **4. Safety Aspects of Conduct of Operations**

##### **a. Engineering Safety Through Improved Conduct of Operations**

"Conduct of Operations" entails the formal control of facility systems and the performance of reviewed and approved procedures in a deliberate manner, using proper communications. The basic requirements for proper Conduct of Operations are set forth in DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*, supplemented by other DOE Orders and guidance documents. The Board's staff observed only limited progress toward implementation of these directives at many facilities and has noted a general lack of understanding and commitment to the concepts set forth in DOE Order 5480.19 by DOE's managers and contractors.

The Board has directed a significant portion of its resources to monitoring conduct of operations at the Pantex Plant, because of the key role that site plays in the disassembly of weapons and the accompanying risks to health and safety of the public and workers. Late this past year, the Board sent a letter to the Assistant Secretary for Defense Programs describing deficiencies observed in conduct of operations at the Pantex Plant. The Board requested a formal report covering: (1) an evaluation of conduct of operations at Pantex; (2) an evaluation of practices at other sites to upgrade conduct of operations and their suitability for Pantex; (3) availability of personnel with appropriate conduct of operations qualifications and experience at contractor and DOE offices; and (4) an evaluation of the effectiveness of actions by DOE to implement improved conduct of operations at Pantex. The Board also requested a report of corrective actions resulting from these evaluations. A satisfactory response from DOE has yet to be received.

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**b. Readiness of Facilities to Operate**

One of the Board's earliest activities was to review preparations for the planned resumption of plutonium processing at the Rocky Flats Plant. Recommendation 90-4 urged DOE to conduct comprehensive Operational Readiness Reviews (ORR), on a facility-by-facility basis, prior to resumption of such operations. Details of that Recommendation are found in the First Annual Report to Congress.

The Board closely followed the implementation of the Operational Readiness Review process for the first facility to resume plutonium operations at the Rocky Flats Plant, which was Building 559, an analytical laboratory. The Board determined that DOE's review had been conducted prematurely. Because the Board realized that DOE's first Operational Readiness Review at the Rocky Flats Plant would be used as a model for future ORRs, the Board insisted that the ORR for Building 559 be performed in a manner that adhered closely to the DOE Implementation Plan for Recommendation 90-4. Therefore, the Board issued Recommendation 91-4, calling for DOE to complete the Operational Readiness Review for Building 559 only after known safety deficiencies had been corrected or were appropriately near closure, and only after the contractor had issued a Readiness to Proceed Memorandum requesting approval for resumption of plutonium operations. The follow-on Operational Readiness Review for Building 559 was completed in January 1992. As discussed in the Board's Second Annual Report to Congress, the Board determined that DOE had adequately implemented Recommendation 91-4, and a model for subsequent ORRs had been developed. The mission of the Rocky Flats Plant was subsequently changed from production to cleanup, and the Board determined that the actions taken by DOE and the contractor to implement Recommendation 90-4 for the limited plutonium processing operations proposed for Building 707 were adequate. See the Board's Third Annual Report for a discussion of the 707 restart effort.

The lessons learned at the Rocky Flats Plant on ORRs, however, were not initially implemented at other facilities in the complex. For example, in early 1992, the Board and its staff conducted reviews of selected safety issues related to plutonium-238 processing operations at the HB-Line at the Savannah River Site, where there had been repeated safety-related shutdowns following resumption of processing in July 1991. The Board determined that both the Operational Readiness Review conducted for the HB-Line by the SRS contractor, and DOE's readiness review, had been premature, limited in scope, and inadequate. As a result, the Board issued Recommendations 92-1 and 92-3, recommending that the contractor and DOE conduct adequate Operational Readiness Reviews prior to resumption of operations at HB-Line, in accordance with previous Board Recommendations. The contractor and DOE subsequently conducted adequate reviews.

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DOE took an important step in defining requirements for Operational Readiness Reviews (ORRs) applicable to all defense nuclear facilities in issuing "Approval for Restart of Facilities Shutdown for Safety Reasons and for Startup of Major New Facilities," Secretary of Energy Notice, SEN-16B-91. Following issuance of these requirements, the Board and its staff monitored the preparations for and conduct of additional Operational Readiness Reviews (ORRs) at several defense nuclear facilities. In many instances, improvements were noted. However, it was observed that several key aspects of the review process were not being consistently implemented.

The Board concluded that DOE lacked effective standards for the conduct of ORRs throughout the complex. DOE directives and guidance needed improvement, particularly in specifying both the required features of a satisfactory ORR and the occasions when an ORR should be performed. Accordingly, the Board issued Recommendation 92-6 on August 26, 1992, urging DOE to develop effective standards to govern the ORR process, including specific criteria for determining when ORRs are required. DOE committed in its 92-6 Implementation Plan, dated January 1993, to develop a new Order providing requirements for the Operational Readiness Review process and a supporting DOE Standard giving detailed guidance for implementing the requirements. The Board conditioned acceptance of DOE's Implementation Plan on receipt and approval of DOE's new Order, and standards for conducting ORRs being developed under the Plan.

In September 1993, DOE completed the new DOE Order 5480.31, *Startup and Restart of Nuclear Facilities*. The Board reviewed the Order, and determined that it provides a clear and effective set of requirements to govern the ORR process. As of December 1993, DOE was completing development of standards (*DOE Standard, Planning and Conduct of Operational Readiness Reviews (ORR)*, DOE-STD-3006-93, November 1993) to provide additional guidance for implementing requirements of DOE Order 5480.31.

In early 1993, the Board and its staff reviewed DOE's new Environmental Restoration Management Contractor (ERMC) approach to operation of defense nuclear waste storage, treatment, disposal and site decommissioning/restoration. At the Fernald Environmental Management Project (FEMP), the ERMC contractor had committed to conduct a readiness review required by DOE-Fernald (DOE-FN) prior to start-up of the Uranyl Nitrate Hexahydrate (UNH) stabilization project. However, a lack of technical vigilance on the part of DOE-FN allowed the ERMC contractor to start operations without either conducting the required readiness review or informing and obtaining approval to start the operation, from either the DOE-FN manager or the DOE Headquarters project office. This disregard for the overall readiness process was a key factor leading the Board to issue Recommendation 93-4.

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A verbatim copy of Recommendation 93-4, as it appeared in the *Federal Register*, is contained in Appendix 1 to this report.

In Recommendation 93-4, the Board called for DOE to "establish a clear process with an appropriate set of requirements and clear definitions of the line of authority for approval to start the UNH stabilization project. The set of requirements should identify the type and scope of readiness reviews DOE will require for the start of the UNH stabilization runs."

Recommendation 93-4 also addressed the broader need for closer management and direction of ERMCS. That portion of the Recommendation addressed the approach DOE needs to undertake to better control the diverse activities of its contractors. These elements were triggered by the lack of sufficient numbers of competent, trained headquarters and field personnel assigned by DOE to technically manage ERMCS, as shown by safety problems encountered and not properly resolved at the FEMP. The Board was also concerned that future ERMCS contracts might be signed before DOE develops internal capabilities to carry out the necessary technical management and oversight responsibilities. In light of the apparent lack of such planning by DOE, Recommendation 93-4 urged DOE to develop and implement a technical management plan for Fernald, and for all future ERMCS contracts, and to delineate the features of an acceptable technical management plan. It further asked that DOE consider the inclusion of a technical management plan in other DOE contracts as those contracts come up for amendment or renegotiation. On August 6, 1993, DOE accepted the Board's recommendation and, in its Implementation Plan, committed to meet Recommendation 93-4 fully.

In January 1993, staff members of the Board reviewed the DOE "Operational Readiness Evaluation" (ORE) at the Pantex Plant for the Preparation for Disposal (PFD) of retired W-79 warheads in Building 12-84. The ORE Team would not recommend commencement of W-79 PFD operations because of deficiencies in a number of areas, including safety analysis and associated safety limits for Building 12-84. The Board agreed with the ORE team's conclusion, and also noted deficiencies in the conduct of the ORE itself, including failure to evaluate the technical and managerial qualifications of personnel in the DOE field organization and the inadequate assessment of the status of compliance with Orders. These observations were forwarded to DOE for consideration in a letter from the Board to the Acting Secretary of Energy dated January 21, 1993.

In March 1993, staff members reviewed the application of the ORR process to the Reclamation Relocation Project in Building 9204-E at the Oak Ridge Y-12 Plant. This review led the Board to conclude that many of the features of an ORR set forth in Recommendation 92-6 had not been covered by the contractor's ORR. Therefore, the Board, by letter dated April 21, 1993, requested DOE to provide an

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evaluation of the processes used in the ORR at Y-12 as contrasted against the Recommendation 92-6 Implementation Plan, and to provide any planned corrective actions. DOE and the contractor subsequently committed to upgrading the ORR process at Y-12 and to conduct future ORRs in a manner consistent with Board Recommendation 92-6 and with the Order being developed by DOE.

In 1993, the process of establishing readiness to operate at the Savannah River Site was examined for: (1) a "special unload" in the tritium facility; (2) the initial startup of the Replacement Tritium Facility (RTF); (3) "cold chemical runs" at the Defense Waste Processing Facility (DWPF); and (4) preparations to restart the F-Canyon/FB-Line. In general, the Board found deficiencies in the implementation of the readiness review process similar to those noted at other sites, a lack of rigor or suitable independence, and the use of ORR-type reviews as adjuncts to preparation by management for restart of the facility. As a result, the Board provided written comments to DOE on the readiness reviews for the special unload, RTF, and DWPF. DOE acknowledged the deficiencies and expanded portions of the reviews or performed them anew.

The Board and its staff conducted several assessments of the readiness to increase the fabrication rate of  $^{238}\text{PuO}_2$  pellets in the TA-55 Plutonium Facility at the Los Alamos National Laboratory (LANL). The Board communicated the results of those assessments to the Assistant Secretary for Defense Programs in a letter dated June 21, 1993. A large number of the pellets are needed to support the manufacture of Radioisotope Thermoelectric Generators for NASA's Cassini Project. These reviews led the Board to conclude that deficiencies in maintenance of containment by the gloveboxes, and in procedures for the maintenance, were not being adequately addressed. These deficiencies allowed degradation of glovebox integrity to occur, resulting in repeated cases of contamination of personnel in TA-55 during early 1993. In addition to these deficiencies, the Board's staff noted the limited scope of the readiness reviews for this project and inadequacies in the hazards analysis. In September 1993, the Board noted these issues, and, by letter to the Assistant Secretary for Defense Programs dated September 10, 1993, requested that DOE consider an enlarged review of the readiness of TA-55 to proceed with production for the Cassini Project. Also, the Board noted that only six Orders of a possible fifty-one safety Orders were assessed in preparation for Cassini production. During preparation of another plutonium facility for operations to support the Cassini Project (the HB-Line at the Savannah River Site), a more complete set of DOE Orders was assessed for compliance. Consequently, the Board, in a letter to the Secretary of Energy dated December 29, 1993, requested a report within 30 days from DOE discussing DOE's evaluation of Order compliance at LANL and the rationale for having assessed compliance with only six safety-related Orders. The same letter also asked DOE to evaluate whether an Unreviewed Safety Question existed at TA-55

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concerning its emergency power generator. At the close of 1993, these issues had not been resolved.

The Board has noted the development of a manual at the Savannah River Site for the use by line management in assessing facilities. This manual, titled *Operational Readiness Functional Area Requirements*, WSRC-SCD-4, is a compendium of requirements associated with DOE's Orders and industry practices. Use of this manual should permit a thorough, structured self-assessment by line management prior to the arrival of an independent ORR team to verify readiness to operate a facility safely.

Nuclear testing at the Nevada Test Site is currently subject to a moratorium. However, the President has publicly stated that testing may be required in the future, and therefore DOE has been directed to take steps necessary to prepare for resumption of testing, pending a decision on the matter. In Recommendation 93-6, the Board urged that DOE develop and institute a program for maintaining expertise in operations key to the safety of nuclear testing at NTS. The Board considers that an overall review of the integrated test activities at NTS would be required to confirm readiness for safe testing, should a decision be made to conduct another nuclear test.

DOE has indicated that in the next few years there will be numerous startups and restarts of defense nuclear facilities. Examples include:

- At the Pantex Plant, DOE is expanding the interim storage of pits in Zone 4, and a DOE ORR is scheduled for early 1994. DOE is also preparing new weapon assembly/disassembly bays in Building 12-104A and a new Special Nuclear Material Component Staging facility in Building 12-116.
- At the Savannah River Site, F-Canyon/FB-Line restart of separations operations is currently planned for early 1994. Thereafter, ORRs are being planned for the Defense Waste Processing Facility and the In-Tank Precipitation processes for processing high level radioactive wastes.
- At the Rocky Flats Plant, DOE has not authorized resumption of limited operations in Building 707 to stabilize plutonium-bearing residues pending completion of an Environmental Assessment. The ORR for Building 707 was completed in November 1992. DOE has informed the Board that it will assess the readiness of Building 707 to safely resume operations in accordance with the requirements of DOE Order 5480.31. Additionally, within the next two years, DOE intends

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to conduct solution stabilization processing in Building 771 using a new stabilization process, necessitating an ORR prior to startup.

- At the Hanford Site, readiness reviews are planned for the K-East Basin fuel re-encapsulation efforts.
- The Hydrogen Fluoride process for converting uranium oxide to uranium metal is scheduled to be restarted at the Oak Ridge Y-12 Plant. Subsequently, the restart of material processing in O-Wing in Building 9212 is planned.
- The startup of the Device Assembly Facility is planned for late 1994 at the Nevada Test Site.
- At the Idaho National Engineering Laboratory, readiness reviews are planned for the restart of the de-nitrator at CPP-601 in early 1994.
- DOE is considering restarting the Omega West Reactor at the Los Alamos National Laboratory.
- Modifications to the Pulse Reactor Facility and Annular Core Research Reactor at the Sandia National Laboratories are in progress. A new facility, the Radioactive and Mixed Waste Management Facility, is being readied for operation in 1995.

The Board will closely monitor the readiness reviews to ensure that they will be conducted by DOE in conformance with the requirements contained in newly issued DOE Order 5480.31, *Startup and Restart of Nuclear Facilities*, and the tenets of Recommendation 92-6.

#### **5. Safety Aspects of the Assembly, Disassembly, and Testing of Nuclear Weapons**

During 1992, after Congress extended the Board's jurisdiction to include facilities involved in the assembly, disassembly, and testing of nuclear weapons, the Board and staff visited all of the nuclear weapons sites to become familiar with operations and conducted a public meeting on August 20, 1992, in Amarillo, Texas, related to the assembly and disassembly of nuclear weapons at the Pantex Plant. Deficiencies identified during these visits were brought to the attention of DOE establishing a basis for further detailed assessments. Those actions are detailed in the Board's Third Annual Report to Congress.



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In 1993, the Board's second full year of cognizance over these facilities, the scope of the technical reviews was expanded. Public hearings were held in Oak Ridge, Tennessee, to discuss safety matters related to the Y-12 Plant, and in Los Alamos, New Mexico, to address safety issues associated with the Los Alamos National Laboratory. Technical reviews identified a need for improvement in numerous safety-related areas, both facility-specific and complex-wide. The most notable reviews were in the areas of utilization of standards, safety assessments, operational readiness reviews, material disposition, and training and qualification of personnel.

As a result of its reviews of issues at weapons assembly, disassembly, and testing sites, the Board developed and issued three Recommendations during 1993. Recommendation 93-1 specifically addressed the use of DOE Orders and standards at facilities that are involved in the assembly, disassembly, and testing of nuclear weapons. The provisions of that Recommendation were presented in detail previously. Recommendation 93-6 urged DOE to ensure that access to essential safety-related nuclear weapons expertise was retained within the defense nuclear facilities complex.

The Board's concern for maintaining vital facilities and expertise to conduct criticality experiments resulted in issuance of Recommendation 93-2 on March 23, 1993. This recommendation asked DOE to take actions to retain facilities and technical capability to perform critical experiments. The ability to perform critical experiments can be an important part of ensuring the safety of activities in support of disassembly of nuclear weapons and site decommissioning and remediation. Recommendation 93-2 was accepted by the Secretary on May 12, 1993; DOE's Implementation Plan was submitted on August 10, 1993, and approved by the Board. The Board and its staff will monitor DOE's use of critical experiment capability to ensure the safety of weapons-related activities.

In addition to the Recommendations issued in 1993, a number of previously issued Recommendations formed part of the bases for Board reviews at the nuclear weapons facilities in 1993. Foremost among these were 90-2 (Standards), 91-6 (Radiological Protection), 92-6 (Operational Readiness Reviews), and 92-7 (Training and Qualification).

As stated earlier, one important focus of the Board during the past year has been the status of Order compliance and utilization of standards. Information on deficiencies observed in the programs at Y-12, NTS, Pantex, and the Albuquerque Operations Office was communicated to DOE. Discussions between the Board's staff and DOE's staff resulted in an agreement to upgrade the quality of Order compliance programs at all nuclear weapons facilities.

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Recommendation 91-6 and DOE's Radiological Control Manual were used as the bases for assessments of radiological protection at the Pantex Plant, Los Alamos National Laboratory, and the Y-12 Plant. These reviews identified deficiencies of certain dosimetry systems at Pantex and in the contamination control practices at the Y-12 Plant. DOE developed corrective action plans to address these deficiencies, and the Board's staff is closely monitoring their implementation.

The Board's staff reviewed DOE's preparations to operate facilities at the Pantex Plant, the Los Alamos National Laboratory, the Mound Laboratory, and the Y-12 Plant. As a result, a number of deficiencies were identified and communicated to DOE. The operational readiness review process at all DOE facilities is presently being upgraded to meet the requirements of newly issued DOE Order 5480.31, *Startup and Restart of Nuclear Facilities*. This Order, with an associated new DOE standard, was developed as one of the corrective actions under DOE's implementation plan for Board Recommendation 92-6. The Board's staff is closely reviewing all planned and on-going readiness reviews to ensure that the requirements of DOE Order 5480.31 are properly applied.

Recommendation 92-7, along with DOE Order 5480.20, *Selection, Training and Qualification of Personnel at DOE Nuclear Facilities*, formed the basis for reviews of the training and qualification programs at nuclear weapons facilities. Detailed reviews at the Pantex Plant resulted in two Board letters. The first was to the Secretary of Energy on April 13, 1993, and the second to the Deputy Assistant Secretary for Defense Programs dated on July 6, 1993, which required DOE to report on its efforts to upgrade training and qualification of both contractor and DOE personnel at the Pantex Plant.

The Nuclear Explosives Safety Study (NESS) process, outlined in DOE Order 5610.11, is the primary method by which DOE evaluates the safety of various operations involving nuclear explosives. A six-month review of this process conducted by the Board's staff, including attendance at a majority of the NESS's performed during 1993 at NTS and Pantex, led to the Board's establishment of a reporting requirement addressing the following observations communicated to the Secretary of Energy in a Board letter dated December 8, 1993:

- The process depends extensively on the knowledge of the individuals presently involved. This dependence has led to a somewhat informal approach to evaluating nuclear explosive safety, characterized by frequently inadequate technical documentation and late receipt by NESS members of important technical input documents.

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- Formal guidance to ensure that the NESS process will properly analyze and document all risks, including both detonation and plutonium dispersal, is lacking.
  - The current approach to, and schedule for, risk assessments in support of the NESS process is questionable; and DOE's plan to integrate risk assessment insights into the NESS process is not clear.
  - There are few specific documented requirements on the qualifications necessary for various participants in the NESS process. Although a majority of the present participants are very experienced, without a systematic and comprehensive program for the selection, training and qualification of personnel, it is unclear whether the next generation will be adequate.

During early reviews of weapons dismantlement operations, the Board's staff noted that procedural compliance practices were inadequate in some respects. This issue was brought to the attention of the Secretary of Energy in a Board letter, dated June 8, 1993. In addition, it was noted that changes to the procedures had been made without proper involvement of the cognizant weapons design laboratory.

The Board discussed these concerns with senior representatives of DOE. As a result of the discussions, DOE determined that a disciplined review of dismantlement procedures and practices was required. The Department decided to expand the "qualification evaluation" procedure already delineated in existing DOE directives to cover the dismantlement process. The resulting Qualification Evaluation for Dismantlement (QED) process has ensured that a detailed review of a dismantlement program is performed prior to its initiation. The QED process assesses the adequacy and correctness of disassembly procedures, and verifies that all safety considerations have been ascertained for potential impact on disassembly operations. The QED process, as a minimum, reviews the following functional areas: (1) nuclear and high explosives safety; (2) industrial safety and hygiene; (3) environmental protection; (4) process and disassembly engineering; (5) quality assurance; (6) radiological protection and health physics; and (7) formality of operations. Immediately following establishment of the new QED process, QED's were performed for the four major programs for weapons dismantlement ongoing at the Pantex Plant at the time the Board's concerns were identified.

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## 6. Safely Managing Special Nuclear Material, Waste, and Residues

### a. Accelerated Waste Characterization

The Board believes that accelerating the pace of the program for characterizing the contents of Hanford's high level nuclear waste tanks is important to nuclear safety. This view is shared by other experts, including a "Red Team" appointed by DOE, which reviewed the waste characterization program for the Hanford Tank Farm (DOE-EM, July 1992, Independent Technical Review of Hanford Tank Farm Operations). Characterization is essential for ensuring safety in the near-term during custodial management and remedial activities, and also in the long-term for advancing the development of permanent solutions to the high level waste problems at Hanford.

The wastes in the Hanford tanks differ markedly from tank to tank. Without timely characterization of the wastes, the nature of the risks associated with the tanks cannot be fully assessed and, where necessary, mitigated. Further, until the characteristics of the wastes are known, final methods for monitoring, retrieval, transport, and treatment of wastes now in tanks cannot be realistically planned.

Therefore, the Board issued Recommendation 93-5 on July 19, 1993, which strongly criticized the overall direction and timeliness of the program to characterize tank wastes at Hanford and called for a comprehensive reexamination and restructuring of the program to accelerate characterization, strengthen technical management, and expedite chemical and physical analyses. The Recommendation called for completion of safety-related sampling and analysis of watchlist tanks within two years, and of the remainder of the tanks by a year later. A verbatim copy of Recommendation 93-5, as it appeared in the *Federal Register*, is contained in Appendix 1 to this report. The Recommendation also called for the waste characterization program to be integrated into the systems engineering for the Tank Waste Remediation System (TWRS) being implemented under Board Recommendation 92-4. The Implementation Plan for Recommendation 93-5 was submitted to the Board on January 21, 1994.

### b. Spent Fuel Storage Basins

During 1993, the Board and its staff conducted two major reviews of fuel basins at various DOE sites. One of these reviews focused on safety at the spent fuel basins at the Hanford Site, the Savannah River Site, and the Idaho National Engineering Laboratory. The other reviewed structural integrity and seismic capabilities of selected basins. These review efforts will continue in 1994.

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Also during 1993, the Board highlighted to DOE the weaknesses in actions by DOE to develop a systems engineering plan to address the spent fuel problems, and noted that actions at INEL to address problems with severely corroding fuel elements were neither timely nor in accordance with proper procedures. DOE responded by preparing a systems engineering plan for the spent fuel program and taking corrective actions at INEL. Because of the number and severity of these vulnerabilities in spent fuel storage, the Board views the matter as having high priority, and will continue to evaluate DOE's spent fuel management plans.

**c. Radioactive Residues of Weapons Production**

Several DOE sites have significant quantities of plutonium stored in the form of scrap, unfinished weapon components, and intermediate materials such as solutions, unpurified oxides, and other compounds. When weapons production was under way, these materials were rapidly recycled through the production facilities. Because production of weapons has ceased, however, the materials are simply being stored at most sites.

The Board is concerned with the stability of some of these stored materials, because many forms of plutonium are chemically unstable, some even pyrophoric. If the materials are poorly packaged or stored in inappropriate environments, there is a possibility of fire or explosion. Large quantities of plutonium are stored in less-than-optimum forms, and many sites have lost, or are susceptible to losing, the operational capability to stabilize plutonium materials. Even repackaging unstable plutonium compounds is becoming difficult to accomplish at some sites. Many of these materials, particularly those with high plutonium content, were never intended to be stored for extended periods. The most serious problems arise from the possibility of generation of hydrogen, spontaneous fires, and leakage from the storage containers.

Large amounts of production by-products containing recoverable quantities of plutonium have been stored at the Rocky Flats Plant for many years, awaiting processing. The Hanford Site, the Savannah River Site, and the Los Alamos National Laboratory also have significant quantities of plutonium in forms that are unstable or could become so. However, the plutonium storage situation at these three other sites is not as problematic as at the Rocky Flats Plant, partly because those sites have maintained more extensive operational capabilities in plutonium handling and processing.

DOE does not currently have adequate standards for long-term storage of plutonium in forms other than encapsulated weapon components. A draft standard covering fairly long-term storage of plutonium metal and oxide is currently being

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developed by DOE and it may address part of the need. The Board will continue to follow this matter closely.

#### **7. Decontamination, Decommissioning, and Restoration of DOE Sites**

A recent GAO report, "Cleaning Up Inactive Facilities Will Be Difficult," states that DOE expects that over 7,000 facilities will be slated for decommissioning and decontamination (D&D) during the next 30 years. No major progress has been made by DOE in final D&D of its current facilities under the Office of Environmental Restoration and Waste Management. Because of the large volume of work, the broad range of hazards involved, and the large expense anticipated, D&D projects must be prioritized. DOE has yet to make significant progress in this prioritization effort.

The Board concluded that no driving force exists within DOE to actually perform D&D other than attempting to maintain old facilities in a surveillance and maintenance mode. Walkdowns of facilities at Hanford, Mound, and Savannah River Site indicate that, in general, facilities are deteriorating rapidly and could present significant hazards to future D&D workers, although the Board has not found that D&D issues pose any imminent danger to the general public. DOE has made little headway in the preparation of standards for D&D for specific types of facilities, such as reactors, reprocessing facilities and separations plants.

### **III. FORMAL SAFETY AND HEALTH INVESTIGATIONS**

In late 1992 and early 1993, the Board combined its investigative, deliberative, and compliance actions to close issues raised through the Board-directed investigation of the HB-Line at the Savannah River Site. During that period, a significant percentage of the resources of the Board's entire legal and technical staff were utilized to follow the ORR process and to assess closure of safety issues that the Board and the ORR process had identified. An open meeting, briefing, and hearing held in mid-December, 1992, in Aiken, South Carolina, covering the contractor's and the Department of Energy's ORRs, were followed by closed meetings conducted by the Board on December 17, 1992, and January 5, 1993, to consider safety issues related to the HB-Line. The Board subsequently obtained a commitment from DOE to complete assessments of compliance with Orders at the HB-Line. Reporting requirements were imposed on DOE with status reports being filed in March and June of 1993. The Board's legal and technical staff continued to follow the progress on such assessments at the HB-Line, including on-site reviews of the status of Order compliance in December of 1993. By the close of 1993, the assessment of compliance with Orders had not been completed by DOE.

During 1993, legal and technical teams conducted investigations of health and safety issues at several defense nuclear facilities pursuant to 42 U.S.C. §2286b(b). Investigations were conducted at the Oak Ridge National Laboratories, the Hanford Site, the Savannah River Site, and the Los Alamos National Laboratory. One investigation resulted in a referral to the Department of Energy's Inspector General. Also, the Board directed the General Counsel to investigate DOE's monitoring of radiological exposure of DOE employees, the Board's staff, and the general public throughout the complex.

#### IV. CLOSED BOARD RECOMMENDATIONS

During the first four years of the Board's operation, DOE completed implementation of, or otherwise closed, ten sets of Recommendations issued by the Board. The following list includes those Recommendations which the Board has determined are closed. The list also indicates the portions of previous annual reports to Congress which discuss activities related to those Recommendations; if the Recommendation was closed by action other than full implementation, that information is given parenthetically.

<u>Rec. No.</u>	<u>Title</u>	<u>Annual Report to Congress</u>
90-1	Operator Training at Savannah River Facilities Prior to Restart of K, L, and P Reactors	First Annual Report, February 1991, pp. 3-4; Second Annual Report, February 1992, p. 16; Third Annual Report, April 1993, p. 13
90-3	Safety at Single-Shell Hanford Waste Tanks (superseded by 90-7)	First Annual Report, February 1991, pp. 5-6, Second Annual Report, February 1992, pp. 18-19; Third Annual Report, April 1991, pp. 14-15
91-1	Strengthening the Nuclear Safety Standards Program for DOE's Defense Nuclear Facilities	Second Annual Report, February 1992, pp. 2-4; Third Annual Report, April 1993, p. 10
91-2	Closure of Safety Issues Prior to Restart of K-Reactor at the Savannah River Site	Second Annual Report, February 1992, pp. 4-5; Third Annual Report, April 1993, pp. 10-11

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91-3	DOE's Comprehensive Readiness Review Prior to Initiation of the Test Phase at the Waste Isolation Pilot Plant (WIPP)	Second Annual Report, February 1992, pp. 5-6; Third Annual Report, April 1993, p. 11
91-4	DOE's Operational Readiness Review Prior to Resumption of Plutonium Operations in Building 707 at the Rocky Flats Plant	Second Annual Report, February 1992, pp. 6-10; Third Annual Report, April 1993, pp. 11-12
91-5	Power Limits for K-Reactor Operations at the Savannah River Site	Second Annual Report, February 1992, pp. 10-11; Third Annual Report, April 1993, p. 12
92-1 & 92-3	Operational Readiness of the HB-Line at the Savannah River Site	Third Annual Report, April 1993, pp. 2-4
92-7	Training and Qualification (consolidated with 93-3 for implementation)	Third Annual Report, April 1993, pp. 8-9

**V. INTERNAL BOARD MANAGEMENT INITIATIVES, LITIGATION, AND PUBLIC HEARINGS**

**A. PERSONNEL RECRUITMENT, INCLUDING THE INTERN PROGRAM**

The identification and hiring of professional personnel with outstanding qualifications are critical to the successful accomplishment of the Board's mission.

As of December 31, 1993, the Board had hired 94 full-time employees including a full-time Site Representative at the Department of Energy's Pantex facility, Amarillo, Texas. During 1993, the Board reviewed 1,563 applications for employment and conducted 38 sets of interviews. This activity is necessary to recruit highly-qualified employees with exceptional scientific, engineering, or legal backgrounds who can effectively carry out the specialized work required.

With the excepted appointment authority granted by Congress, the Board has been able to achieve progress in hiring high-quality engineering and scientific personnel to address the health and safety questions associated with the design, construction, operation, and decommissioning of DOE's defense nuclear facilities. This excepted appointment authority has enabled the Board to significantly

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strengthen its ability to compete with other excepted Federal agencies and the private sector for the talent to properly perform its mission.

The Board has been able to hire outstanding technical talent with extensive backgrounds in nuclear, mechanical, electrical, chemical, structural, and metallurgical engineering and physics, using a nationwide recruiting campaign. As an indication of the Board's technical talent, 22 percent of the staff hold degrees at the Ph.D. level and 70 percent have degrees at the Masters level. In addition, almost all technical staff members, except Interns, possess practical nuclear experience gained from duty in the U.S. Navy's nuclear reactor program or the civilian reactor industry. Four other senior members of the Board's staff have law degrees (JD), as well as degrees in a technical specialty. Both the Board and staff include persons experienced in environmental impact assessments and regulatory processes. In 1993, the Board successfully recruited personnel with extensive weapons experience. A number of staff members completed special courses in weapons design and construction. This expertise was supplemented by outside experts with extensive experience with plutonium processing and weapons assembly and disassembly. The Board plans to continue its aggressive program to attract and hire additional technical staff with backgrounds commensurate with the Board's public health and safety responsibilities.

In September 1991, the Board initiated a Technical Intern Program designed to aid in the recruitment and development of the nation's top engineering graduates. The Board has conducted extensive recruitment and interview programs each year since then to locate interns with superior academic accomplishments in an engineering discipline and other attributes that indicate the potential for effective performance. There are currently nine interns in various phases of the program: one intern in a first-year assignment at Board Headquarters; seven interns in the second-year, graduate-education phase at Cornell, the University of California-Berkeley, Purdue, and the University of Illinois; and one intern completing a third-year assignment at a nuclear power plant. The recruitment and selection methods used have proven very effective based on the outstanding academic and on-the-job performance of interns. Board staffing projections include the recruitment of three technical interns in 1994.

**B. PUBLIC HEARINGS, PUBLIC COMMENT, AND INTERACTION WITH BOARD**

During 1993, Board Members traveled to defense nuclear sites on 21 occasions, where they met with contractors, DOE representatives, members of the public, labor unions, and public interest groups. The Board conducted seven public meetings, hearings, and briefings at various sites throughout the country. The Board made extensive efforts to include and inform the public of Board activities in 1993, as follows:

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• Individual Written Notices of Public Meetings, Hearings, and Briefings	1,476
• Individual Written Notices of Board Recommendations to the Secretary of Energy	1,179
• Responses to Inquiries from the Public and News Media	293

### C. LITIGATION

1993 brought the successful resolution of the Sunshine Act litigation initiated by the Natural Resources Defense Council (NRDC) and Energy Research Foundation (ERF) in 1992. In that litigation the NRDC/ERF challenged the Board's interpretation of its enabling legislation providing for public availability of Board recommendations "after receipt by the Secretary of Energy" or the President in appropriate cases. 42 U.S.C. section 2286d(a); g(3). At the request of the Chairman, the Attorney General reappointed the Board's General Counsel and his Deputy as Special Attorneys to the United States Attorney General, which allowed independence in handling the continuing litigation.

On July 24, 1992, the D.C. Circuit Court of Appeals decided that the Defense Nuclear Facilities Safety Board's enabling statute required closed Board meetings on recommendations for the President or the Secretary of Energy regarding health and safety issues at DOE's defense nuclear facilities. *NRDC/ERF v. Defense Nuclear Facilities Safety Board*, 969 F.2d 1248 (D.C. Cir., July 24, 1992). The court concluded that, under the plain meaning of the Board's enabling statute, which contained specific public access provisions, the Board's discussions on recommendations could be held in closed meetings consistent with the Government in the Sunshine Act, 5 U.S.C. §552b (1988).

Petitioners chose to petition the Court of Appeals for rehearing, with a suggestion that the rehearing be conducted *en banc*. That petition for rehearing was denied on October 9, 1992. *NRDC/ERF v. Defense Nuclear Facilities Safety Board*, No. 91-1199 (D.C. Cir., October 9, 1992). In accord with the Board's bill of costs, the Court of Appeals awarded costs to the U.S. Government against the Petitioners, Natural Resource Defense Council and Energy Research Foundation. Those costs were paid in 1993.

The Petitioners then petitioned the Supreme Court for a writ of *certiorari* seeking to overturn the D.C. Circuit Court of Appeals' decision. The Board's Office of General Counsel prepared draft opposing briefs and worked closely with the Solicitor General's Office, which filed the final Brief For the Respondent In

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Opposition. On May 17, 1993, the Supreme Court issued its Order denying the petition for the writ of *certiorari* to the Court of Appeals for the D.C. Circuit, thus successfully concluding the litigation, by allowing the Board's position to stand.

#### **D. OFFICIAL SITE VISITS BY BOARD MEMBERS AND BY STAFF**

From the establishment of the Board in October, 1989, through December 31, 1993, Board Members, its staff, and its contractor experts had collectively made 473 site visits to DOE's defense nuclear facilities. In 1993 alone, 173 site visits were made to DOE's defense nuclear facilities by Board Members, its staff, or its contractor experts. These visits focused primarily on selected facilities that both the Board and DOE consider to be most pressing in light of DOE's mission, primarily the Savannah River Site, the Pantex Plant, the Hanford Site, the Rocky Flats Plant, the Idaho National Engineering Laboratory, the Oak Ridge Y-12 Complex, the Los Alamos National Laboratory, and the Nevada Test Site.

The Board reviewed firsthand the health and safety issues at each of these sites. In 1993, the Board Members made 21 site visits to DOE's defense nuclear facilities conducting these reviews. During these visits, the Board gathered the bases for its recommendations to the Secretary of Energy and monitored the implementation of recommendations that have already been made.

#### **VI. PLANNED FOCUS OF BOARD ACTIVITIES IN 1994**

Changes in the nuclear defense complex have had, and will continue to have, a significant impact on the Board's oversight mission. Although production was still the primary mission of the nuclear weapons complex at the time the Board was established, Congress gave the Board a broad statutory mandate to oversee DOE's defense nuclear activities. In late 1991, Congress expanded the Board's purview to encompass the assembly, disassembly, and testing of nuclear weapons. The Board's oversight activities have been influenced by several major changes in the complex, including: (1) the interruption of materials production throughout the complex in 1989, due in large part to safety concerns; (2) DOE's subsequent attempts to resume limited nuclear operations at some of these sites; (3) abandonment of restart activities at many facilities, due primarily to arms control agreements reached in the early 1990's; and (4) the determination that many of these facilities are surplus to DOE's future mission.

It is tempting to conclude that the reduction of weapons production activities at DOE facilities means that safety oversight can also be reduced. The reality is that, to the contrary, there is a need to increase that scrutiny. Simply put, the process of "shutting down" many defense nuclear facilities compounds existing hazards of storing and handling nuclear materials with new hazards of cleaning up the facilities. If

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safety systems are not properly maintained, and other precautions taken, these facilities can pose an increasing risk to health and safety. The Board is statutorily required to oversee DOE's efforts to ensure adequate protection of public health and safety during the entire life-cycle of DOE facilities under the Board's jurisdiction, including the decontamination and decommissioning of these facilities.

Many of the issues arising from these changes in the defense complex involve operations and processes that are new to the nuclear weapons industry; others are more long-standing. All of them have broad, as well as specific, health and safety implications that linger throughout the complex. Among the long-standing matters is the relatively poor record of DOE in its self-regulating efforts. DOE and its contractors have not fully embraced the necessity for conducting nuclear operations in accordance with safety standards, Orders, and other requirements designed to protect public health and safety. Despite four years of persistent effort by the Board and its staff, DOE and its contractors have not even identified all of the Orders and other requirements applicable at many defense nuclear facilities, let alone enforced compliance. In similar vein, DOE and contractor personnel are often inadequately qualified or trained for the technical challenges they face. DOE and its major contractors face increasingly severe problems in recruiting and retaining well-qualified personnel. This in turn has an impact on the Board's mission, since the Board and its staff must provide technical advice and oversight in instances where DOE line and oversight organizations should have anticipated and corrected problems without Board intervention.

This environment -- long-standing problems overlain with new activities -- presents potential public health and safety concerns different from those previously encountered in the operation of the complex. For example, aged and degraded equipment can pose significant safety concerns at facilities slated to remain operational or required to be operated for clean-up. Corrosion of spent nuclear fuel stored in basins that were not designed for long-term use is becoming a major issue. Chemical and radioactive wastes continue to accumulate. These wastes and the untreated radioactive residues from production processes may become more hazardous through time. Thus, an increasing number of potential problems are surfacing, some of which may be greater in severity than those encountered in five decades of production operations.

To successfully operate in this new environment, DOE must adopt a systems approach. Systems engineering includes the intellectual control and integration of all disciplines throughout the system life cycle in a manner so as to ensure that all user requirements are satisfied. Incorporating the principles of systems engineering can help assure that all factors involving worker and public health and safety, as well as environmental concerns, are integrated into the program. The Board's staff will expand efforts to evaluate DOE progress in implementing the systems approach.

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Protecting the health and safety of the public, and especially of on-site workers because of their proximity to the hazards involved, becomes more challenging as additional defense nuclear facilities make the transition from production, at the same time that other facilities remain in operation or are restarted. This challenge is illustrated by the breadth of subjects requiring Board scrutiny during 1993. The number and severity of activities required in protecting public and worker health and safety could easily grow as defense nuclear facilities cease production operations and enter the transition, decommissioning and decontamination, and remediation processes. The significant issues in this area include:

- the necessity of operating obsolete or shut-down processing facilities for short periods to remove in-process radioactive or hazardous materials;
- surmounting technical problems associated with existing high-level radioactive waste storage tanks;
- design and construction of new facilities for interim and long-term storage of wastes;
- elimination of corroding spent fuel, even though facilities normally used to process the fuel are shut down; and
- the need for safe decommissioning and decontamination of a number of major nuclear facilities.

In the weapons-related areas, the technical challenges facing DOE and the Board will change as DOE's plans for the complex change. Major weapons-related issues requiring continuing attention include:

- the need to safely disassemble 20,000 or more nuclear weapons;
- the requirement to design and construct nuclear weapons storage facilities to accommodate both safety concerns and possible independent international verification, as well as to provide substantially increased capacity for the safe storage of weapons-grade plutonium, enriched uranium, and other nuclear materials removed from weapons; and
- the necessity for DOE's reconfiguration of the weapons complex to be planned and conducted in accordance with health and safety principles.

One of the biggest technical challenges and uncertainties results from the physical condition of facilities in the nuclear weapons complex. As facilities age and less attention is paid to their maintenance and upkeep, their condition will degrade.

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As key operating personnel depart, knowledge of facility and weapons designs and contents will erode, and safety will be reduced. The potential for detonation, fires, and corrosion hazards increases as chemical compounds become more unstable. Existing radiological hazards may become worse as certain radionuclides (e.g., americium) "grow" into nuclear materials due to radioactive decay, and as unknown or uncharacterized radioactive contamination is discovered in the decontamination process. During dismantling of facilities, workers are likely to come in contact, often unexpectedly, with radioactive and chemical hazards that have been inaccessible for many years. Contaminants may be driven into the environment by the dismantling process or by exposure to the weather. Shutting down a defense nuclear facility can actually increase the risk of dispersal of radioactivity through material degradation, action of natural phenomena, fires, or inadvertent nuclear criticalities.

A recent General Accounting Office report confirms that many of these technical challenges exist and will persist. The report, dated June 25, 1993, states that, "Inadequate maintenance and DOE's past emphasis on production over environmental cleanup are presenting several problems for DOE's inactive facilities program. ... [S]ome of DOE's aging facilities have been abandoned with hazardous materials still in them, have not been characterized, or have been only partially decontaminated..." The report states further, "Many of the Department's inactive facilities are in poor physical condition and present serious risks to individuals who work in and around them," and notes, "...[DOE] agree[s] that the report accurately portrays the poor condition of many of the Department's currently inactive facilities [and] the potential risks that these facilities present for workers' health and safety..." The report concludes that, "...inactive facilities can present real dangers to workers in and around them and ... the way [DOE] closes and maintains inactive facilities will influence the ... dangers of cleaning them up."

The political, economic, and social environment facing DOE is no longer stable or predictable. In some aspects, they are unknown. Each of the technical challenges is also marked by uncertainty. By their very nature, decontamination, decommissioning and clean-up operations are rarely as routine or predictable as production operations. These missions will require longer-range planning and budgetary commitments than DOE has historically undertaken. Indeed, the issues reflect national policy decisions that have yet to be made.

#### **A. COMPLEX-WIDE SAFETY ISSUES REQUIRING PRIORITY ATTENTION IN 1994**

Within the broad context depicted above, the Board plans to place high priority focus in 1994 on a number of complex-wide safety issues. These include the need for the Board to:

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- Continue to urge development and implementation of safety-related orders, standards, and guides; assess their adequacy; and ascertain compliance
  - Insist on DOE's adoption of a systems approach in projects and programs
  - Closely pursue DOE's upgrading of technical capabilities and expertise
  - Instill continued improvement in conduct of operations by DOE and its contractors
  - Oversee the safe dismantling and storage of weapons and weapons components
  - Ensure preparation for, and indefinite safe storage of, plutonium-bearing materials
  - Actively pursue DOE's program for resolving ongoing safety issues associated with corrosion and storage of spent fuel
  - Ensure that DOE pursues excellence in the radiation protection program
  - Oversee the safe handling and disposition of waste materials and the control of releases to the environment

#### **B. SITE-SPECIFIC SAFETY ISSUES**

The Board plans to place a high priority on the following site-specific safety issues in 1994:

##### Fernald:

- Scrutinize the safe stabilization of uranyl nitrate hexahydrate solutions

##### Hanford Site:

- Closely pursue DOE's actions to clean up corroding spent fuel in the K-East Basin
- Insist on accelerated characterization of high level waste in tanks, as an integral part of systems engineering for Hanford

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Idaho National Engineering Laboratory:

- Closely assess DOE's upgrading of ICPP fuel basins and associated safety bases
- Monitor the disposition of remaining reprocessing solutions at the Idaho Chemical Processing Plant and review DOE's actions for safely storing calcined wastes

Los Alamos National Laboratory:

- Assess compliance with DOE Orders
- Review the development by DOE and the Laboratory of site seismic criteria, evaluations of specific structures and systems, and plans for upgrading seismic resistance of facilities

Nevada Test Site:

- Continue close scrutiny of the Nuclear Explosives Safety Studies process
- Critically review the design and safety basis for the new Device Assembly Facility, existing assembly areas and defense radioactive waste disposal activities

Oak Ridge Y-12 Plant:

- Closely follow upgrades to radiological controls and readiness review practices instituted under two separate Board reporting requirements

Pantex:

- Ensure that the Safety Analysis Reports being developed for facilities without them and upgrades to existing Safety Analysis Reports are technically adequate
- Conduct technical design reviews of, and oversee preparations for, upcoming dismantlement programs and facility startups, including Operational Readiness Reviews, Nuclear Explosive Safety Studies, and Qualification Evaluations for Dismantlement



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Rocky Flats Plant:

- Urge DOE to take aggressive action to treat and store plutonium-bearing residues and solutions
- Oversee the safe start-up of limited operations planned for Buildings 707, 771, and 371

Savannah River Site:

- Oversee actions to maintain disciplined operations at F-Canyon and FB-Line, where seriously degraded conditions exist
- Urge DOE to make a systematic review of the high level waste complex, with emphasis on reassessing the development needs of the Defense Waste Processing Facility

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**APPENDIX A**

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Dated: January 25, 1993.

John T. Conway,  
Chairman.

Dated: January 21, 1993

Several of the Board's recommendations have emphasized the importance of an effective program of standards utilization in defense nuclear facilities. By so doing, the Board has shown that it considers the detailed review of ongoing operations for compliance with DOE Orders (and applicable consensus standards) as an essential measure in assuring that defense nuclear facilities are being operated in a safe manner.

The Board has noted significant progress by DOE in the issuance of new and revised nuclear safety orders that more explicitly delineate requirements in such areas as: unreviewed safety question determinations, technical safety requirements, nuclear safety analysis reports, design requirements and nuclear criticality safety. However, the Board's ongoing review of the use of standards in defense nuclear facilities has disclosed a number of potential inconsistencies in the manner in which DOE Orders related to nuclear safety are applied at facilities that produce and process fissile materials, relative to those facilities that assemble, disassemble, and test nuclear weapons. The Board notes that DOE orders differentiate between nuclear safety and "nuclear explosive safety," (the latter is defined by DOE Order 5610.11, Nuclear Explosive Safety); however, the Board considers that certain basic safety principles apply to the handling of fissile materials, regardless of the form that the material is in.

For example, a number of orders related to nuclear safety are explicitly excluded from applicability to facilities that assemble, disassemble and test nuclear weapons, while others are applicable only to "nuclear facilities," (as defined by DOE Order 5480.5, Safety of Nuclear Facilities). Those that apply to "nuclear facilities" do not necessarily apply to facilities that assemble, disassemble and test nuclear weapons. In other technical areas, such as quality assurance, essentially different programs have been put in place (i.e., DOE-AL directives QC-1 and QC-2, as opposed to DOE Order 5700.6C).

The Board is committed to ensuring the level of safety assurance at those facilities that assemble, disassemble and test nuclear weapons is at least as rigorous as that required at other defense nuclear facilities and that it can be measured to compare with the level of safety assurance provided to the public and site workers by commercial

nuclear material processing facilities. The above being recognized, the Board recommends that:

1. DOE review its list of orders and directives related to nuclear safety and determine those that apply to facilities and operations that assemble, disassemble and test nuclear weapons.
2. DOE evaluate the level of nuclear safety assurance provided by the orders and directives applicable to facilities that assemble, disassemble and test nuclear weapons and compare it to the level of safety assurance provided by DOE Orders and directives applicable to other DOE defense nuclear facilities.
3. DOE develop a plan for addressing any deficiencies found by the above two reviews.
4. Priority be given by DOE to completing site-wide order compliance reviews at facilities that assemble, disassemble and test nuclear weapons; with special emphasis placed on the Pantox Plant.

John T. Conway,  
Chairman.

#### Appendix—Letter to Acting Secretary of Energy

January 21, 1993.

Ms. Linda G. Stuntz, Acting Secretary of Energy, Washington, DC 20585.

Dear Ms. Stuntz: On January 21, 1993, the Defense Nuclear Facilities Safety Board, in accordance with 42 U.S.C. 2286a(5), unanimously approved Recommendation 93-1 which is enclosed for your consideration. Recommendation 93-1 deals with Standards Utilization in Defense Nuclear Facilities.

42 U.S.C. 2286d(a) requires the Board, after receipt by you, to promptly make this recommendation available to the public in the Department of Energy's regional public reading rooms. 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 DOE 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. 93-2084 Filed 1-27-93; 8:45 am]  
BILLING CODE 6220-KD-M

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

[Recommendation 93-1]

### Standards Utilization in Defense Nuclear Facilities

AGENCY: Defense Nuclear Facilities Safety Board.

ACTION: Notice; recommendation.

**SUMMARY:** The Defense Nuclear Facilities Safety Board (Board) has made a recommendation to the Secretary of Energy pursuant to 42 U.S.C. 2286a concerning Standards Utilization in Defense Nuclear Facilities. The Board requests public comments on this recommendation.

**DATES:** Comments, data, views, or arguments concerning this recommendation are due on or before March 1, 1993.

**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.

**FOR FURTHER INFORMATION CONTACT:** Kenneth M. Pusateri or Carole J. Council, at the address above or telephone (202) 208-6400.

scale dismantling of nuclear weapons, have generated strong pressures to reduce the defense nuclear budget and to close down many defense nuclear facilities and operations. At the same time, the development of firm plans for a Complex 21 to serve future nuclear defense needs has slowed. These trends lead to a possibility that capabilities and functions necessary for current and future needs could be terminated along with those no longer required. One of these, important for the avoidance of certain types of accidents, is support of nuclear criticality control.

Because of the importance of avoiding criticality accidents, the Board carefully follows the state of criticality control at DOE's defense nuclear facilities. This interest has been evident as Board members and staff have reviewed practices at the Pantex Plant. The Board believes it is important to maintain a good base of information for criticality control, covering the physical situations that will be encountered in handling and storing fissionable material in the future, and to ensure retaining a community of individuals competent in practicing the control.

In the course of retrenchment of its activities in recent years, the Department of Energy and its predecessor agencies have terminated use of all but one of its general purpose facilities for conducting neutron chain-reacting critical experiments with fissionable material. The research at these facilities had served programmatic purposes of diverse DOE programs, as well as laying a general experimental basis for practices that ensure averting criticality accidents. The Board is informed that there is now a strong possibility that the last DOE facility capable of general purpose critical experiments will be shut down in the near future, due to lack of funding. This possibility arises because no single program of the Department has an overriding need for this remaining facility at the Los Alamos National Laboratory, and therefore no single program office is motivated to provide its financial support in this period of budget stringency. A certain complacency fed by some years of freedom from criticality accidents seems also to underlie this possibility.

The Board observes that the art and science of nuclear criticality control have three principal ingredients. The first is familiarity with factors that contribute to achieving nuclear criticality, and the physical behavior of systems at and near criticality. This familiarity is developed in individuals only through working with critical systems. It cannot be imparted solely

through learning theory and using computer codes. The second is theoretical understanding of neutron multiplication processes in critical and subcritical systems, leading to predictability of the critical state of a system by methods that use theory benchmarked against good and well characterized critical experiments. The third is thorough familiarity of nuclear criticality engineers with the first two factors, obtained through a sound program of training that indoctrinates them in the experimental and theoretical aspects.

The Board has reviewed the status of benchmarking the theoretical methods of criticality control against existing critical experiments and has found that there are notable failures of theoretical analysis to account for the results of a number of experiments. It is not known whether this discrepancy results from inadequate nuclear data used in the analysis or from inadequate care in conducting the experiments and recording their physical features. Both factors could contribute. In addition, it seems that on the average there may be a small non-conservative bias in overall predictions of the theory. In spite of these shortcomings, conservatism in methods used to develop the limits to be applied during handling and storage of fissionable material seems to have led to adequate safety in recent years. The Board believes that in the interest of continued safety it is important to clear up the existing discrepancies, which are obstacles to confident understanding of criticality control. To do so will require conduct of further neutron chain-reacting critical experiments targeted at the major sources of discrepancy between the theory and the experiments, as well as careful analysis of the experiments.

Finally, the Board believes that there is no guarantee that the physical circumstances of handling and storage of fissionable material in the future will always be found in the realm of benchmarked theory. This point is especially important under circumstances that will exist for a number of years to come, with increasing amounts of fissionable material to be stored in a variety of chemical and physical forms. This does not appear to be an appropriate time to eliminate an ability to ensure that such activities will be free of criticality hazard. For safety purposes it will be necessary to retain the capability to perform experiments under conditions not foreseen at this time. This capability once lost would be most difficult to reproduce, and it could be approximated only at great cost and

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

[Recommendation 93-2]

### The Need for Critical Experiment Capability

AGENCY: Defense Nuclear Facilities Safety Board.

ACTION: Notice; recommendation.

SUMMARY: The Defense Nuclear Facilities Safety Board (Board) has made a recommendation to the Secretary of Energy pursuant to 42 U.S.C. 2286a concerning The Need for Critical Experiment Capability. The Board requests public comments on this recommendation.

DATES: Comments, data, views, or arguments concerning this recommendation are due on or before April 29, 1993.

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.

FOR FURTHER INFORMATION CONTACT: Kenneth M. Pusateri or Carole J. Council, at the address above or telephone (202) 208-6400.

Dated: March 25, 1993.

John T. Conway,  
Chairman.

### The Need for Critical Experiment Capability

Dated: March 23, 1993.

The end of the international competition in manufacture of nuclear weapons, and the transition to large

after substantial time, deterring such development even if it were needed badly.

For all the above reasons, the Board believes that continuation of an experimental program of general purpose critical experiments is necessary for continued safety in handling and storing fissionable material. It is needed to improve the basis for the methodology. It is needed as part of the process of properly educating criticality control engineers. It is needed to ensure the capability of answering criticality questions with new and previously researched features.

Therefore the Board recommends that:

1. The Department of Energy should retain its program of general purpose critical experiments.
2. This program should normally be directed along lines satisfying the objectives of improving the information base underlying prediction of criticality, and serving in education of the community of criticality engineers.
3. The results and resources of the criticality program should be used in ongoing departmental programs where nuclear criticality would be an important concern.

John T. Conway,

Chairman.

Appendix—Letter to Secretary of Energy  
March 23, 1993.

The Honorable Hazel R. O'Leary,  
Secretary of Energy,  
Washington, DC 20585.

Dear Madame Secretary: On March 23, 1993, the Defense Nuclear Facilities Safety Board, in accordance with 42 U.S.C. 2286a(5), unanimously approved Recommendation 93-2 which is enclosed for your consideration. Recommendation 93-2 deals with The Need for Critical Experiment Capability.

42 U.S.C. 2286d(a) requires the Board, after receipt by you, to promptly make this recommendation available to the public in the Department of Energy's regional public reading rooms. 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 DOE 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.

Enclosure

[FR Doc. 93-7213 Filed 3-29-93; 8:45 am]  
BILLING CODE 4920-KD-M

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

[Recommendation 93-3]

### Improving DOE Technical Capability in Defense Nuclear Facilities Programs

AGENCY: Defense Nuclear Facilities  
Safety Board.

ACTION: Notice; recommendation.

**SUMMARY:** The Defense Nuclear Facilities Safety Board (Board) has made a recommendation to the Secretary of Energy pursuant to 42 U.S.C. 2286a concerning Improving DOE Technical Capability in Defense Nuclear Facilities Programs. The Board requests public comments on this recommendation.

**DATES:** Comments, data, views, or arguments concerning this recommendation are due on or before July 8, 1993.

**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.

**FOR FURTHER INFORMATION CONTACT:** Kenneth M. Pusateri or Carole J. Council, at the address above or telephone (202) 208-6400.

Dated: June 3, 1993.

John T. Conway,  
Chairman.

### Improving DOE Technical Capability in Defense Nuclear Facilities Programs

Dated: June 1, 1993.

Effective functioning of any organization, whether in the private sector or government, is highly dependent upon the capabilities of people and the way they are guided and deployed. Nowhere is this dependency more crucial than in the Department of Energy's (DOE) defense nuclear complex, where the potential hazards inherent in nuclear materials production, processing, and manufacturing require high quality technical expertise to assure public and worker safety.

Nuclear weapons development and production have progressed over the

years from early efforts of a small group of highly talented, ingenious individuals in scientific laboratories to employment of thousands of workers in industrial-type production environments. While the national response to today's changing international scene is resulting in downsizing of the nuclear stockpile and a change in mission of many of the defense nuclear facilities, the need remains for continuing vigilance to protect public and worker health and safety. In fact, a case can be made for the need for greater vigilance now throughout the weapons complex because of: increased risk of equipment mishaps in aged facilities; loss of existing technical expertise through attrition and downsizing, and a reduced inclination for young engineers and scientists to get involved in the nuclear weapons field.

Nevertheless, the level of scientific and technical expertise in the DOE of defense nuclear facilities and operations has been declining. The Defense Nuclear Facilities Safety Board in its last three annual reports has observed that:

" \* \* \* the most important and far-reaching problem affecting the safety of DOE defense nuclear facilities is the difficulty in attracting and retaining personnel who are adequately qualified by technical education and experience to provide the kind of management, direction, and guidance essential to safe operation of DOE's defense nuclear facilities.

The Board has not been alone in calling attention to the problem. Congressional perception of the need to upgrade DOE technical expertise is evident in the Board's enabling legislation. The need for such upgrading is further underscored by assessments made by a number of other groups over the past decade, as the attached excerpts from their reports indicate.

A reputation for technical excellence is a strong attraction for talented individuals. Organizations with strong technical missions commonly cite technical excellence as a goal towards which management should strive. However, sustained leadership emphasis and deliberate actions are required if the reality of technical excellence is to be achieved.

Actions by the Board, such as recommendations and public hearings, have resulted in some efforts on the part of certain DOE organizations and M & O contractors to upgrade existing staff and recruit better qualified personnel. However, such efforts have not been coordinated DOE-wide and have been well short of the need. The Board believes that a more aggressive, broad-

based, and well-coordinated program directed at the enhancement of the technical capabilities of the DOE staff should be defined and implemented.

The Board recognizes the difficulty any ongoing organization faces in developing programs targeted at upgrading competence of staff. Such efforts rarely succeed without strong endorsement, involvement, and guidance by the organization's top management and without the impetus provided by objective appraisals made by outside, independent experts. Further, the sheer size, differing requirements, and dispersion of DOE staff complicates both the problem and the solution. Nonetheless, the strong correlation between technical excellence and assurance of public health and safety compels this Board to urge that DOE give high priority to the problem of attracting and retaining technical personnel with exceptional qualifications. More specifically the Board recommends that DOE:

1. Establish the attraction and retention of scientific and technical personnel of exceptional qualities as a primary agency-wide goal.

2. Take the following specific actions promptly in the interest of achieving this goal.

a. Seek excepted appointment authority for a selected number of key positions for engineering and scientific personnel in DOE programmatic offices, in other line units, and in the oversight units responsible for the defense nuclear complex.

b. Establish a technical personnel manager within the Office of the Secretary to coordinate recruitment, classification, training, and qualification programs for technical personnel in defense nuclear facilities programs.

3. Develop a broadly based program, giving consideration to the following:

#### a. DOE Internal Initiatives

(1) Develop a set of mutually supportive actions which DOE could take, within existing personnel structures, to enhance capabilities. Measures that could be considered include:

(a) Plan and execute a system for using attrition to build technical capability.

(b) Review the performance appraisal system for technical employees for its effectiveness in determining basic pay, training needs, promotions, reductions in grade, and reassignment/removal.

(c) Review and improve programs for training and assigning technical personnel. (This activity would be coordinated with actions taken, planned to be taken, in response to Board

Recommendations 90-1, 91-6, 92-2, and 92-7.)

(d) Explore with the Secretary of Defense the possibility of assigning to DOE defense nuclear facilities activities a number of outstanding officers with nuclear qualifications who may now be surplus to DOD needs.

(e) Establish initiatives designed to take advantage of skills of marginal technical performers and retrain them.

(f) Expand Headquarters/Field personnel exchange programs for highly qualified junior technical staff to promote understanding of all aspects of technical issues including their resolution.

#### b. Independent External Assessments

(1) Use respected, independent, external organizations such as the National Research Council of the National Academy of Sciences, and the National Academy of Public Administration to assess DOE's ongoing and planned actions directed at attracting and retaining personnel with strong technical capabilities and to make recommendations for enhancements. Such assessment could include:

(a) Government-wide and/or DOE personnel recruitment and development policies and practices that may be effective inducements to government service.

(b) Comparison of DOE methods of building a qualified technical staff with qualifications comparable to those of other government agencies with predominant technical missions.

#### c. DOE Internal Assessments

(1) Perform an in-depth assessment of educational and experience requirements of key positions and develop both a short-term and long-term plan for key personnel development. Such assessment could include:

(a) Identification of qualifications (education and experience) required in key positions (above GS-14) in DOE Headquarters and field organizations with responsibilities for safely carrying out the defense nuclear program.

(b) Evaluation of incumbents for their ability to meet such qualification requirements.

(c) Evaluation of current availability within DOE of fully qualified personnel to fill these positions.

(2) Develop an action plan to meet needs thus identified.

John T. Conway,  
Chairman.

Appendix—Letter to Secretary of Energy

June 1, 1993.

The Honorable Hazel R. O'Leary,  
Secretary of Energy, Washington DC 20585.

Dear Secretary O'Leary: On June 1, 1993, the Defense Nuclear Facilities Safety Board, in accordance with 42 U.S.C. 2286a(5), unanimously approved Recommendation 93-3 which is enclosed for your consideration. Recommendation 93-3 deals with Improving DOE Technical Capability in Defense Nuclear Facilities Programs.

42 U.S.C. 2286d(a) requires the Board, after receipt by you, to promptly make this recommendation available to the public in the Department of Energy's regional public reading rooms. 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 DOE 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.

Enclosure

#### Reference Documents Identifying DOE Technical Personnel Problems

1. "A Safety Assessment of Department of Energy Nuclear Reactors," DOE/US-0005, March 1983

An important contributing factor (to the lack of adequate attention by DOE Headquarters' organizations to the nuclear safety aspects of its reactors) is the lack of sufficient numbers of highly competent technical people in Headquarters organizations with nuclear safety responsibilities. Field Office organizations also suffer from this lack.

#### 2. National Research Council Reports

a. "Safety Issues at the Defense Production Reactors," National Academy Press, 1987.

The committee concludes that the Department, both a headquarters and in its field organizations, has relied almost entirely on its contractors to identify safety concerns and to recommend appropriate actions, in part because the imbalance in technical capabilities and experience between the contractors and DOE staff is of sufficient magnitude to preclude DOE from comprehensive DOE involvement in the operation of the production reactors. The committee recommends that the Department acquire and properly assign the resources and talent necessary to ensure that safe operation is being attained.

b. "Safety Issues at the DOE Test and Research Reactors," National Academy Press, 1988.

The suitability of the existing (DOE organizational) arrangement is undermined by the absence of adequate staff in the DOE line management who are sophisticated on safety and operational matters \* \* \*. In effect, the system relies almost exclusively on the skills and competence of the contractors.

c. "The Nuclear Weapons Complex: Management for Health, Safety, and the Environment," National Academy Press, 1989.

Constant attention must be paid to the maintenance and improvement of technical capabilities. Concerted efforts are needed to recruit competent technical personnel at all levels; and DOE must maintain an environment for the retention of employees by providing challenging assignments, meaningful participation in decision making, and professional advancement. Strong training programs are necessary to build a culture in which health, safety, and environmental considerations are seen as an integral component of operations.

J. Secretary of Energy Letter to the President, December 20, 1991

\* \* \* The technical knowledge and skills of many DOE managers and employees are not sufficient to do their jobs.

4. S. Conf. Rep. No. 232 (to accompany S. 1085), 100th Cong., 1st Sess. (1987)

The Board is expected to raise the technical expertise of the Department substantially, to assist and monitor the continued development of DOE's internal ES&H organization, and to provide independent advice to the Secretary.

5. Advisory Committee on Nuclear Facility Safety ("Ahearn Committee") Letter to the Secretary of Energy, March 24, 1989.

We recommend that you streamline management to make responsibilities clear, that you put knowledgeable people in line positions of responsibility, and that you give them authority. This is important for assurance of nuclear safety. Solving the DOE's problems will require upper management and operating personnel to work together closely and effectively. This will not be possible if the staff must work through buffers of people who are not technically competent.

6. "Hazards Ahead: Managing Cleanup Worker Health and Safety at the Nuclear Weapons Complex," Office of Technology Assessment, 1993

EM \* \* \* lacks adequate numbers of qualified staff to develop occupational health and safety programs suited to EM line operations and has little capacity to assess contractor's performance in health and safety matters.

The DOE Office of Environment, Safety and Health (EH) does not have enough qualified staff to monitor contractor operations.

[FR Doc. 93-13462 Filed 6-7-93; 8:45 am]  
BILLING CODE 4820-KO-M

FOR FURTHER INFORMATION CONTACT:  
Kenneth M. Pusateri or Carole J.  
Council, at the address above or  
telephone (202) 208-6400.

Dated: June 21, 1993.

John T. Cooway,  
Chairman.

DOE's Management and Direction of  
Environmental Restoration  
Management Contracts

Dated: June 16, 1993.

The Board and its staff have been monitoring the efforts of the Department of Energy (DOE) in technically managing the Uranyl Nitrate Hexahydrate (UNH) stabilization project at the Fernald Environmental Management Project since DOE began preparations for operational testing in early 1992. The stabilization project was initiated after the UNH solution was declared waste in 1991. The purpose of the project is to process the UNH into a filter cake for interim nuclear waste storage onsite pending final disposition.

In addition to maintaining a focus on the technical aspects affecting safety at Fernald, the Board has a high interest in DOE's use of its new Environmental Restoration Management Contractor (ERMC) approach to defense nuclear waste storage, treatment, disposal, and site decommissioning/restoration at this site. Experience acquired at Fernald can prove valuable to the Department and its future ERMCs for defense nuclear sites. Of particular interest to the Board is how, under this approach, DOE and the ERMC will ensure adequate protection of the health and safety of the public and the onsite workers involved in storage and processing of nuclear waste at Fernald.

The Board's staff has visited Fernald to review the UNH stabilization project in five separate occasions since March 1992. Topics for review have included technical management arrangements, operator training, start-up test plans, radiation protection, nitrogen dioxide releases, and the testing of system operability. The Board forwarded observations from the March 1992 Fernald visit to the Assistant Secretary for Environmental Restoration and Waste Management (EM-1) in a letter dated July 8, 1992. Observations from a staff trip in April of this year were forwarded to EM-1 in a letter dated May 11, 1993. These reviews at Fernald have shown weaknesses in DOE's technical direction of contractor performance, the contractor's conduct of operations, and the level of knowledge of personnel. With respect to the first weakness, a lack of technical vigilance on the part of DOE-Fernald (DOE-FN) allowed the

ERMC contractor to start operations at the UNH project in April 1993 without (1) conducting a DOE-FN-required readiness review and without (2) informing and obtaining the approval of either the DOE-FN manager or the DOE headquarters project office to start the operation.

Most recently, incidents involving the improper transfer of UNH solution into a treatment system sump, and the resultant release of approximately 30 gallons of UNH solution to the environment, have again shown how inadequate procedures, inadequate knowledge of systems and procedures on the part of operators, and absence of an appropriate level of discipline in the conduct of operations can contribute to unsafe operations. These incidents were logged in DOE's occurrence reporting system in reports ORO-WMCO-FMPC-1993-0027 AND ORO-WMCO-FMPC-1993-0028, respectively. Furthermore, the Board has noted recent events at other facilities under the cognizance of EM, including the Defense Waste Processing Facility at SRS and the Uranium Oxide Plant at Hanford, that appear to indicate fundamental safety problems resulting from defective discipline of operations.

The incidents at Fernald and at other sites, taken together, also suggest that DOE's technical management and oversight structure for ERMC contracts are in need of upgrading. As the defense nuclear complex moves more rapidly toward long-term storage, environmental restoration, and cleanup, new contractors at other sites will be engaged using the ERMC approach, as is being used at Fernald. Based upon observations of the Fernald project, the Board has concern stemming from health and safety considerations that: (1) DOE may not have sufficient numbers of competent, trained headquarters and field personnel to technically manage such contracts, and (2) contracts may be negotiated and signed before DOE has developed internal plans on how to carry out its technical management and oversight responsibilities.

The Board is aware that you have recently announced initiatives to reform DOE contract management. These initiatives are directed largely at more effective financial management and program implementation. The Board would encourage, in the interests of public and worker health and safety, that the planned review of contracting mechanisms and practices also encompass the DOE technical direction and oversight structure. The Board believes that competence and effectiveness in technical aspects of management are essential to assure that

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

(Recommendation 93-4)

DOE's Management and Direction of  
Environmental Restoration  
Management Contracts

AGENCY: Defense Nuclear Facilities  
Safety Board.

ACTION: Notice; recommendation.

**SUMMARY:** The Defense Nuclear Facilities Safety Board (Board) has made a recommendation to the Secretary of Energy pursuant to 42 U.S.C. 2286a concerning health and safety factors associated with DOE's management and direction of Environmental Restoration Management Contracts. The Board requests public comments on this recommendation.

**DATES:** Comments, data, views, or arguments concerning this recommendation are due on or before July 26, 1993.

**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.



contract services are provided in a manner which meets health and safety objectives.

The Board believes that DOE should formalize and strengthen its technical management of ERM contracts. A straightforward step toward achieving this objective is for DOE to develop, in parallel with the drafting and negotiation of a new contract, a separate document which will provide detailed project and technical management plans and allocate qualified technical personnel to manage that contract at both HQ and the field location. Such a plan would in effect be a functions and responsibilities document. It would lay out management expectations for those assigned the technical monitoring, direction, and oversight of the contracted services, and identify the interfaces with other DOE resources managing the non-technical aspects of the contract. The contractor would normally not be allowed to commence operations involving radioactive materials until DOE's plan for technical management of site activities has been put into effect. This means, among other things, that the relevant DOE site and headquarters offices have been adequately staffed with qualified persons to provide competent technical direction, guidance, and oversight of the contractor's operations. In addition, the principles contained in applicable DOE Orders and in previous Board recommendations on such topics as DOE facility representatives (92-2), operational readiness reviews (92-6), and training (92-7) should be incorporated, where appropriate, into DOE's plan.

Such advance planning for technical management of ERM contracts would have the following beneficial impacts: (1) Timely identification and commitment of adequate technical resources to manage new contracts and projects; (2) up front identification for DOE technical managers of expectations deriving from DOE responsibilities for protection of health and safety of workers and the public; and (3) assurance that DOE's technical line management and safety oversight organizations are involved early in the contracting process.

In summary, the Board believes that improvement of DOE's capability to provide technical management and oversight of ERMCs across a board front is necessary to ensure adequate protection of the public health and safety. Therefore, the Board recommends that:

1. DOE develop and implement a technical management plan for Fernald and all future ERM contracts. For

Fernald, the technical management plan should be developed and implemented expeditiously. For future ERM contracts, such a plan should be readied prior to contractor selection, and should be implemented at the initiation of contracted services.

2. Each plan for technical management of contracted services include as a minimum:

(a) A clear statement of functions and responsibilities of those in DOE assigned the task of technical direction, monitoring, or oversight of the contracted efforts, both at headquarters and the relevant operations offices;

(b) Definition of the technical and managerial qualifications required of DOE's technical management staff at each level of responsible DOE line and oversight units;

(c) Identification of the principal interfaces with the non-technical DOE personnel involved in the contract management;

(d) Identification, by name, of the key technical personnel selected to perform the requisite technical direction, monitoring, and oversight functions;

(e) Identification of policies, practices, orders, and other key instructions that represent a basic framework to be used in DOE technical management of the contractor in ensuring public and worker safety and adequate environmental protection; and

(f) A detailed program to ensure compliance with applicable statutes and DOE Orders, standards, rules, directives, and other requirements related to public and worker safety and environmental protection.

3. DOE consider the insights gained from addressing recommendations 1 and 2 above for ERM contracts in pursuing the broader initiatives for reforming contract management you recently announced.

To assist DOE in resolving the broader-based safety issues addressed in the previous recommendations, the Board recommends that the following additional actions be taken at Fernald:

4. DOE headquarters complete an independent review of the recent incidents at Fernald, identifying the root causes for those incidents and the corrective actions required to remedy the underlying problems, and translate the Fernald findings into lessons learned applicable to other facilities.

5. DOE establish a clear process with an appropriate set of requirements and clear definitions of the line of authority for approval to start the UNH stabilization project. The set of requirements should identify the type and scope of readiness reviews DOE will require for the start of the UNH

stabilization runs. For the type and scope of the reviews, consideration should be given to the standards set forth in previous Board recommendations on this subject (i.e. 90-4, 91-3, 91-4, 92-1, 92-3, and 92-6) and account for the known safety considerations for this operation. This process should also include identification of the appropriate DOE official(s) responsible for ensuring that public and worker health and safety are adequately protected and for giving final start-up approval.

6. DOE immediately establish a group of technically qualified Facility Representatives at Fernald to monitor the ongoing activities of daily operations at the site. DOE's "Guidelines for Establishing and Maintaining a Facility Representative Program at DOE Nuclear Facilities," issued in March, 1993, may be a useful basis for quickly establishing such a program at Fernald.

John T. Conway,  
Chairman.

Appendix—Transmittal Letter to Secretary of Energy

John T. Conway, Chairman  
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Joseph J. DiNunno  
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Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, NW., Suite 700,  
Washington, DC 20004 (202) 208-6400  
June 16, 1993.

The Honorable Hazel R. O'Leary,  
Secretary of Energy, Washington, DC 20585.

Dear Secretary O'Leary: On June 16, 1993, the Defense Nuclear Facilities Safety Board, in accordance with 42 U.S.C. 2286a(5), unanimously approved Recommendation 93-4 which is enclosed for your consideration. Recommendation 93-4 deals with health and safety factors associated with DOE's management and direction of Environmental Restoration Management Contracts.

42 U.S.C. 228d(a) requires the Board, after receipt by you, to promptly make this recommendation available to the public in the Department of Energy's regional public reading rooms. 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 DOE 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. 93-14894 Filed 6-23-93; 8:45 am]

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containing ferrocyanide compounds and pointed to the need for action in connection with tank 101-SY, which periodically vents flammable mixtures of nitrous oxide and hydrogen gas. In Recommendation 90-7, the Board emphasized the urgent need for more rapid and complete sampling and analysis of tank wastes. The wastes in the Hanford tanks differ markedly from tank to tank. Identification of what specifically is in each tank is essential and urgent. Without timely characterization of the wastes, the nature of the risks associated with the tanks cannot be fully assessed and, where necessary, mitigated. Further, until the characteristics of the wastes are known, final methods for tank waste monitoring, retrieval, transport, and treatment cannot be realistically established.

The Board has repeatedly expressed its dismay at the continued slow rate of conduct of this characterization program and has urged a greater rate of progress. At last count only 22 of the 177 tanks on the site have been sampled. Only four of those sampled were among the 54 tanks on the watch list of tanks that generate the greatest safety concerns. The number of samples per tank continues to be insufficient to provide adequate characterization of the full tank. While the published schedules for sampling and analysis promise improvement, they seem optimistic when viewed against the record to date. They appear to present wishes rather than anticipated activities.

Two sets of problems appear to be principal contributors to the slow pace of characterization of the contents of the tanks. The first is a complex of factors acting to impede access to the interiors of the tanks and extraction of samples of their contents. The second is the exhaustive set of measurements made on each sample, along with limitations on laboratory capability for completing these measurements. The Board notes that measurements made for safety purposes do not necessarily receive priority over those done for other reasons, such as satisfaction of formal EPA-related requirements for final waste disposition.

The Board believes that accelerating the pace of the program of characterizing the contents of Hanford's high level nuclear waste tanks is important to nuclear safety at this important defense site. This view is shared by other experts, including DOE's own "Red Team", which reviewed the waste characterization program for the Hanford Tank Farm

(DOE-EM, July 1992, Independent Technical Review of Hanford Tank Farm Operations). Characterization is essential for ensuring safety in the near term during custodial management and remedial activities, and also in the long term for advancing the development of permanent solutions to the high level waste problems at Hanford.

In addition to the matter of acceleration and reprioritization of the sampling schedules, the Board is also concerned about the sampling effort itself. The Board notes that a recently released DOE/RL audit (DOE-RL/OPA Audit 93-02, April 1993) of the sampling programs revealed significant weaknesses in the control, management, and technical implementation of core sampling, laboratory, and supporting activities.

Because the failure to vigorously pursue tank waste characterization raises important health and safety issues, DOE needs to take action to accelerate and strengthen the management of the characterization effort to ensure adequate protection of public health and safety.

Therefore, the Board recommends that DOE:

1. Undertake a comprehensive reexamination and restructuring of the characterization effort with the objectives of accelerating sampling schedules, strengthening technical management of the effort, and completing safety-related sampling and analysis of watch list tanks within a target period of two years, and the remainder of the tanks by a year later;

- a. In accordance with the above, give priority in the schedule of tanks to be sampled to the watch list tanks and others with identified safety problems, and priority to the chemical analyses providing information important to ensuring safety in the near term during the period of custodial management. Other analyses, required by statutes such as the Resource Conservation and Recovery Act prior to final disposition of the waste, should not be cause for delay of safety-related analyses. In most cases, analyses needed for long-term disposition may be postponed until more pressing safety-related analyses are completed.

- b. Reexamine protocols for gaining access to the tanks for sampling with the objective of simplifying documentation and approval requirements.

- c. Increase the laboratory capacity and activities dedicated to tank sample analysis:

- (i) Expedite efforts to obtain and begin utilizing additional sampling and analytical equipment now being

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

(Recommendation 93-5)

### Hanford Waste Tanks Characterization Studies

AGENCY: Defense Nuclear Facilities Safety Board.

ACTION: Notice; recommendation.

**SUMMARY:** The Defense Nuclear Facilities Safety Board (Board) has made a recommendation to the Secretary of Energy pursuant to 42 U.S.C. 2286a concerning improvements in the waste characterization program for the high level waste storage tanks at the Hanford Site. The Board requests public comments on this recommendation.

**DATES:** Comments, data, views, or arguments concerning this recommendation are due on or before August 27, 1993.

**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.

**FOR FURTHER INFORMATION CONTACT:** Kenneth M. Pusateri or Carole J. Council, at the address above or telephone (202) 208-6400.

Dated: July 21, 1993.

John T. Conway,  
Chairman.

### Hanford Waste Tanks Characterization Studies

Dated: July 19, 1993.

Since its beginning almost four years ago, the Board has assigned one of its highest priorities to assurance of safety at the high level nuclear waste storage tanks at the Hanford Site. The Board addressed two of its sets of recommendations (90-3 and 90-7) to potential hazards associated with tanks

procured, and the training of personnel needed for an enlarged through-put capacity.

(ii) Explore availability and utility of laboratory services on- and off-site, such as Hanford's Fuel Materials and Examination Facility and the INEL and LANL laboratories, for accelerating the waste characterization effort.

2. Integrate the characterization effort into the systems engineering effort for the Tank Waste Remediation System:

a. Schedule tank sampling consistent with engineering and planning for removal, pre-treatment, and vitrification of the tank wastes.

b. Critically examine the list of chemical analyses done on samples to establish the smallest set needed to satisfy safety requirements.

c. Strengthen the management and conduct of the sampling operations.

#### Appendix—Transmittal Letter to Secretary of Energy

July 19, 1993.

The Honorable Hazel R. O'Leary,  
Secretary of Energy, Washington, DC 20585.

Dear Secretary O'Leary: On July 19, 1993, the Defense Nuclear Facilities Safety Board, in accordance with 42 U.S.C. 2286a(5), unanimously approved Recommendation 93-5 which is enclosed for consideration. Recommendation 93-5 deals with Hanford Waste Tanks Characterization Studies.

42 U.S.C. 2286d(a) requires the Board, after receipt by you, to promptly make this recommendation available to the public in the Department of Energy's regional public reading rooms. 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 DOE 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. 93-17940 Filed 7-27-93; 8:45 am]

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capability to conduct critical experiments. We wish now to draw attention to the need to retain access to capability and capture the unique knowledge of individuals who have been engaged for many years in certain critical defense nuclear activities, in order to avoid future safety problems in these and related activities.

The first critical area requiring continued access to departing personnel is the disassembly of nuclear weapons at the Pantex site, an activity that will continue for a number of years. The second is the testing of nuclear explosives at the Nevada Test Site, an activity presently subject to a moratorium. However, the President, in establishing that moratorium, said that he has retained the possibility of later resumption of tests if that is needed, and that he expects the Department of Energy to maintain a capability to resume testing. In reaction to the recent Chinese underground test he has instructed the Department of Energy to take steps necessary to prepare for resumption, pending a decision as to whether further tests at the Nevada Test Site should be conducted.

A substantial amount of documentation exists on the design and safety aspects of nuclear weapons that will have to be dismantled at Pantex. This information is essential for the dismantlement program and is used in that program. Even so, the Board has pointed out that it is also important, for safety reasons, to involve individuals from the design laboratories of Los Alamos, Livermore, and Sandia in review of detailed dismantlement procedures and specialized procedures responding to problems encountered in the course of dismantlement. This practice has been initiated, and it has already been seen to be vital to safety assurance in the dismantlement program.

The design individuals from the laboratories most needed in connection with dismantlement of a specific weapon are those who had been active in the original design of that weapon. They are believed to possess information not recorded in documentation, such as reasons for specific design features, and personal knowledge of any problems that have arisen during design, fabrication, and stockpile life. Many of the remaining individuals with this background are being lost from the system, because of the University of California's recent retirement incentive, planned layoffs by contractors, and DOE downsizing and retirements. Some recent moves to prevent or discourage use of retired individuals as consultants compound

the problem; they erect barriers that could prevent access to the needed expertise.

Similar problems also arise in connection with maintaining capability for testing of nuclear explosives at the Nevada Test Site. On the assumption that the testing moratorium will continue, we foresee an impairment of capability to ensure the safety of tests if national priorities call for resumption of testing at some future time. This impairment will occur both through reduction in competence that naturally follows when a highly skilled operation is not conducted over a long period of time, and through loss of skilled and experienced personnel. The loss of skilled personnel will be especially troubling because there has traditionally been a high degree of dependence on administrative controls for safety in testing of nuclear explosive devices at the Nevada Test Site. Proper exercise of these administrative controls requires considerable background in past methods of test emplacement and test conduct, and extensive institutional memory.

The Board recognizes the Department's efforts to develop a "stockpile stewardship" program focused to ensure the continued safety and reliability of fielded weapons, to ensure maintenance of laboratory development capability, and to ensure a limited production capability. Our areas of concern complement these necessary activities, but are focused instead on ensuring that capability is maintained to conduct testing operations safely if they must be done, and that all future dismantlement activities can be completed safely. Although it may be relatively straightforward to maintain these capabilities in the near term, ensuring their availability 5 to 20 years in the future may be very difficult.

In accordance with the above concerns, the Board makes the following recommendations:

(1) That a formal process be started to identify the skills and knowledge needed to develop or verify safe dismantlement or modification procedures specific to all remaining types of U.S. nuclear weapons (retired, inactive, reserve, and enduring stockpile systems). Included among the skills and knowledge should be the ability to conduct relevant safety analyses.

(2) That a similar formal process be started to identify the skills and knowledge needed to safely conduct nuclear testing operations at the Nevada Test Site, including the processes of assembly/disassembly, on-site transportation, insertion/emplacement, arming and firing, timing and control,

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

[Recommendation 93-6]

**Maintaining Access to Nuclear Weapons Expertise in the Defense Nuclear Facilities Complex**

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

**ACTION:** Notice; recommendation.

**SUMMARY:** The Defense Nuclear Facilities Safety Board (Board) has made a recommendation to the Secretary of Energy pursuant to 42 U.S.C. 2286a dealing with maintaining access to nuclear weapons expertise in the defense nuclear facilities complex. The Board requests public comments on this recommendation.

**DATES:** Comments, data, views, or arguments concerning this recommendation are due on or before January 24, 1994.

**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 Carole J. Morgan, at the address above or telephone (202) 208-6400.

Dated: December 20, 1993.

John T. Conway,  
Chairman.

Dated: December 10, 1993.

The ongoing reduction in size of the stockpile of nuclear weapons and the related changes in the defense nuclear complex have a number of safety-related consequences. The Board has addressed several of its sets of recommendations to such problem areas, including 92-5, which concerned discipline of operations in a changing defense nuclear facilities complex, and 93-2, which stated a continued need for

and post-shot operations. Included among the skills and knowledge should be the ability to conduct relevant safety analyses.

(3) That a practice be instituted of reviewing the personnel losses at the nuclear weapons laboratories and the Nevada Test Site, as well as the losses of key personnel from DOE's own staff engaged in nuclear defense activities, to ascertain which of the skills and knowledge are projected to be lost through departure of personnel.

(4) That DOE and its defense nuclear contractors negotiate the continued availability (through retention, hiring, consulting, etc.) of those personnel scheduled to depart whose skills and knowledge have been determined to be important in accordance with the above.

(5) That programs be initiated to obtain from these expert personnel (and to record) the as yet undocumented anecdotal technical information that would be of value in augmenting the technical knowledge and expertise of successor personnel. This should be done either prior to departure of the retiring personnel or shortly thereafter.

(6) That procedures for safe disassembly of weapons systems be developed while the personnel with system-specific expertise on the original development of the weapons are still available. Likewise, analyses of the possibility of hazard from degradation of remaining nuclear weapons with time should be expedited, while these individuals are available. In addition, the current participation of design laboratory experts in the safety aspects of disassembly of weapons at the Pantex Site should be strengthened.

(7) That a program be developed and instituted for maintaining expertise in operations key to safety of nuclear testing at the Nevada Test Site, to ensure that if testing is resumed at any future time, it can be performed with requisite safety. Possible components are those activities and experiments that would be permitted within limitations of treaties being discussed, for example: Hydronuclear tests, backdrilling for isotopic analysis of residues from old shots, and exercises including steps in preparation for tests, up to actual emplacement.

(8) Given the loss of experienced personnel, that a determination be made as to whether traditional dependence on administrative controls to ensure nuclear explosive safety at the Nevada Test Site would be adequate and appropriate if nuclear testing should be resumed at a later time. It may be found necessary to develop an approach for ensuring nuclear explosive safety in the testing program that is less dependent

on the performance of highly experienced personnel, such as through the use of engineered safeguards similar to those used in fielded weapons as part of the arming and firing, and timing and control systems.

John T. Conway,  
Chairman.

December 10, 1993.

The Honorable Hazel R. O'Leary, Secretary of Energy, Washington, DC 20585

Dear Secretary O'Leary: On December 10, 1993, the Defense Nuclear Facilities Safety Board, in accordance with 42 U.S.C. 2286a(5), unanimously approved Recommendation 93-6 which is enclosed for your consideration. Recommendation 93-6 deals with Maintaining Access to Nuclear Weapons Expertise in the Defense Nuclear Facilities Complex.

42 U.S.C. 2286d(e) requires the Board, after receipt by you, to promptly make this recommendation available to the public in the Department of Energy's regional public reading rooms. 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 DOE 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. 93-31351 Filed 12-22-93; 8:45 am]  
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